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PRINCIPAL INVESTIGATOR: Dr. Bradley Dengler

CONTRACTING ORGANIZATION: Henry M. Jackson Foundation

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14. ABSTRACT

Algorithms for the management of blunt TBI have been published and widely utilized[1, 2, 3],however, no such algorithms for the management of penetrating TBI have ever been published. Hence, this proposal for an international and multidisciplinary effort to generate new evidence and consensus-based clinical practice guidelines has been undertaken in conjunction with the Brain Trauma Foundation in Stanford University which has long been a global leader in clinical practice guideline generation[2] and the Seattle International Brain Injury Consensus Conference (SIBICC) effort[1, 4]. We first convened a steering committee and delineated key topics related to penetrating TBI for evidence-based research on Oct, 2021 and established PICOT (mnemonic derived from clinical research question elements: Patient, Intervention, Comparison, Outcome and Time) lead questions from which to frame a literature search strategy enumerated in our Yr 1 Qtr 1 report. From the initial series of meetings of international multidisciplinary experts using the Delphi method of consensus, a publication titled " Rationale and Methods for Updated Guidelines for the Management of Penetrating TBI" (Hawryluk G et al, 2022)[5] was produced as one of the first deliverables. The subaward agreement between co-investigators from Stanford Univ. and Oregon Health Sciences Univ. (OHSU) was finalized on June 15, 2022 which decided on a Statement A (public) distribution of the resulting recommendations in line with their institutions' research efforts to perform the systematic literature review. The preliminary report of this Literature Review forms the body of this report. This evidence will then form the basis for the best practice guidelines to be eventually disseminated to civilian and military neurosurgical communities.

15. SUBJECT TERMS

Penetrating Traumatic Brain Injury, International Subject Matter Experts, Clinical Practice Guidelines

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1. INTRODUCTION

Guidelines for the management of traumatic brain injury were the first surgical clinical practice guidelines published[3] and their implementation has been credited with an approximate 50% reduction in mortality. The Brain Trauma Foundation's guidelines are respected and compliance with them is mandated for US trauma centers to maintain trauma accreditation. The Brain Trauma Foundation has published adult[3, 6, 8] and pediatric severe TBI[9] management guidelines as well as those related to combat TBI (https://www.braintrauma.org/coma/guidelines), pre-hospital care[10] and prognosis[11]. In most cases these guidelines have been subjected to updates and modernization. The penetrating TBI guidelines, however have not been updated for almost 20 years.

As guideline methodology has evolved, increased rigor has diminished the role of expert opinion in the generation of clinical practice guidelines. It is axiomatic that management algorithms based on expert opinion must inherently bridge published evidence and its limitations with the realities of patient care. As such, modern evidence-based guidelines have excluded consensus-based algorithms because the methodology used to generate them is unique. This has led to a void in the literature leaving non-expert practitioners without guidance and insufficient attention to advances emanating from recent studies.

The proposed effort under this study, "The Development of Best Practice Penetrating TBI Guidelines for Military and Civilian Patients", (Award # W81XWH21C0102), or the pTBI Guidelines Study (short title) will unite key military and civilian resources and investigators with long-standing experience and successful track-records developing and disseminating clinical practice guidelines. The Lead investigators are herein cited: Dr. Ghajar is President of the Brain Trauma Foundation and he has overseen the development of the entire portfolio of guidelines since the organization's inception. Dr. Hawryluk recently co-chaired the recent Seattle International Severe Traumatic Brain Injury Consensus Conference and first-authored the resulting high-impact publication. Dr. Bell is the immediate past Chair of Neurosurgery at Walter Reed and a respected expert in military neurosurgery and endovascular procedures – and in particular management of penetrating and blast TBI. We believe that the combined expertise and experience of this group will ensure the success of the proposed work. The retirement of Dr. Bell from the US military last June 30, 2022 has prompted his designation of Dr. Bradley Dengler (LTC, MC, USA), staff neurosurgeon at WRNMMC as incoming lead investigator to ensure continuity of this collaborative multi-institutional initiative. As a retired civilian, Dr. Bell has rejoined the pTBI Guidelines study as a Co-investigator. The Memoranda of departure and acceptance of both outgoing and incoming PIs have been approved by the DoD and are included in the Annexes section of this report (Annexes B and C). Recognizing the proposal goals as aligned for Program Evaluation through Literature Review, the WRNMMC IRB ruled in April 17, 2021 that the pTBI Guidelines study is Not Research and will not require further IRB supervision with regards Continuing Reviews.

2. KEYWORDS: Penetrating Traumatic Brain Injury, military and civilian patients, Clinical Practice Guidelines,

3. ACCOMPLISHMENTS

A. Creation of a Steering Committee and resulting work products

One of the stated goals of the study was the creation of a steering committee and its first deliverable. This was done by identifying the 21 internationally recognized Subject Matter Experts (SMEs) on Penetrating Traumatic Brain Injury (pTBI) and As stated in our Yr 1 Qtr 1 report, a total of 55 PCOT (nemonic derived from clinical research question elements: Patient, Intervention, Comparison, Outcome and Time) questions were surveyed and resolved among Subject Matter Experts (SMEs) to frame a literature search strategy in a series of

weekend and teleconferencing meetings concluded last October – November, 2021. Surveys taken as to how PCOT lead questions were evaluated and weighted are annexed (Annex D). The topics ranged from prehospital, hospital, critical care, operative, diagnostic and post-hospital issues and opened the path to a systematic review which would form the basis of Clinical Practice Guideline recommendations.

B. Publication

From conference notes and records, the investigators were able to organize provisional material which was publication-worthy. The resulting article "Rationale and Methods for Updated Guidelines for the Management of Penetrating Traumatic Brain Injury" was published in the 2022 issue of the journal *Neurotrauma Reports* as the study's early second deliverable.

C. Finalizing the Standford Univ – Oregon Health Sciences University (OHSU) Subaward Agreement and Preliminary Results of Systematic Literature Review

As the collaborating sites in Stanford University and the Oregon Health Sciences University (OHSU) responsible for the systematic Literature Review finalized their Subaward agreement, last June 15, 2022, OHSU assigned staff proceeded to implement a first pass literature review from searches through all databases outlined in the published methodology.

The OHSU investigators searched Ovid Medline ®, EMBASE, and Cochrane CENTRAL without date limits for reports and studies of any size for evidence on the management of penetrating brain injury. Our searches returned 6,077 citations and abstracts with studies published from 1945 to 2022 (Annex E). We are in the process of abstract and full-text article review of these publications.

The literature includes a large number of case reports, so OHSU designated staff are pulling many more full-text articles than they normally would for a review as typically case reports are not included due to their low quality of evidence. It is anticipated that at full-text level many of these case reports will end up being excluded because they do not provide information on how the pTBI was managed, but reviewers will have to evaluate the full-text to determine that.

4. Impact

The vast majority of severe traumatic brain injury encountered in the civilian sector mechanistically results from closed injury (blunt force, motor vehicle accidents, falls, etc.). The enormously successful guidelines referenced above[6] address this injury pattern, with some translational application to penetrating injury. The penetrating head injury that occurs in civilian settings is associated with an extremely high early mortality (70-90%)9, and therefore meaningful study from this perspective is scarce. Secondary to the longest period of continuous armed conflict in the history of the United States, military surgeons have encountered and cared for a concentration of survivable penetrating brain injury that has resulted in significant advances in the surgical and critical care of these patients. This study and care has resulted in a proportionally higher survival of military service members when compared to historical civilian counterparts[9]. While not unique to the military population, it is an injury pattern that active duty service men and women are subjected to by virtue of what they encounter on the field of battle. This project is an opportunity for military physicians and its system to collaborate with their civilian counterparts in the creation of a guidelines that has direct application to the battlefield setting, and is translatable to the care of civilian patients as well.

5. Changes/Problems

In 2 succeeding Quarterly Reports (Yr 1 Qtr 2 and Yr 1 Qtr 3), we reported on Stanford University's objection to DFAR 252.204-7000- Disclosure of Information, requesting that this clause be removed, but if this Flowdown cannot be deleted, Stanford requests adding the following language under a new section above the list of FARs/DFARs Flowdowns. (see italics)

- "*Contractor's work under this Agreement is Fundamental Research, as confirmed in the attached statement from the Prime Awarding Agency. Fundamental Research means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons, as defined by NSDD 189. Contractor is a University performing fundamental research under this subcontract and, as such, no additional limitations or restrictions should be placed on Contractor's ability to exercise its rights in publications and data first produced in the performance of this Contract. As such, the following clauses are not applicable to Contractor or the work being performed under this Subcontract."*

Further, Stanford Univ. and Oregon Health Sciences University (OHSU) restated their objection in detail:

"Stanford and OHSU's work and any products produced in the course of its fundamental research during this Project are freely distributable. HJF will not provide any restricted information to Stanford of OHSU in the course of this work. Stanford and OHSU's results, data, and processes are approved for public release; there are no restriction on dissemination."

"Stanford needs to confirm that our deliverables under the project are subject to Distribution Statement A – meaning that they are also approved for public release and distribution is unlimited. If HJF does not have Distribution Statement A, due to the clause, Stanford must request written confirmation from the AFRL Contracting Officer regarding which Distribution Statement applies to Stanford and OHSU's scope of work and deliverables. Stanford must have this clearly confirmed up-front that our work will not be subject to a publication restriction, which is why receiving anything other than Distribution Statement A is an issue."

With the resolution of the Distribution issue upon signing of the Subaward Agreement between Stanford U and OHSU, the consistent use of Distribution A in all reports for this study has been adopted.

6. Products

The resulting products from the study efforts so far have been: (1) the establishment of a Steering Committee (one of the study's main a aims and a deliverable) (2) the formulation of PCOT (nemonic derived from clinical research question elements: Patient, Intervention, Comparison, Outcome and Time) lead questions to support the framework of the systematic Literature Review became the 2nd deliverable, (3) the publication, "Rationale and Methods for Updated Guidelines for the Management of Penetrating Traumatic Brain Injury" was published in the 2022 issue of the journal Neurotrauma Reports based on conference notes and papers from the Steering Committee meetings. The published manuscript is the study's early 3rd deliverable.

7. Participants & Other Collaborating Organizations

KEY PERSONNEL

Name	Role	Specialty	Country
Bradley Dengler, M.D.	PI (6/30/22 – present)	Neurosurgeon	USA
Randy Bell, M.D.	PI (9/15/21 – 6/30/22) Co-PI (6/30/22 – present	Neuroendovascular surgeon	USA
Jamshid Ghajar, M.D.	Co-PI (BTF, Stanford Univ.)	Neurosurgeon	USA
Gregory Hawryluk, M.D.	Co-PI (SIBICC, Univ. of Manitoba)	Neurosurgeon	Canada
Shelley Selph, M.D., MPH	AI (OHSU)	Medical Informatics	USA
Anthony Figaji, M.D.	AI	Pediatric Neurosurgeon	South Africa
Jeffrey Rosenfeld, M.D.	AI	Neurosurgeon	Australia
Rocco Armonda, M.D.	AI	Neurosurgeon	USA
Patti Raskin, M.D.	AI	Neurosurgeon	USA
James Ecklund, M.D.	AI	Neurosurgeon	USA
Guy Rosenthal	AI	Neurosurgeon	Israel
Andres Rubiano	AI	Neurosurgeon	Colombia
Ryan Kitigawa	AI	Neurosurgeon	USA
Alan Hoffer	AI	Neurosurgeon	USA
Uzma Samadani	AI	Neurosurgeon	USA
Martina Stippler	AI	Neurosurgeon	USA
David Adelson	AI	Pediatric Neurosurgeon	USA
David Wright, M.D.	AI	Emergency Medicine	USA
Deborah Stein, M.D.	AI	General Surgery	USA
Stacey Shackelford, M.D.	AI	General Surgery	USA

Chris Neal, M.D.	AI	Neurosurgeon	USA

SUPPORTING PERSONNEL

Teodoro Tigno Jr., M.D.	Scientific Coordinator	Scientist II	USA

8. Special Reporting Requirements

(Pls see separate attachment)

9. Appendices

APPENDIX A.

References:

1. Hawryluk GWJ, et al. (2019) A management algorithm for patients with intracranial pressure monitoring: the Seattle International Severe Traumatic Brain Injury Consensus Conference (SIBICC). Intensive Care Med 45: 1783-1794

2. R Bullock 1 , R M Chesnut, G Clifton, J Ghajar, D W Marion, R K Narayan, D W Newell, L H Pitts, M J Rosner, J W Wilberger. Guidelines for the management of severe head injury. Brain Trauma Foundation. *Eur J Emerg Med*, 1996 Jun;3(2):109-27. doi: 10.1097/00063110-199606000-00010

3. The Brain Trauma Foundation. The American Association of Neurological Surgeons. The Joint Section on Neurotrauma and Critical Care. Critical pathway for the treatment of established intracranial hypertension *Journal of Neurotrauma* (2000) 17: 537-538. DOI: 10.1089/neu.2000.17.537

4. Hawryluk GWJ, et al. (2019) A management algorithm for patients with intracranial pressure monitoring: the Seattle International Severe Traumatic Brain Injury Consensus Conference (SIBICC). Intensive Care Med

5. Hawryluk, GWJ; Selph, S; Lumba-Brown, A; Totten, AM; Ghajar, J; Aarabi, B; Ecklund, J; Shackelford, S; Adams, B; Adelson, D; Armonda, RA; Benjamin, J; Boone, D; Brody, D; Dengler, B; Figaji, A; Grant, G; Harris, O; Hoffer, A; Kitigawa, R; Latham, K; Neal, C; Okonkwo, DO; Pannell, D; Rosenfeld, JV; Rosenthal, G; Rubiano, A; Stein, DM; Stippler, M; Talbot, M; Valadka, A; Wright, DW; Davis, S; Bell, R. Rationale and Methods for Updated Guidelines for the Management of Penetrating Traumatic Brain Injury. *Neurotrauma Reports.* Vol 3, No. 1, 21 Jun 2022, https://doi.org/10.1089/neur.2022.0008

6. Brain Trauma F, American Association of Neurological S, Congress of Neurological S, Joint Section on N, Critical Care AC, Carney NA, Ghajar J, (2007) Guidelines for the management of severe traumatic brain injury. Introduction. *Journal of Neurotrauma* 24 Suppl 1: S1-2.

7. Carney N, Totten AM, O'Reilly C, Ullman JS, Hawryluk GW, Bell MJ, Bratton SL, Chesnut R, Harris OA, Kissoon N, Rubiano AM, Shutter L, Tasker RC, Vavilala MS, Wilberger J, Wright DW, Ghajar J, (2017) Guidelines for the Management of Severe Traumatic Brain Injury, Fourth Edition. *Neurosurgery* 80: 6-15

8. Adelson PD, Bratton SL, Carney NA, Chesnut RM, du Coudray HE, Goldstein B, Kochanek PM, Miller HC, Partington MD, Selden NR, Warden CR, Wright DW. American Association for Surgery of Trauma, Child Neurology S, International Society for Pediatric N, International Trauma Critical Care S, Society of Critical Care M, World Federation of Pediatric I, Critical Care Society,(2003)

9. Guidelines for the acute medical management of severe traumatic brain injury in infants, children, and adolescents. Chapter 11. Use of hyperosmolar therapy in the management of severe pediatric traumatic brain injury. Pediatr Crit Care Med 4: S40-44

10. Badjatia N, Carney N, Crocco TJ, Fallat ME, Hennes HM, Jagoda AS, Jernigan S, Letarte PB, Lerner EB, Moriarty TM, Pons PT, Sasser S, Scalea T, Schleien CL, Wright DW, Brain Trauma F, Management BTFCfG, (2008) Guidelines for prehospital management of traumatic brain injury 2nd edition. Prehosp Emerg Care 12 Suppl 1: S1-52

11. (2000) The Brain Trauma Foundation. The American Association of Neurological Surgeons. The Joint Section on Neurotrauma and Critical Care. Age. Journal of Neurotrauma 17: 573-581

12. Larkin B, Graves EKM, Boulter JH, Szuflita NS. MD, Meyer RM, Porambo ME, Delaney JJ, Bell RS. Two-year mortality and functional outcomes in combat-related penetrating brain injury: battlefield through rehabilitation. *Neurosurgery Focus* 45(6): E4, 2018.

APPENDIX B. Memo from Outgoing PI

Walter Reed National
Military Medical Center

March 6, 2022

MEMORANDUM FOR USAMMRA CONTRACTING OFFICER

FROM: Randy S. Bell
CAPT, MC, USN
PI for BA200139:
W81XwH-21-C-0102

SUBJECT: Change of PI for BA200139: W81XwH-21-C-0102

1. I have received orders to proceed to the retirement list effective 01 SEP 2022. The actual date will be 05 JUL 2022. Effective 30 JUN 2022, I am requesting transfer of PI for this project to LTC Bradley Dengler. LTC Dengler is already a subject matter expert working on this project, and is eminently qualified to assume the role of PI. LTC Dengler will assume administrative control of this project. I will retain operational control to help insure the completion of the statement of work.

2. My point of contact will remain (240) 381 – 2528.

Digitally signed by
BELL.RANDY.S.1042554150

BELL.RANDY.S.104255 4150

Date: 2022.03.07
07:55:02 -05'00'

APPENDIX C. Memo of Acceptance, Incoming PI

DEPARTMENT OF THE ARMY
OFFICE OF THE SURGEON GENERAL
7700 ARLINGTON BOULEVARD
FALLS CHURCH, VA 22042-5140

MEMORANDUM FOR USAMMA CONTRACTING OFFICER

SUBJECT: Change of PI for BA200139: W81XWH-21-C-0102

1. I accept to transfer of this award from CAPT Randy S. Bell and will take full responsibility for the award.

2. The current statement of work will be completed as previously described.

3. Point of contact for this memorandum is the undersigned at (610) 223-7261 or Bradley.a.dengler.mil@mail.mil.

DENGLER.BRADLEY.ALLEN.1248894683
Digitally signed by DENGLER.BRADLEY.ALLEN.1248894683
Date: 2022.03.01 14:28:24 -05'00'

BRADLEY A. DENGLER
LTC, MC

APPENDIX D. Evaluation of PCOT Questions

***Color Legend:**

- **Survey of PCOT questions (w consensus > 80%)**
- **Points nearing Consensus (70-79.9%)**
- **Points w/o Consensus (<70%)**

Preliminary Results of First Survey

October 16, 2021

Points of Consensus (>80%) [13]

- **Penetrating head injury can be conceptualized as (1) low velocity missile (2) high velocity missile and (3) non-missile (96.4%)**
- **High velocity missile wounds to the brain can be survivable (100%)**
- salvageability should be assessed early in the course of caring for all penetrating brain injury patients (82.1%)
- GCS score should be considered when determining salvageagility in pTBI (96.4%)
- Patient age should be considered when determining salvageagility in pTBI (92.9%)
- Patient age should be considered when determining salvageagility in pTBI (92.9%)
- A high velocity penetrating missile injury that traverses the thalamus is typically non-survivable (85.7%)
- A high velocity penetrating missile injury that traverses the brainstem is typically non-survivable (92.9%)
- Organ donor services be routinely consulted following a determination that a penetrating TBI is not salvageable?(100%)
- All patients with penetrating brain injury should be screened for traumatic cerebrovascular injury (85.7%)
- Catheter angiography is required to screen for traumatic pseudoaneurysms when a questionable lesion is identified on a CTA. (89.3%)
- Catheter angiography is required to screen for traumatic pseudoaneurysms when metallic fragments cause problematic artifact on a screening CTA. (92.9%)
- A consultant/staff/faculty neurosurgeon must be present when any intracranial foreign body is removed. (92.9%)

Points Nearing Consensus (70-79.9%) [2]

- Catheter angiography is not required in all cases to screen for delayed pseudoaneurysms following pTBI. (75%)
- True or False: All pTBI patients should receive antibiotic prophylaxis following their injury. (75%)

Points Without Consensus (<70%) [10]

- MR imaging is contraindicated in patients with one or more post-traumatic intracranial metallic foreign bodies. (67.9%)
- CT angiography is not sufficiently sensitive for delayed pseudoaneurysm detection and cannot be the sole vascular imaging performed (67.9%)
- The timing following a pTBI when you consider an initial screening examination for delayed pseudoaneurysm formation. (No suggestion of consensus, most popular selection only got 22% of the vote.
- When a delayed pseudoaneurysm is detected a period of observation is acceptable to determine if it may undergo spontaneous resolution. (50%)
- Following a negative screening study for delayed traumatic pseudoaneurysms, it is not mandatory to perform another, additional follow up examination at a later time point. (55.6%)
- Open or endovascular treatment is not mandatory for ALL identified traumatic pseudoaneurysms. (67.9%)
- It is not acceptable to remove a non-missile penetrating intracranial foreign body in an angiogram suite which cannot function as an operating room. (73.1%)
- Proximal vascular control must be secured before removing any non-missile penetrating intracranial foreign body. (66.7% False)
- The presence of an endovascular balloon in a proximal vessel that can be readily inflated is not an acceptable sole form of proximal vascular control when removing a non-missile penetrating intracranial foreign body. (66.7%)

A consultant/staff/faculty neurosurgeon or someone directly under their supervision is the only individual who can remove

Preliminary Results of Second Survey
November 1, 2021

Points of Consensus Survey (>80%) [16]

- Assessing and correcting problems with the ABC's is the initial priority of the first responders in pTBI (96.9%)
- Classification system for pTBI for this guideline will be 1) missile injury, 2) blast fragment injury, 3) low velocity injury (96.9%)
- Traumatic aneurysms (TA) bear high risk of death or additional injury if they rupture (87.5%)
- Open or endovascular surgery required for TA's with size increase over time (87.5%)
- Proximal control in surgery should be considered when there is risk of damaging large proximal vessels (96.8%)
- Proximal vascular control should be considered in surgery with penetrating injury through anterior skull base (80.7%)
- Proximal vascular control should be considered in surgery with penetrating injury through the pterion region (83.9%)
- Proximal vascular control should be considered in surgery with obvious injury to large intracranial vessel (100%)
-Treatment should be more strongly considered for a larger TA than a small one (80.7%)
- pTBI is the preferred abbreviation for penetrating brain injury (87.5%)
- Coil occlusion is an acceptable treatment for a TA (96.8%)
- Prophylactic antibiotics should be administered with penetrating air sinus injury (84.4%)
- Prophylactic antibiotics should be administered with grossly contaminated pTBI (100%)
- MR imaging risks brain damage from heat when ferromagnetic (known or unknown) is present intracranially (84.4%)
- MR imaging risks brain damage from induced motion of an intracranial ferromagnetic (known or unknown) metal foreign body (96.9%)
- Pupillary exam should be considered with determining salvageability/survivability (100%)

Points Nearing Consensus (70-79.9%)

- high quality CTA without metal artifact sufficient to screen for TA's without need for catheter angiogram (75%)
- If TA detected in a delayed fashion, a period of observation is acceptable to determine if spontaneous resolution will occur if treatment expected to cause infarct in eloquent brain (74.2%)

Points Without Consensus (<70%) [

- Neither salvageability (41.9%) nor surviveability (38.1%) nor a distinct and different term (19.6%) were preferred
- No distinct preference on when follow up neurovascular screening exam to be performed with initial normal exam. No additional exam (18.8%), 2nd exam 7-14 days (43.75%), 2nd exam 14-21 days (28.13%), 2nd exam 21-28 days (3.13%), 2nd exam after 30 days (6.25%)
- TA's have similar mortality and rupture risks as true saccular aneurysms (31.3%)
- No consensus based on size for mandatory treatment of TA's (< 2mm- 6.5%; 2-5 mm 19.4%; 5-7 mm 29%; >10 mm 3.2%; There is no size at which treatment of a TA is mandatory)
- MR angiography should be strongly considered in pTBI with non metallic objects (53.3%)
- MR imaging when ferromagnetic objects present intracranially relatively (46.9%) or absolutely (53.1%) contraindicated.
- First meaningful GCS score after pTBI is in the field (31.3%), in the trauma bay (50%), in the neurocritical care unit (18.8%).
- Initial lab coag values should be considered when determining salvageability (62.5%)
- ISS should be considered when determining salvageability (56.3%)

1. (1998). "Posttraumatic risk for seizures related to severity of injury." Annals of internal medicine 128(8): 704.

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2. (2000). "Minerva." British medical journal 321(7256): 308.

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3. (2001). "Prompt intervention lowers seizure risk after traumatic brain injury." Drugs and Therapy Perspectives 17(9): 12-15.

The occurrence of seizures in the first week after traumatic brain injury is a well known phenomenon, and prophylactic administration of anticonvulsants for the initial week after brain injury is considered standard treatment. The incidence of these seizures can have devastating effects on metabolic processes (e.g. glucose utilisation) within the brain. The actual frequency of early post-traumatic seizures may be as high as 20% and may not be detectable except by electroencephalogram (EEG). The main clinical risk factors for seizures are younger age, greater severity of brain injury and subdural haematoma, and penetrating wounds. If seizures are suspected early after the injury, anticonvulsants should be used at dosages achieving plasma concentrations approaching the higher end of the therapeutic range (see Patient care guidelines). Continuous EEG monitoring may also be warranted. The prompt treatment of status epilepticus, first with high doses of benzodiazepines and then with anticonvulsants, is very important in determining a good outcome after brain trauma. The development of chronic epilepsy is more common with more severe injuries (e.g. brain contusion) and may influence the decision to continue prophylactic anticonvulsants.

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4. (2005). "Clinical Trial of New Elastomer for Maxillofacial Prosthetics." Multicenter Trial of CPE for Maxillofacial Prosthetics.

Maxillofacial prosthetics is a subspecialty of prosthodontics, providing the clinical rehabilitation treatment of patients who have lost parts of the face due to cancer, trauma, or birth defects. It is an orphan field that:, - treats few patients, making the subspecialty unprofitable for manufacturers to develop new materials;, - offers fundamental rehabilitation and improvement in the quality of life to patients who may have exhausted personal or third party funding; and, - provides a dental solution to an essentially medical problem., Silicone rubber materials have been used for facial rehabilitation for more than 4 decades with few improvements. There is a clear need for new, alternative, and more economic materials for extraoral maxillofacial prostheses. Research at Gulf South Research Institute in New Orleans by the Principal Investigator and others in the 1970s and 1980s developed an alternative low-cost thermoplastic industrial rubber material (chlorinated polyethylene, CPE) that met all toxicological (safety) and physical (effectiveness) requirements. A Phase 2 clinical trial at the time yielded equivocal results when compared to conventional but costly silicone rubber products., This research is a controlled, randomized, single-crossover, double-blinded investigator-initiated multicenter Phase 3 clinical trial treating 100 patients that evaluates:, - experimental thermoplastic CPE; and, - control silicone (Silastic Adhesive A/MDX4-4210) materials for non-inferiority of CPE based on functional and subjective characteristics, and on the quality of life., The clinical centers of the trial are at M.D. Anderson Cancer Center in Houston, Texas, and at the Toronto Sunnybrook Regional Cancer Centre in Toronto, Canada.

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5. (2006). "Internet-Based Treatment for Children With Traumatic Brain Injuries & Their Families: Counselor Assisted Problem Solving." Improving Mental Health Outcomes of Child Brain Injury.

A traumatic brain injury (TBI) is caused by a strong blow, jolt, or penetration to the head that disrupts normal brain functioning. A TBI can range from a mild concussion to severe brain damage. Falls, assaults, and motor vehicle accidents account for more than 50% of TBIs. Physical symptoms of a TBI can be subtle to severe and can include nausea, memory loss, mood swings, blurred vision, and light-headedness. This type of injury can be very stressful for families and can result in feelings of anxiety, burden, and depression among family members. A child who experiences a TBI will often display new social and behavioral problems, leading to further parental distress and increased family dysfunction. Recent studies have shown that problem-solving interventions can reduce caregiver distress and improve child adjustment following a TBI. However, access to skilled therapists and specialized care for this kind of psychosocial treatment is often limited in many communities. In such communities, the Internet offers a new way to meet the mental and other health needs of individuals with TBIs. This study will evaluate the effectiveness of an Internet-based psychosocial treatment in improving problem solving, communication skills, stress management strategies, and coping among teens who have had a TBI and their families., Families participating in this study will be randomly assigned to either an Internet-based counselor-assisted problem-solving (CAPS) group or an Internet resource comparison group (IRC). Participants assigned to CAPS will work with a trained counselor who will guide them through a 6-month structured online problem-solving and skill-building program via one-on-one videoconference sessions. Families assigned to IRC will receive computers, high speed Internet access, and links to brain injury information and resources, but no access to the CAPS Web site content. The effectiveness of CAPS will be assessed after treatment and at 6- and 12-month follow-up evaluations.

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6. (2007). "XIII. Antiseizure prophylaxis." Journal of neurotrauma 24(SUPPL. 1): S-83-S-86.

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7. (2008). "Recombinant Human Growth Hormone During Rehabilitation From Traumatic Brain Injury." A Phase II, Randomized Controlled Trial of Recombinant Human Growth Hormone During Rehabilitation From Traumatic Brain Injury.

1. Patient selection and enrollment. Participants will be recruited into the study from subjects admitted for acute inpatient rehabilitation in the North Texas Traumatic Brain Injury Model Systems (NT-TBIMS) affiliated rehabilitation units. Our goal is to enroll participants who have the potential for neuroregeneration, but who suffered a sufficiently severe injury that the chance of full recovery (to normal pre-injury function) is low. Over a 4 year enrollment period, we plan to randomize 168 subjects into the study (with the anticipation that 71 will complete each arm of the trial)., Inclusion Criteria, 1. Non-penetrating TBI, 2. Age 18 - 50 years., 3. Admission to a North Texas Traumatic Brain Injury Model System-affiliated rehabilitation unit within 8 weeks of injury. Enrollment in TBI-MS database not required., 4. Randomization within 2 - 10 weeks of injury., 5. Rancho Los Amigos Rating IV or better at the time of randomization. Should not be at Rancho IV level for more than 4 weeks before randomization., 5. GH deficiency diagnosed by either of the following two criteria:, 1. . Peak GH response to L-arginine stimulation test < 1.4 microg/L; or, 2. . Plasma IGF-1 level 1 SD below the expected median for age and body weight. 6. Availability of caregiver to oversee administration of medications. 7. Reasonable expectation for completion of outcome measures 8. Residence inside the United States., Exclusion Criteria:, 1. History of pre-existing neurologic disease (such as epilepsy, brain tumors, meningitis, cerebral palsy, encephalitis, brain abscesses, vascular malformations, cerebrovascular disease, Alzheimer's disease, multiple sclerosis, or HIV-encephalitis), 2. History of premorbid disabling condition that interfere with outcome assessments, 3. Contraindication to rhGH therapy. (hypersensitivity to rhGH or any of the components of the supplied product, including metacresol, glycerin, or benzyl alcohol), 4. Penetrating traumatic brain injury, 5. Diabetes mellitus., 6. Obesity (BMI > 30)., 7. Active infection., 8. Active malignant disease., 9. Acute critical illness, heart failure, or acute respiratory failure, 10. Previous hospitalization for TBI > 1 day, 11. Membership in a vulnerable population (prisoner), 12. Pregnancy. Women of childbearing age will be given a pregnancy test during screening to exclude pregnancy., 13. Lactating females, We will measure baseline IGF-1 as

well as carry out L-arginine GH stimulation tests prior to entry into the study, and measure IGF-1 levels again at completion of the treatment phase., 2. Treatment. After obtaining informed consent, we will measure IGF-1 levels as well as perform dynamic GH testing. Eligible patients will be randomization in a double-blind fashion to (Group 1) rhGH subcutaneously or (Group 2) placebo. The GH treatment arm will receive a starting dose of 400 microg/day, with increases (or decreases) in dose by 100-200 microg/day each month, monitoring for side effects, until goal IGF-1 (in the upper quartile of the range for age and body weight) is reached up to maximum dose of 1,000 microg/day. Dose adjustments may be modified by the investigators for participants receiving oral estrogens or other circumstances know to influence GH dosing or atypical responses to treatment. Doses for participants receiving placebo will also be adjusted monthly to maintain the blinding., The treatment will be overseen by a board certified endocrinologist (Dr. Auchus), according to practice guidelines recently released by the Endocrine Society "Clinical Guidelines for Evaluation and Treatment of Adult Growth Hormone Deficiency". The principle is that therapy is started at a relatively low dose and increased monthly, adjusting for the occurrence of adverse effects. In this study, to accommodate both GH-deficient and GH-sufficient strata, the treatment goal is serum IGF-1 as close as possible to the upper limit for the age-adjusted reference range without exceeding this normal range., The objective of randomization is to produce study group comparable with respect to known and unknown risk factors, to remove investigator bias in the recruitment and allocation of participants and to guarantee that statistical tests have valid significance levels. To balance factors that may influence treatment outcome, randomization will be stratified and blocked, by two factors:, 1. Age (< 35 years vs. > 35 years), 2. Severity of injury (duration of post-traumatic amnesia < 20 days vs. > 20 days). Each combination of factors forms a stratum and randomization is allocated within each stratum. GH Stimulation Test: After obtaining informed consent, an 18 - 20 g IV catheter is placed in a forearm vein. 5 ml of blood is sampled at baseline, and afterwards L-arginine is infused over 30 minutes (in 100 mL NS, dose 0.5 g/kg up to a maximum of 30 g). Blood is sampled at 30, 60, and 90 minutes after starting the infusion of the L-arginine. All blood samples are centrifuged and serum frozen at -20oC within 15 minutes of collection. All serum specimens are assayed for glucose and GH. Growth Hormone deficiency is defined as a peak response to arginine infusion < 1.4 ng/mL. Growth Hormone insufficiency is defined as peak GH response < For IGF-1 levels, we will use the age and gender normative data based on 3,961 healthy subjects., 3. Safety Assessments. Safety will be assessed by clinical evaluations at 1, 2, 3, and 4.5 months after initiating therapy. At these evaluations participants and their caregivers will be asked about possible adverse effects of GH treatment, including fluid retention, paresthesias, joint stiffness, peripheral edema, arthralgias, and myalgias. Additionally, blood will be obtained for assessment of glucose, free T4, lipid profile, and insulin level. The dose of GH (or placebo) will be adjusted by the study physician depending on the occurrence and severity of adverse effects., 4. Outcome Measures. Table 3 summarizes the functional and neuropsychologic tests we will use to assess outcome in our study. This battery of measures was developed by the NCMRR TBI Clinical Trials Network to maximize power in TBI clinical trials compared to a single measure alone. These measures are designed to capture a broad perspective of functional and cognitive parameters that are important following TBI, and utilizes scales that have a long history in TBI research. Further, there is convincing evidence that they can be reliably administered 6 - 12 month after injury., 5. Biochemical tests. Plasma GH and IGF-1 levels will be measured by the Clinical Contracts Research Laboratories at UT Southwestern Medical Center (CLIA ID No. 45D0659587), using commercially-available immunoassays. This laboratory will also carry out the safety lab assessments (glucose, insulin, free T4, lipid profile. Results will be available within 1 week to allow randomization within the time window, and to allow dose adjustments in a timely fashion., 6. Statistical Analysis and Sample size calculation. This is a Phase II study, designed to assess feasibility and obtain information about dosing efficacy and magnitude of effect. There are two features of the study design that are relatively novel to TBI clinical trials, which merit some introduction. The first is the use of a futility (non-inferiority) design, and the second is the use of a composite outcome statistic., The goal of Phase II studies is to provide information about side effects and toxicities in the type of patients for whom the treatment is intended, determine the logistics of administration, provide estimates of treatment costs, and obtain some information about expected effect size. For reasons discussed above,

we believe that such information is not yet available regarding the use rhGH in the early phase after TBI, and that a Phase II study designed to obtain this information is warranted. Drugs that remain promising after Phase II studies generally proceed to Phase III clinical trials, which typica ly require many hundreds of patients and are usually conducted at multiple centers and at great expense., Futility design trials were pioneered in cancer chemotherapy studies, and have recently been used in Phase II clinical trials of neurological disorders such as Parkinson's disease and stroke. A traditionally designed study focuses on efficacy, with a null hypothesis that the treatment arms are equivalent. In such studies, the assumption is that a false positive result is riskier than a false negative result (that it is riskier to falsely assume than an ineffective therapy works than it is to discard a potentially effective treatment). In such studies, it is customary to set alpha at 0.05 (the likelihood of a false positive result less than 5%), and beta at 0.2 (the likelihood of a false negative result--that a beneficial effect will be missed is less than 20%). A futility design incorporates the view that in the early phases of clinical development of a new therapy, it is in fact riskier to discard a potentially useful treatment than it is to fail to definitively identify efficacy, since that can only be done in a phase III study. Thus, in a phase II futility study the null hypothesis is that treatment has promise and will therefore produce results exceeding a meaningful threshold. Thus, alpha of 0.1 (as set in our study) in a futility study means that the chance of beneficial effect being missed is less than 10%. In a futility design, if the efficacy threshold is not met, the null hypothesis is rejected and further study of the treatment is considered futile42. Thus, for the primary hypothesis, the design of our study is that of a futility (non-superiority) study, powered to not reject a potentially useful therapy, rather than prove efficacy., The second relatively novel feature of our study is the use of a composite outcome statistic. A composite outcome statistic takes into account the fact that in a complex disorder such as TBI, there are multiple domains of dysfunction, and a single scale (such as the GOS-E or a given neuropsychometric test) may not be optimally sensitive to identify functionally important deficits in all patients. There are several mathematical approaches to the need to compare two groups with respect to more than one outcome. The options available include using Bonferroni or other adjustments for multiple comparisons, reducing the dimensions of the problem by averaging the outcomes, or applying a global test based on a multiple correlated binary outcomes43,44. Of these, the latter approach has been found to be useful in a variety of clinical settings. Incorporating several different measures, which although correlated measure different domains of dysfunction after TBI, significantly lowers the sample size required. We have elected to use a composite outcome statistic developed by the NIH TBI Clinical Trials Network, which will be used in the Citocholine Brain Injury Treatment (COBRIT) study. This measure was developed by a subcommittee of the NIH network that included clinicians, neuropsychologists, and biostatisticians, including Dr. Diaz-Arrastia and Dr. Sureyya Dikmen (who will serve in the DSMB for this trial). In our study, the use of a composite statistic lowers the sample size from 228 to 164., All participants in the GH treatment arm may not achieve goal serum IGF-1 values in the first month, yet data will be analyzed in an intention-to-treat manner., Primary Hypothesis:, 1. . Treatment with recombinant human Growth Hormone (rhGH) in the subacute period after TBI results in improved functional outcome 6 months after injury, as measured by the Composite Outcome Score of the TBI Clinical Trials Network . Secondary Hypotheses:, 2. . Treatment with rhGH results in increased IGF-1 levels., 3. . rhGH treatment results in improved bone mineral density and lean body mass 6 months after injury., 4. . Benefits of rhGH treatment persist up to 1 year after injury, 5. . Low GH response to L-arginine stimulation at baseline is associated with poor functional outcome., 6. . Low IG -1 levels at baseline are associated with poor functional outcomes., 7. . rhGH treatment is more effective in patients who have low IGF-1 levels at baseline., 8. . rhGH treatment is more effective in patients who have low GH response to L-Arginine stimulation at baseline.

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8. (2009). "Investigating the effect of Boswellia Serrata, a kind of herbal remedy on cognitive impairments following closed head injuries." Investigating the effect of Boswellia Serrata supplementation on cognitive rehabilitation following diffuse axonal injuries.

INTERVENTION: Boswellia Serrata medical compound (400 mgr, three times daily, per oral, for 6 weeks Intervention 1: Boswellia Serrata medical compound (400 mgr, three times daily, per oral,

for 6 weeks. Intervention 2: Placebo(TDS,PO). Placebo Placebo(TDS,PO) Treatment - Drugs, CONDITION: Diffuse axonal Injury. ; Traumatic compression of brain NOS Traumatic compression of brain NOS, PRIMARY OUTCOME: Disability Rating Scale score. Timepoint: 2, 6 and 12 weeks after admission. Method of measurement: Physical exam and history. Glasgow Coma Scale score. Timepoint: First day of admission, and 2, 6, and 12 weeks later. Method of measurement: Physical exam. Glasgow Outcome Scale Extended score. Timepoint: 2, 6 and 12 weeks after admission. Method of measurement: physical exam and history. Mini-Mental State Examination score. Timepoint: 2, 6 and 12 weeks after admission. Method of measurement: Physical exam and history., SECONDARY OUTCOME: Coma duration. Timepoint: from admission until Glasgow Outcome Scale score overgoes 9. Method of measurement: physical exam. Duration of admission. Timepoint: Number of days from admission to discharge. Method of measurement: follow up., INCLUSION CRITERIA: INCLUSION CRITERIA: age 15 – 55 years old, stable Vital signs, Glasgow Coma Scale score of 12 or less within the first 24 hours of injury, Post traumatic amnesia of at least 24 hours, loss of consciousness immediately after motor vehicle crash, subjects with no known life-threatening or unstable dangerous disease before head injury, ability to receive medication orally or by nasogastric tube, no active severe infection, Exclusion criteria: pregnancy breast feeding, Multiple traumas that may impair the accuracy of results, penetrating head injury, receiving chronic asthmatic, anticancer, antifungal, anti-inflammatory pain relievers, immunomodulators, or sedatives, Prior significant TBI, brain tumor, cerebral vascular event, other stable brain insults, Prior history or familial history of any severe allergic or atopic disease, The presence of any severe or progressive lesion such as intracranial hematoma that would lead to open cranial surgery after injury, Any ac

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9. (2009). "A Randomized, Double blind, Placebo-Controlled Dose Escalation Study to Investigate the Safety and Pharmacokinetics after Single and Multiple Doses of SLV334 in Sequential Cohorts of Patients with Moderate and Severe Traumatic Brain Injury. Estudio con escalada de dosis, aleatorizado, doble ciego, controlado con placebo que investiga la seguridad y farmacocinetica tras dosis unicas y multiples de SLV334 en cohortes secuenciales de pacientes que sufren traumatismo cerebral moderado y severo."

INTERVENTION: Product Name: SLV334 Product Code: SLV334 Pharmaceutical Form: Solution for infusion CAS Number: 182821-33-6 Current Sponsor code: SLV334 Other descriptive name: {(3S)-3-[({1-[(2R)-2-carboxy-4-(1-naphthyl)butyl] cyclopentyl}carbonyl)amino]-2oxo-2,3,4,5-tetrahydr Concentration unit: mg/ml milligram(s)/millilitre Concentration type: equal Concentration number: 25- Pharmaceutical form of the placebo: Solution for infusion Route of administration of the placebo: Intravenous use, CONDITION: Moderate and severe Traumatic Brain Injury (TBI), Traumatismo cerebral moderado y severo. ; MedDRA version: 9.1, Level: PT, Classification code 10060690, Term: Traumatic brain injury, PRIMARY OUTCOME: Main Objective: The aim of the study is to determine the safety and tolerability of SLV334 after a single intravenous (i.v.) dose of 1000 mg SLV334 and after multiple i.v. doses of 1000 mg SLV334 and 2000 mg SLV334 (up to 3 days, b.i.d.) compared to placebo in patients with moderate and severe Traumatic Brain Injury (TBI). Primary end point(s): Safety: ; The primary outcome measure will be the safety of SLV334 including mortality, adverse events (AE), serious adverse events (SAE), vitals signs, laboratory variables and ECG; ; Pharmacokinetics:; In cohorts 1-3, pharmacokinetics measurements of SLV334 plasma levels will be measured at 6 time-points up to 24 hours after start of the first infusion. In cohort 4, plasma levels of SLV334 will be measured at 12 time-points up to 24 hours after the first dose of Day 3.; ; Pharmacodynamics:; - Biomarkers for Endothelin Converting Enzyme (ECE) and Neutral Endopeptidase (NEP): ET-1, Big-ET-1, BNP, ANP and cGMP.; - Biomarkers for apoptosis and necrosis (alpha II-spectrin breakdown products, UCH-L1 and BA252). Secondary Objective: -To determine the pharmacokinetics of SLV334 after a single dose of 1000 mg; SLV334 and after multiple doses of 1000 mg SLV334 and 2000 mg SLV334 (up to 3 days, b.i.d.) in subjects with moderate and severe TBI.; - To assess the effect of SLV334 on clinical assessments such as intracranial pressure (ICP), cerebral perfusion pressure (CPP) and therapy intensity level (TIL).; - To assess in a sub-sample of subjects

(those with a ventricular catheter or microdialysis), SLV334 levels in the cerebrospinal fluid (CSF) and/or microdialysis compared to systemic levels.; - To assess in a sub-sample of subjects (as previously), the influence of single and multiple doses of i.v. SLV334 on neurohormone activities/conc.s related to the mode of action (neutral endopeptidase [NEP] and endothelin converting enzyme [ECE] and markers for apoptosis, necrosis and neural damage in the cerebrospinal fluid (CSF) and/or microdialysis compared to placebo and compared to systemic (plasma) levels., INCLUSION CRITERIA: 1. Male or female subjects, age between 16 and 70 years, inclusive [the lower age limit will be 18 if required by local regulations]; 2. TBI diagnosed by history, clinical examination with Glasgow Coma Scale (GCS) of 12 or less; 3. Evidence of TBI confirmed by abnormalities on Computed Tomography (CT) scan; 4. Clinical indication to monitor ICP; 5. Randomization and drug treatment with study drug possible within 8 hours after closed [non-penetrating] head trauma; 6. Informed Consent is given. Are the trial subjects under 18? yes Number of subjects for this age range: F.1.2 Adults (18-64 years) yes F.1.2.1 Number of subjects for this age range F.1.3 Elderly (>=65 years) yes F.1.3.1 Number of subjects for this age range

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10. (2009). "Safety and Tolerability of Oxycyte in Patients With Traumatic Brain Injury (TBI)." A Randomized, Placebo Controlled, Double-Blind, Single Dose, Dose Escalation Study to Evaluate the Safety and Tolerability of Oxycyte in Patients With Severe Non-Penetrating Traumatic Brain Injury.

This is a randomized, placebo controlled, double-blind, single dose, dose-escalation study to evaluate the safety and tolerability of Oxycyte in patients with severe non-penetrating Traumatic Brain Injury administered in conjunction with 50% to 80% oxygen and standard of care treatment., At each dose level, patients receiving Oxycyte will be compared to a control group of patients who will receive Normal Saline (NS); all patients will receive 50% oxygen or greater, if per standard of care for a particular patient based on his / her condition, up to a maximum of 80%., Ischemic brain damage is found in 80% of patients who die from severe head injury and studies have shown that early, transient cerebral hypoperfusion of unknown origin is present in about 40% of these patients. In several early research studies, it is documented that about one-third of severe head injured patients have reduced brain oxygen tension (<25 mm Hg) especially during the first 6 to 12 hours following severe head injury. In this group of patients with low brain oxygen, the clinical prognosis is poor with death being a frequent outcome., Based on a belief that increased brain oxygen levels would prove beneficial in the TBI patient, it is theorized that perfluorocarbon-enhanced oxygen delivery may provide the same or greater benefit. PFCs are especially attractive in this setting for several reasons; first, because they transport oxygen without the need for erythrocytes and hemoglobin and can thus perfuse and oxygenate "peri-contusional" brain tissue in which it has been shown that capillaries are so narrowed as to impede red blood cell (RBC) transport; secondly, perfluorocarbon (PFCs) actually increase oxygen transport and oxygen tension in the tissues, which cannot be achieved with normobaric hyperoxia alone.

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11. (2010). Rechtsmedizin 20(4).

The proceedings contain 302 papers. The topics discussed include: sleepless in Zurich - prevalence of benzodiazepines and z-drugs in routine hair samples; screening and quantitation of 9 synthetic CB1 receptor agonists in serum by LC-MS/MS; cardiopulmonary resuscitation related changes in post mortem magnetic resonance and computed tomography; application of the 3ds max computer software in forensic reconstruction of bone fractures - presentation of cases; micro-CT analysis of gunshot wounds for estimating the firing range; numerical description of x-ray fronto-orbiculo-maxillary shape in image analysis as a high distinctive tool for development of the system of identification of persons and human remains; signs of starvation - reconstruction of nutritional life histories by isotopic analyses of hair; vitreous chemistry - methodological and interpretational considerations; circadian biomarkers for estimating trace deposition time; and wound pattern simulation - augmented reality in mobile learning applications as part of hands-on training for medical students at Hanover Medical School.

12. (2011). "Treadmill Training at Constant or Different Speeds for People With Traumatic Brain Injury." Effect of Time Varying Walking Velocity in Body-Weight Supported Treadmill Training.

Objectives: To test the effectiveness of using time varying walking velocity in Body-Weight Supported Treadmill Training (BWSTT) as compared to using constant velocity in subjects with Traumatic Brain Injury (TBI). We hypothesize that using time varying velocity will result in a greater improvement in ambulatory function., Study Population: 30 adult subjects with a clinical diagnosis of non-penetrating TBI and with functional deficits in gait will be enrolled. Subjects will be recruited from NIH, affiliated hospitals/clinics, and in the community., Design: This pilot study will use an instrumented treadmill (Bertec Co., Columbus, Ohio) and a force controlled harness system called ZeroG (Aretech LLC, Ashburn, Virginia). Subjects will be randomly assigned to one of two groups (12 subjects per group): the first group will receive BWSTT at a constant velocity (also known as standard treadmill training); and the second group will receive BWSTT at randomized time varying velocity. BWSTT at time varying velocity consists of two components: 1) subjects passively adjusting their walking speed to the continuously changing speed of the treadmill; and 2) subjects actively changing their walking speed by following the instructed walking speed displayed on a monitor screen while the treadmill is automatically adjusted to the subjects speed. Each group will receive 8 gait training sessions (30 minutes per session, twice per week) for four weeks. Gait performance will be tested before (pre-test) and after (post-test) the 8 session gait training program., Outcome Measures: The primary outcome measures are parameters representing gait performance: maximum walking speed, self-selected walking speed, cadence, stride length, percentage of swing, stance and double stance periods, gait symmetry, Time Up and Go (TUG), and Dynamic Gait Index (DGI) scores. The secondary outcome measure is physical and cognitive effort exerted during the training session as evaluated by grip-strength test and LNS (Letter-Number Sequencing) test.

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13. (2012). "Corticosteroids." Pediatric Critical Care Medicine 13(1 SUPPL.): S61-S63.

The recommendation regarding steroid administration to treat severe TBI in pediatrics is based on two reports of one class II trial, which indicates that steroid treatment is not associated with improved functional outcome, decreased mortality, or reduced ICP. Significant suppression of endogenous cortisol levels was documented with dexamethasone treatment and trends toward increased incidence of pneumonia were observed. Given the lack of evidence for benefit in children and the potential for harm from infectious complications and known suppression of the pituitary adrenal axis, the routine use of steroids to treat children with severe TBI to lower ICP or improve functional outcomes or mortality is not recommended.

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14. (2012). "The effect of Erythropoietin Alfa in traumatic brain injury." Comparison of the effect of Erythropoietin alfa and Placebo on Glasgow Coma Scale Score and Glasgow Outcome Score of the patients with moderate to severe traumatic brain injury.

INTERVENTION: Control group will recieve 2cc of intravenous normal saline in a single dose Intervention 1: Intervention arms patients will receive 400 IU/Kg Erythropoietin Alfa, intravenously, in a single dose. Intervention 2: Control group will recieve 2cc of intravenous normal saline in a single dose. Intervention arms patients will receive 400 IU/Kg Erythropoietin Alfa, intravenously, in a single dose Placebo Treatment - Drugs, CONDITION: External causes of morbidity and mortality Traumatic Brain Injury. ; External causes of morbidity and mortality V01-Y98, PRIMARY OUTCOME: GCS score. Timepoint: Admission time, 24 hourse. 7 days. Method of measurement: Clinical assessment (Physical examination)., SECONDARY OUTCOME: Decrease in hospital stay. Timepoint: Day of discharge. Method of measurement: days. Glasgow Outcome Scale Score. Timepoint: 6th mounth. Method of measurement: Clinical assessment (Physical examination)., INCLUSION CRITERIA: Inclusion and exclusion Criteria were as follows: Patients with blunt head trauma; GCS equal or less

than 13 in admission time; patient admitted in hospital less than 8 hours after trauma, Exclusion Criteria: Patient’s GCS above 13 in admission time; patients with GCS=3 and pupils without reaction to light in admission time; penetrating head injury; O2-Sat bellow 90% in admission time; admission after 8 hours of injury; any critical injury in any part of the body except for head; patient with history of CPR before the intervention; any kind of severe pre-existing systemic co-morbidity; history of hypersensitivity to any injected drug; any patients with drug history of anticoagulant therapy; age under 4 years or above 70 years

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15. (2012). "Rivastigmine Patch in Veterans With Cognitive Impairment Following TBI." Rivastigmine Patch in Veterans With Cognitive Impairment Following TBI.

Traumatic brain injury (TBI) represents one of the most significant health risks related to military duty; rapidly becoming the "signature injury" of the Iraq and Afghanistan conflicts. TBI patients often experience multiple cognitive problems, with disturbances in memory, attention, and executive functions among the most common. Disturbances in memory as well as attention are particularly problematic, as disruption of these relatively basic cognitive functions may exacerbate or cause additional disturbances in executive function, communication and other more complex cognitive domains. These cognitive deficits, especially when memory is affected, significantly impact day-to-day functioning and are the source of lingering disability and distress to the affected individuals. However, despite advances made in TBI care, treatment of cognitive deficits in TBI lag behind, forcing clinicians to provide treatment without the guidance of evidence-based scientific data. This proposal aims to begin the process of providing clinicians with evidence-based guidelines for pharmacological management of Veterans with TBI suffering from persistent cognitive deficits following their injuries. This aim will be accomplished by conducting a clinical trial in Veterans suffering from moderate to severe posttraumatic memory impairment following TBI. Specifically, this proposal will evaluate the efficacy and safety of rivastigmine transdermal patch, an intermediate-acting cholinesterase inhibitor, in this population., The investigators hypothesize that rivastigmine transdermal patch will be more effective than, and equally safe as, placebo in the treatment of moderate to severe posttraumatic memory impairment in Veterans with TBI when tested in a randomized, multi-site, parallel design, placebo-controlled trial, at a 12-week endpoint. The exploratory hypothesis states that compared to placebo, rivastigmine patch will be more effective and equally safe in the treatment of patients who will continue in a randomized, placebo-controlled phase for a total of 26 weeks. To test these hypotheses we will evaluate the effect and the safety of rivastigmine 9.5 mg/24 hours (10cm2) transdermal patch in 138 Veterans who meet or exceed the criteria for closed, non-penetrating, mild TBI and who present at baseline with moderate to severe memory impairment. Memory impairment will be defined as a Total Recall index (Trials 1-3) of the Hopkins Verbal Learning Test-Revised (HVLT-R) that is at least 25% lower than the intelligence-adjusted expected score, as assessed by the Wechsler Adult Intelligence Scale - Fourth Edition (WAIS-IV) Information and Vocabulary subtests. The study consists of a screening period, one-week single-blind, placebo run-in phase, and a 12-week double-blind acute treatment phase (Phase I). Subjects will be randomized 1:1 to rivastigmine transdermal patch 9.5mg/24 hours (10cm2) or matching placebo. During Phase I, there will be an initial 4-week titration period followed by an 8-week continuation phase. Following the 12-week acute treatment phase, randomized patients will continue in the double-blind phase (Phase II) for additional 14 weeks or until study treatment period ends. Recruitment stage ended 2.25.16. Efficacy will be determined by comparing the proportion of patients in each treatment group who are classified as responders at week 12. Secondary measure of functional capacity assessing the impact of memory improvement on real-world functioning, other measures of cognitive domains affected in TBI, namely attention, working and episodic memory and executive functions, as well as measures of mood and quality of life will be examined. Study findings will contribute to the body of evidence needed to establish standards of care for Veterans with posttraumatic memory impairment and other cognitive deficits.

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16. (2012). "Scientific and Educational Abstracts Presented at the ASER 2012 Annual Scientific Meeting and Postgraduate Course." Emergency radiology 19(5).

The proceedings contain 95 papers. The topics discussed include: evaluation of radiation dose among patients admitted through a university hospital emergency department; enhancing patient safety by improving communication between the departments of radiology and emergency medicine; implicating 'infiltrate': what does infiltrate mean and how does its use in chest radiograph reports impact patient management?; evaluation of a CT urography dual phase protocol for patients presenting to the emergency department with flank pain; community acquired pneumonia pathway (CAPP): electronic communication and notification among ed patients with suspected pneumonia; craniocerebral gunshot wounds: a current analysis armed with new technology; stress-induced injury of the cuboid in adults; and MR evaluation of craniocervical dissociation: determination of the additive value of MRI and potential diagnostic criteria.

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17. (2013). "The Effect of Cyclosporine on Head Trauma." The effect of cyclosporine-A on neuro-recovery of diffuse axonal injury in comparison with placebo.

INTERVENTION: Cyclosporine-A, vial solution, 5mg/kg in 250 mili liter dextrose water 5% solution(DW5%) during the first 24hour of admission, one dose is administrated in all periods of the study. Intervention 1: Cyclosporine-A, vial solution, 5mg/kg in 250 mili liter dextrose water 5% solution(DW5%) during the first 24hour of admission, one dose is administrated in all periods of the study. Intervention 2: Intravenous, slow infusion of 250 mili liter of dextrose water 5% solution(DW5%) during the first 24hour of admission, that this solution is administrated one time in all periods of the study. Intravenous, slow infusion of 250 mili liter of dextrose water 5% solution(DW5%) during the first 24hour of admission, that this solution is administrated one time in all periods of the study. Treatment - Drugs, CONDITION: Diffuse Axonal Injury. ; Diffuse Brain Injury Diffuse Brain Injury, PRIMARY OUTCOME: Level of Consciousness. Timepoint: 1day, 3month, 6month. Method of measurement: GCS, GOS-E, MMSE., SECONDARY OUTCOME: Liver Function Tests. Timepoint: 12hour, 24hour, 36hour, 48hour, 4day, 7day, 3month, 6month. Method of measurement: AST(Aspartat Aminotransferase), ALT(Alanine Aminotransferase), ALP(Alkaline Phosphatase)., INCLUSION CRITERIA: Inclusion criteria are:, Age between 16 and 75 years; GCS score less than 10 in 24 hours of admission; Complete consent form; ßHCG is negative and no pregnant patients., Exclusion criteria are:, Negative brain stem reflex response; Patients with immune deficiency; Liver and kidney diseases; Penetrative brain injury; Multiple trauma; Past medical history of cancer; And patients that need emergency surgery; Pregnant women

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18. (2014). "Direct Cortical Measurement of the Intensity and Pattern of Current Flow Produced by TDCS." Direct Cortical Measurement of the Intensity and Pattern of Current Flow Produced by TDCS.

Noninvasive brain stimulation (NBS) represents a promising set of tools for neurotherapeutics and rehabilitation. In a literature search, NBS has been tested for over seventy neurologic and psychiatric conditions. NBS may complement existing medical treatments, especially for neurologic indications without suitable pharmacotherapies (e.g. tinnitus, dyskinesias) or for patients with pharmaco-resistant illness (e.g. intractable epilepsy, severe depression)., In particular, transcranial direct current stimulation (tDCS) modulates brain activity by delivering low intensity unidirectional current through the scalp. Rather than induce action potentials, tDCS modulates resting neuronal transmembrane potential to influence brain plasticity. Moreover, from a pragmatic perspective, tDCS' benefits include its low cost, portability, and ease of use. Furthermore, tDCS can easily be combined with other interventions such as mental imagery, computerized cognitive interventions, or robot-assisted motor activity., Current physiological understanding of how TDCS affects brain plasticity at a synaptic, cellular, and a network level is limited. Experimentally, spontaneous neuronal firing activity under the anode generally increases, while firing activity under the cathode decreases, although the precise effects probably depend on the orientation of the axons to the electric field (Nitsche and Paulus, 2000, Bindman

et al., 1964, Creutzfeldt et al., 1962, Purpura and McMurtry, 1965). The neuromodulatory effects of tDCS have also been broadly attributed to LTP- and LTD-like mechanisms of synaptic plasticity, involving modulation of NMDA-receptor activity, and sodium and calcium channel activity (Hattori et al., 1990, Islam et al., 1995, Liebetanz et al., 2002). Furthermore, functional neuroimaging studies have revealed both local and distant network effects induced by tDCS, probably mediated by interneuronal circuits (Lefaucheur, 2008)., Advancing the investigators mechanistic understanding of how tDCS affects cortical excitability on a local and distributed level is necessary to (1) customize stimulation parameters (e.g. electrode size, positioning, current intensity and duration) to precisely target brain regions and maximize therapeutic outcomes, (2) confirm safety outcomes for vulnerable patient populations (e.g. children, patients with skull defects and implanted hardware). Previously, patients with a scalp or skull defect have been excluded from stimulation (Bikson, 2012) protocols because of a theoretical risk of current shunting through highly conductive CSF collections. However patients with penetrating brain injury, stroke, or previous brain surgery are precisely those who may most benefit from these technologies., Computational models using finite element methods (FEM) aim to determine the pattern and intensity of current flow through the brain by incorporating both (1) stimulation parameters and (2) patient characteristics such as underlying anatomy and tissue properties (e.g. size and position of skull defect relative to electrode configuration) (Bikson 2012). For example, one computational model incorporating electrode configuration and skull defect size and properties (Datta et al., 2010) predicts that the majority of electrode configurations surrounding the skull defect (with the exception of stimulating directly on top of a small skull defect) will not significantly increase the peak cortical electrical field intensity. Rather, current is directed to the edges of the bony defect, which may be counterproductive to therapeutic goals. Another computational case study on a stroke patient demonstrated that a relatively conductive stroke lesion concentrated current in the perilesional areas, and that placement of the reference electrode (e.g. right should, right mastoid, right orbitofrontal, and contralateral hemisphere) significantly altered the path of greatest current flow (Datta et al., 2011)., Yet, these modeling predictions are limited in their clinical application, as experimental validation is necessary. Quantitative d termination of the electrical field at the neural tissue level is required to establish efficacy and safety for a given individual (Bikson 2012). To the investigators knowledge, there are no published studies that have empirically confirmed the predicted patterns and current flow intensities predicted by these models. This proposed experimental study represents the first-in-kind to quantify voltage intensities, as measured at the brain surface, in response to various stimulation parameters, and will represent a significant advance in the field of noninvasive neurostimulation

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19. (2014). "The effect of riluzole on spinal cord injury." The effect of riluzole on motor and sensory function of patients with post- traumatic acute spinal cord injury.

INTERVENTION: Intervention 1: Rilozul therapy will be performed in group A and after 6 months, sensory, motor and pain examinations will be done in all of patients. Rilozul will be administrated 50mg PO (by mouth) every 12 hours continuing for 4 weeks. Intervention 2: Placebo will be administrated to control group and after 6 months, sensory and motor examinations will be done. Placebo Placebo will be administrated to control group and after 6 months, sensory and motor examinations will be done. Rilozul therapy will be performed in group A and after 6 months, sensory, motor and pain examinations will be done in all of patients. Rilozul will be administrated 50mg PO (by mouth) every 12 hours continuing for 4 weeks. Treatment - Drugs, CONDITION: Injury of nerves and lumbar spinal cord at abdomen, lower back and pelvis level Spinal injury. ; Injury of nerves and lumbar spinal cord at abdomen, lower back and pelvis level, PRIMARY OUTCOME: Motor injury. Timepoint: Primary, 6 weeks and 6 months following end of treatment. Method of measurement: Frankel classification. Pain. Timepoint: Primary, 6 weeks and 6 months following end of treatment. Method of measurement: Visual Analog Scale. Sensory injury. Timepoint: Primary, 6 weeks and 6 months following end of treatment. Method of measurement: Frankel classification., SECONDARY OUTCOME: Side effects. Timepoint: Primary, 6 weeks and 6 months following end of treatment. Method of measurement: Physical examination., INCLUSION CRITERIA: INCLUSION CRITERIA:,

1. acute spinal cord injury with Frankel Impairment Scale level A to C;, 2. 18 to 70 years old;, 3. Informed consent;, 4. C4 to L2 vertebral fractures, Exclusion criteria:, 1. Hepatic or renal disorders;, 2. Penetrating brain trauma;, 3. Traumatic brain injury;, 4. Pregnancy or Breastfeeding;, 5. Recent alcohol consumption;, 6. Neurological or psychiatric disorders;, 7. Life threatening injuries;, 8. Unable to receive riluzole orally

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20. (2014). "Effects of Methylphenidate on the Acute Management of Patients with Severe and Moderate Traumatic Brain Injury."

INTERVENTION: Intervention 1: Patients in the treatment(case) group will receive methylphenidate 20 mg/kg per dose PO BID by the second day of admission for two weeks. Intervention 2: Patients in the control group will receive placebo 20 mg/kg per dose PO BID by the second day of admission for two weeks. Patients in the control group will receive placebo 20 mg/kg per dose PO BID by the second day of admission for two weeks. Patients in the treatment(case) group will receive methylphenidate 20 mg/kg per dose PO BID by the second day of admission for two weeks. Treatment - Drugs, CONDITION: Moderate and Severe Traumatic Brain Injury., PRIMARY OUTCOME: Cognitive function. Timepoint: During 3 and 6 months of follow-up. Method of measurement: Using cognitive measuring tests., SECONDARY OUTCOME: Disability Rating Score. Timepoint: During 3 and 6 months of follow-up. Method of measurement: DRS specific tests. GCS. Timepoint: During 3 and 6 months of follow-up. Method of measurement: GCS specific tests. GOSE. Timepoint: During 3 and 6 months of follow-up. Method of measurement: GOSE specific tests. Lenght of ICU stay. Timepoint: Total ICU treatment duration. Method of measurement: Based on patients' file and record. Lenght of overall hospital stay. Timepoint: Total hospital treatment duration. Method of measurement: Based on patients' file and record., INCLUSION CRITERIA: INCLUSION CRITERIA: ages between 16 and 60; having a history of non-penetrating traumatic brain injury with a GCS=6-8 (Severe) and GCS 9-12 (Moderate) without multi organ injury or failure., Exclusion criteria: not agreeing to enter the study; not being able to tolerate nasogastric Feeding; dying in 48 hours of admission; having a history of pre-morbid neurologic disease, psychosis, major affective disorder, developmental disability, ADHD, currently abusing alcohol or recreational drugs. taking psychoactive medications other than anticonvulsants. having systemic diseases that could have affected the results eg. Diabetes or psychiatric problems, pregnancy or likely to become pregnant; mental retardation, behavioral problems, impairments in vision, hearing, or motor function that were severe enough to preclude participation in the research tasks.

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21. (2014). "HypOthermia for Patients requiring Evacuation of Subdural Hematoma: a Multicenter, Randomized Clinical Trial."

INTERVENTION: Preoperatively rapid-induced hypothermia therapy Normothermia, CONDITION: Acute Subdural Hematoma, PRIMARY OUTCOME: Comparing the ratio of good and poor outcome based on 6-month Glasgow Coma Scale Extended(GOSE), INCLUSION CRITERIA: 1. Non-penetrating traumatic brain injury 2. GCS motor score <= 5 (not following commands) 3. Estimated or known age 21-65 years 4. Acute subdural hematoma requiring emergent craniotomy within 6 hours of initial injury

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22. (2015). Sinapse 15(1).

The proceedings contain 47 papers. The topics discussed include: cerebrotendinous xanthomatosis: casuistry of the CHUC metabolic disorders consult and a review of the literature; spontaneous intracranial hypotension: an etiology of headache; incomplete HANAC (hereditary angiopathy, nephropathy, aneurysms, and muscle cramps) syndrome and the first COL4A1 gene mutation in Portugal (G236T); multiple penetrating brain injury by nail guns: case description and review of the literature; apomorphine in advanced Parkinson's disease: an option when other therapeutic

fails; multiple sclerosis is an index disease in multiple autoimmune syndromes?; childhood-acquired demyelinating syndromes; MS Forecast: an electronic tool to simulate MS prognosis; metabolic and mitochondrial diseases: myths and facts; depression and anxiety n multiple sclerosis: clinical and demographic associations in a cohort of patients; optic neuritis as presenting manifestation of BehcAciret's disease with multisystem involvement; olfactory dysfunction and cognitive impairment in primary progressive multiple sclerosis; and the role of phonemic verbal fluency test on the assessment of cognitive performance in multiple sclerosis.

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23. (2015). "Effect of Exercise Training on Physical, Cognitive, and Behavioral Function in People With TBI." Effect of Exercise Training on Physical, Cognitive and Behavioral Function in Patients With Traumatic Brain Injury.

Objective, The broad objective of this study is to examine the effects of moderate and more intense aerobic exercise as an intervention on cognitive performance, physical functioning and health-related quality of life in patients with chronic (more than 12 months post-injury) traumatic brain injury (TBI). Importantly, structural and biological brain changes will be measured to examine whether functional outcomes are related to exercise-induced adaptations. It is hypothesized that in the chronic phase of persons with TBI, there will be improved: 1) cognitive function, 2) physical fitness and fatigue severity, 3) motor performance and balance, and 4) mood and depressive symptoms, in those that performed the exercise intervention compared to a control group. It is also hypothesized that these functional improvements will be related to exercise intensity, improved cortical connectivity, dopamine transmission gene scores, and blood biomarkers related to neuroand angio-genesis., Study Population, 80 ambulatory adults with non-penetrating TBI will be enrolled. Subjects will be recruited from NIH, affiliated hospitals/clinics and the community., Design, All subjects will perform baseline assessments including cognitive and behavioral performance, brain imaging, fitness, motor and balance testing, and selected blood and genetic testing. Thereafter, subjects will be randomized to either a waitlist control, or one of two exercise conditions: 1) 30 minutes at a fast pace, moderate-intensity (rapidresistive exercise; RET); 2) 30 minutes at higher-intensity (aerobic exercise; AET). Both exercise groups will perform the exercise on an elliptical trainer 3 times a week, for a session duration of 45 minutes including warm-up and cool-down. The RET group will focus on rapid reciprocal motion with minimal resistance, while the AET group will exercise at an elevated intensity known to produce an aerobic effect. After 12 weeks, all groups will repeat the baseline assessments (3 month follow-up). Following this assessment, the waitlist control group will be randomized to either RET or AET and the exercise groups will cease formal supervised exercise sessions. A third assessment visit will be performed after an additional 12 weeks (6 month follow-up)., Outcome Measures, Cognitive performance will be tested and interpreted compared to norms. Performance on motor and balance tasks will be assessed with the Smart Balance Measurement System and the GAITRite System. Physical fitness will be determined by peak oxygen consumption and aerobic threshold as measured by pulmonary gas exchange during an exercise tolerance test on the treadmill. Structural brain volumes will be determined by magnetic resonance imaging (MRI) and cortical connectivity will be quantified using resting state functional MRI and Diffusion Tensor Imaging (DTI) to evaluate integrity of and changes in white matter tracts in response to exercise. Blood will be collected to quantify the presence of biomarkers (such as VEGF, BDNF and IGF-1) and dopamine transmission. Other self-reported measures of quality of life, fatigue severity, depression and sleep quality would also be collected.

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24. (2015). "Effects of atorvastatin in patients with traumatic brain injury." Effects of atorvastatin on reduction of size of brain contusions and peri contusional edema and prognosis of patients with moderate and severe traumatic brain injury.

INTERVENTION: Group 1: ?Atorvastatin 20 mg tab every 12hours for 10 days Group 2 : Placebo tablet,20mg every 12 hours for 10 days Intervention 1: Group 1: ?Atorvastatin 20 mg tab every 12hours for 10 days. Intervention 2: Group 2 : Placebo tablet,20mg every 12 hours for 10 days. Placebo

Treatment - Drugs, CONDITION: Brain contusion. ; Focal brain injury Focal brain injury, PRIMARY OUTCOME: Brain contusion volume. Timepoint: On admission, day 5 and 10 after intervention. Method of measurement: CT-volumetry of brain contusions. Final outcome(GOS). Timepoint: 6months after intervention. Method of measurement: Glasgow Outcome Scale (GOS) which is from 1 to 5 (1=death, 2=vegetative state, 3=severe disability, 4=moderate disability, 5= good recovery). This is a standard scoring scale for stating final outcome in patients with traumatic brain injury. Volume of pericontusional edema. Timepoint: On admission, day 5 and 10 after intervention. Method of measurement: CT-volumetry of pericontusional edema., INCLUSION CRITERIA: INCLUSION CRITERIA: Documented closed head injury; Age between 18 and 75 years; Having brain contusions on initial brain CT scan; Taking the first dosage of medication within first 10 hours of trauma event; GCS:5-13 without influence of sedations upon admission; Obtaining written informed consent from legally authorized representative, Exclusion criteria: Having a lesion on brain CT which urges a surgical evacuation at any time of hospital admission (Surgical EDH, SDH, ICH or midline shift>5mm and decompressive craniectomy); Spinal cord injury or spinal column instability with neurologic deficit; Penetrating brain injury; Any blood glucose under 50mg/dL or over 500mg/d; Severe renal disorder from past history or Cr>2.5 or patients on hemodialysis; Severe liver disease from past history or total bilirubin above 1.5 times of normal value; INR>1.6; Systolic BP below 90mmHg on admission without respond to fluid resuscitation; Pregnant women or a positive pregnancy te

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25. (2015). "Effects of oral glibenclamide in patients with traumatic brain injury." Effects of oral glibenclamide on reduction of size of brain contusions and peri contusional edema and prognosis of patients with moderate and severe traumatic brain injury: a randomized clinical trial.

INTERVENTION: Group 1: Oral glibenclamide 10 mg daily for 10 days Group 2 : Placebo agent, 10mg Daily, for 10 days Intervention 1: Group 1: Oral glibenclamide 10 mg daily for 10 days. Intervention 2: Group 2 : Placebo agent, 10mg Daily, for 10 days. Treatment - Drugs, CONDITION: Brain contusion. ; Focal brain injury Focal brain injury, PRIMARY OUTCOME: Brain contusion and precontusional edema volume. Timepoint: Onadmission, day 3 and 10 after intervention. Method of measurement: CT-volumetry of brain contusions. Outcome. Timepoint: 6 months after intervention. Method of measurement: Glasgow Outcome Scale (GOS)., INCLUSION CRITERIA: INCLUSION CRITERIA: Documented closed head injury; Age between 18 and 75 years; Having brain contusions on initial brain CT scan; Taking the first dosage of medication within first 10 hours of trauma event; GCS:5-13 without influence of sedations upon admission; Obtaining written informed consent from legally authorized representative, Exclusion criteria: Having a lesion on brain CT which urges a surgical evacuation at any time of hospital admission (Surgical EDH, SDH, ICH or midline shift>5mm and decompressive craniectomy); Spinal cord injury or spinal column instability with neurologic deficit; Penetrating brain injury; Any blood glucose under 50mg/dL or over 500mg/d; Severe renal disorder from past history or Cr>2.5 or patients on hemodialysis; Severe liver disease from past history or total bilirubin above 1.5 times of normal value; INR>1.6; Systolic BP below 90mmHg on admission without respond to fluid resuscitation; Pregnant women or a positive pregnancy te

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26. (2016). "Abstracts from the 34th Annual National Neurotrauma Symposium." Journal of neurotrauma 33.

The proceedings contain 381 papers. The topics discussed include: treatment of the difficult thoracolumbar fractures; nerve transfers for cervical spinal cord injury; can technology save us? the biomechanics of concussion prevention; aging with traumatic brain injury: age-at-injury effects on behavioral outcome following diffuse brain injury in rats; epigenetic, transcriptomic, and sleep alterations following penetrating ballistic brain injury (PBBI); the role of mTOR in exercise dependent axon regeneration through a peripheral nerve graft following spinal cord injury; oxidative status and reduced colonic giant migratory contractions following experimental spinal cord injury; exposure to blast overpressure alters cerebrovascular reactivity in rats; morphine undermines recovery following

SCI: opioid-immune interactions; transplanted mitochondria significantly maintain cellular respiration after acute contusion spinal cord injury; sex-dependent social behavior deficits and neuronal morphology after pediatric brain injury; transplanted mitochondria significantly maintain cellular respiration after acute contusion spinal cord injury; microstructural cervical spinal cord MRI quantifies tract-specific injury and correlates with global and focal deficits; and chondroitinase ABC and neural stem cells synergistically promote recovery after traumatic cervical spinal cord injury.

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27. (2017). "The Effect of Intravenous Sodium Ascorbate on Secondary Brain Injury in a Cohort of Severe Traumatic Brain Injury patients: The Orange Concentrate Randomised Control Trial." A double-blinded pilot randomized control trial comparing the effect of intravenous vitamin C versus placebo on secondary neurological injury in a cohort of severe traumatic brain injury patients.

INTERVENTION: Arm 1: 3g Sodium Ascorbate in 100 ml 0.9% Saline solution intravenous infusion every 6 hours for 7 days, Arm 2: 6g Sodium Ascorbate in 100 ml 0.9% Saline intravenous infusion every 6 hours for 7 days, CONDITION: Severe Traumatic Brain Injury, PRIMARY OUTCOME: Protocol adherence rate assessed by review of medication charts and patient records Protocol enrolment rate - total number of enrolled patients versus total number of suitable but not enrolled patients admitted to the unit over the 12 month period of study., SECONDARY OUTCOME: Change in serum concentration of Neuron-Specific Enolase Change in serum concentration of S100B Continuous EEG seizure activity (seizure episodes per day) ICU length of stay assessed by review of patient and ICU records, INCLUSION CRITERIA: Non-penetrating Severe Traumatic Brain Injury (GCS 8 or lower), Predicted to require at least 48 hrs of mechanical ventilatory support in ICU.

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28. (2017). "Efficacy of the fibrinogen and Fresh frozen plasma in patients with severe trauma." Survey Efficacy of the fibrinogen and Fresh frozen plasma in the hemodynamic and clinical outcomes of patients with severe trauma.

INTERVENTION: first group will be treated with fibrinogen extract (made in Iranian Blood Transfusion Organization, 70 mg/kg, every 8 hours until the INR reaches under 1.8) Intervention 1: first group will be treated with fibrinogen extract (made in Iranian Blood Transfusion Organization, 70 mg/kg, every 8 hours until the INR reaches under 1.8). Intervention 2: second group will be treated with FFP (made in Iranian Blood Transfusion Organization, 10- 15 mg/kg, every 8 hours until the INR reaches under 1.8). second group will be treated with FFP (made in Iranian Blood Transfusion Organization, 10- 15 mg/kg, every 8 hours until the INR reaches under 1.8) Treatment - Drugs, CONDITION: Other early complications of trauma Trauma. ; Other early complications of trauma, PRIMARY OUTCOME: Blood PH. Timepoint: 4 and 12 hours after the beginning of the intervention. Method of measurement: Lab. Blood pressure. Timepoint: 4 and 12 hours after the beginning of the intervention. Method of measurement: Manual blood pressure monitor. Oxygenation index. Timepoint: 4 and 12 hours after the beginning of the intervention. Method of measurement: Lab., SECONDARY OUTCOME: Days requiring mechanical ventilation. Timepoint: During hospital admission. Method of measurement: Counting the days required for mechanical ventilation. Duration of hospitalization. Timepoint: Time of discharge. Method of measurement: Count the number of admitted days. Level of consciousness. Timepoint: At the beginning of the intervention. Method of measurement: Using the Glasgow Coma Score. Number of blood units taken. Timepoint: During the days of admission. Method of measurement: Count of injected blood units. Patients death. Timepoint: End of intervention. Method of measurement: Clinical. Types of brain and organ damage. Timepoint: At the beginning of the intervention. Method of measurement: Imaging through CT scan., INCLUSION CRITERIA: INCLUSION CRITERIA: Age over 18 years old; patients with multiple trauma; need for repeated transfusion; injury severity score 16 and above; satisfaction to participate in the study. Exclusion criteria: Unwillingness of the patient to continue cooperation in the plan; trauma limited to head; Penetrating trauma; injury severity score less than 16.

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29. (2017). "Proceedings of the 2017 Spring Meeting of the Society of British Neurological Surgeons." British journal of neurosurgery 31(2).

The proceedings contain 121 papers. The topics discussed include: cellular inflammatory response to penetrating trauma caused by transplantation surgery in the brain; alcohol related traumatic brain injury in neuro-intensive care; 5-ALA immunofluoresence guided endoscopic resection of high grade gliomas; volumetric growth correlates with histological grade in meningioma; genomic analysis, surgical treatment and outcomes of lower-grade gliomas in a single institution; rhabdoid meningioma: a single unit experience of treatment for a rare and aggressive variant and review of the literature; single centre experience of surgical resection and orbital reconstruction in sphenoorbital meningiomas: a 11 year series; high intensity ultrasound to ablate sacral chordoma: preliminary data; do we achieve disease control with adjuvant stereotactic radiosurgery or radiotherapy in atypical meningiomas? a retrospective cohort analysis of 79 cases; shunt procedures in idiopathic intracranial hypertension, the role of obesity in shunt failure; outcomes of hemispherotomy in paediatric epilepsy surgery; changes in quality of life after single-level selective dorsal rhizotomy; management of childhood craniopharyngioma - staged individualised treatment; are the SINS and NOMS classifications useful in predicting the need for surgery in patients with metastatic vertebral body involvement?; and systematic review of en bloc resection in the management of Ewing's sarcoma of the mobile spine with respect to local control and disease free survival.

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30. (2018). "North American Brain Injury Society's Brain Injury Across the Age Spectrum: Improving Outcomes for Children, Adolescents, and Adults." Journal of Head Trauma Rehabilitation 33(3).

The proceedings contain 110 papers. The topics discussed include: dance and movement-based (DMB) therapy in TBI rehabilitation using laban movement analysis (LMA); earlier time to aerobic exercise associated with faster recovery following acute sport concussion; the association between university sport participation and well-being of former athletes in mid-adulthood: a focus on prior concussions and sport type played; substandard impact performance of common bicycle helmets; speech cognitive therapy and cognitive symptom improvement in patients with traumatic brain injury as a result of domestic violence; a comparison of female vs. male symptom reporting on baseline concussion testing across the pre-adolescent to late adolescent age span; and interprofessional pediatric treatment model plays critical role in recovery process: case study of 8-year-old child with catastrophic brain injury from gunshot.

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31. (2018). "Using Propranolol in Traumatic Brain Injury to Reduce Sympathetic Storm Phenomenon." Using Propranolol in Traumatic Brain Injury to Reduce Sympathetic Storm Phenomenon: A Prospective Randomized Clinical Trial Injury to Reduce Sympathetic Storm Phenomenon: A Prospective Randomized Clinical Trial.

The sympathetic storming events can be triggered by suctioning, repositioning, or environmental stimuli. To differentiate sympathetic storming from similar conditions, symptoms and signs have to occur in TBI patients a minimum of 1 cycle per day for 3 consecutive days (body temperature of 38.5 °C or more, heart rate at least 120 beat / min, systolic blood pressure > 140 mmHg, respiratory rate > 20 breaths / min, in presence of dystonia, diaphoresis, agitation and laboratory investigations confirm elevated serum catecholamines. Beta blockers has a cardio protective effect via lowering heart rate, stroke volume and mean arterial blood pressure which limits myocardial O2 consumptions and guards against myocardial infarction. They also have neuron protective effects via reducing cerebral blood flow thus lowering O2 and glucose consumption as cerebral metabolism is reduced. Propranolol a nonselective B receptor antagonists works on &bgr;1 receptors in brain, heart, and kidney and &bgr; 2 receptors in lungs, liver, skeletal muscles, eye and arterioles.We suppose that using Beta - adrenergic receptor blockers as propranolol blunts the sympathetic storming phenomenon as it is a nonselective &bgr; inhibitor and has a lipophilic property which enables it to penetrate blood brain barrier.

32. (2019). "Abstracts From the 47th Annual Meeting of the Society for Neuroscience in Anesthesiology and Critical Care." Journal of neurosurgical anesthesiology 31(4).

The proceedings contain 116 papers. The topics discussed include: induction of diffuse axonal brain injury based on rotational acceleration in rats; functional roles of the Alpha2delta-2 gabapentin receptor at the climbing fiber to purkinje cell synapse in the cerebellum; neuronal mechanisms of unconsciousness in an absence seizure model; optical pharmacokinetics of intra-arterial delivery of Cy5 labeled cell penetrating peptide -TAT to 9L brain tumors; comprehensive perioperative optimization and enhanced recovery clinical pathway for complex spine surgery patients: university of Florida experience; external ventricular drain management practices in Thailand: results of the EPRACT study; and facetime live chat between patient and family during awake craniotomy: patient and family centered care in neuroanesthesia.

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33. (2019). "The BONANZA trial- a randomised controlled trial that is testing whether a management strategy guided by early brain tissue oxygen monitoring in patients in with severe traumatic brain injury improves long term neurological and functional outcomes." The BONANZA Trial -a randomised controlled trial in patients with severe traumatic brain injury that will determine whether a neuro-intensive care management strategy guided by continuous brain tissue oxygen (PbtO2) monitoring and intracranial pressure (ICP) monitoring will improve neurological and functional outcomes at 6 months measured by the GOSE, when compared to standard care using ICP monitoring alone.

INTERVENTION: Patients in the intervention arm will have continuous PbtO2 and ICP monitoring. Cerebral hypoxic episodes will be treated according to the BONANZA PbtO2 optimisation strategy. The PbtO2 treatment algorithm is a set of physiologic interventions that vary depending on the clinical scenario. The physiological interventions are tiered in a hierarchical fashion, with less aggressive interventions attempted before more aggressive manoeuvres. Three abnormal clinical scenarios are possible: 1. Isolated intracranial hypertension: PbtO2 is greater than or equal to 20 mmHg and ICP is greater than target. 2. Isolated cerebral hypoxia: PbtO2 is less than 20 mmHg and ICP is within the satisfactory range. 3. Simultaneous cerebral hypoxia and intracranial hypertension: PbtO2 is less than 20 mmHg and ICP is greater than target. All therapies are administered when the patient is in intensive care. Tier 1 therapies include sedation and analgesia. A broad range of agents may be used, most commonly Propofol, Midazolam, Morphine and Fentanyl. Vasopressors or drugs that are used to improve blood pressure may also be given in order to improve blood flow to the brain. Commonly used vasopressors are Noradrenaline and Adrenaline. Osmotherapy may also be administered to reduce the water content of the brain and reduce brain swelling. Commonly used osmotics include Mannitol and Hpertonic saline. The doses of all these drugs mentioned are variable and are usually given via an infusion that is titrated according to the patients response. Tier 2 therapies include the use of neuromuscular blockade agents like Cisatracurium. The dose is variable and may be given intermittently as a bolus or via infusion depending on each patient scenario. Other tier 2 therapies include blood tranfusion, and adjustments to the ventilator in order to optimize levels of oxygen and carbon dioxide in the patients blood. Tier 3 therapies are largely optional and include lowering the patients te, CONDITION: Injuries and Accidents - Other injuries and accidents Neurological - Other neurological disorders Severe traumatic brain injury; ; Severe traumatic brain injury, PRIMARY OUTCOME: Neurological outcomes measured using the Glasgow Outcome Score - Extended (GOS-E)[6 months post injury.], SECONDARY OUTCOME: Mortality (all cause)., ; [ICU discharge, ; Hospital discharge] Quality of life assessments (QOL) using EQ5D.[6 months post injury], INCLUSION CRITERIA: Patients >17 years who have suffered a non-penetrating severe TBI and who require ICP monitoring (in the judgement of the treating clinician).

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34. (2019). "The effects of oral glibenclamide in patients with traumatic brain injury." A clinical trial of effects of oral glibenclamide on size of brain contusions and their peripheral edema in patients with moderate and severe traumatic brain injury.

INTERVENTION: Intervention 1: Intervention group: Oral glibenclamide 15 mg (three tablet, 5 mg each, chemidarou Pharmaceutical Company), daily for 10 days. Intervention 2: Control group: Placebo agent (Barij Essence Pharmaceutical Company, 3 tablets Daily, for 10 days., CONDITION: Brain contusion. ; Focal traumatic brain injury, PRIMARY OUTCOME: Brain contusion volume. Timepoint: On admission, day 3 and 7 days after intervention. Method of measurement: CT-volumetry of brain contusions., SECONDARY OUTCOME: Glasgow Outcome Scale (GOS). Timepoint: On Discharge time and 3 months later. Method of measurement: Physical Examination. Precontusional edema volume. Timepoint: On admission, day 3 and 7 days after intervention. Method of measurement: CT-volumetry of brain contusions., INCLUSION CRITERIA: INCLUSION CRITERIA: Patients aged between 18 and 75 years with documented closed head injury patients with non-penetrating brain injury Having brain contusions on initial brain CT scan GCS: 5-13 without influence of sedations upon admission Random blood sugar more than 70 mg/dl before the intervention Patients without a lesion on brain CT which urges a surgical evacuation at any time of hospital admission (Surgical EDH, SDH, ICH or midline shift>5mm and decompressive craniectomy) Patients without severe renal disorder from past history or Cr>2.5 Patients without severe liver disease from past history or total bilirubin above 1.5 times of normal value.

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35. (2019). "Fluid administration strategy in severe traumatic brain injury." Restricted versus liberal fluid administration strategy in severe traumatic brain injury (RELIST). A randomized clinical trial.

INTERVENTION: The study will recruit patients aged 14 or above (14 is the age of adulthood in Saudi Arabia) who are victims of severe TBI (GCS < 9) within 24 hours of the incidence of trauma. The main intervention of the study is controlling the fluid balance in the first 7 days to keep it Â± 500 ml /day as compared to no interference with balance in the control group. Otherwise, both groups are treated similarly, according to our unit protocol adopted from guidelines of Brain Trauma Foundation. Intervention: Maintaining a 24 hours balance of +/- 500 ml , for the first 7 days. While following the TBI protocol as per the guidelines. Daily balance may be controlled using diuretics, and if needed vasopressors to maintain hemodynamic targets. Control: This group also follows the TBI protocol as per the guidelines, except there is no interference with the fluid balance, CONDITION: Isolated, non penetrating severe traumatic brain injury (GCS < 9) ; Injury, Occupational Diseases, Poisoning ; Intracranial injury, PRIMARY OUTCOME: Percentage of patients with favorable Glasgow Outcome Scale (4 or 5) upon ICU discharge, SECONDARY OUTCOME: ; 1. Percentage of patients with favorable GOS at 6 months; 2. ICU length of stay and mortality; 3. Development of pulmonary oedema; 4. Days on TBI management protocol; 5. Days on mechanical ventilation;, INCLUSION CRITERIA: 1. Age = 14 years 2. Severe TBI (GCS <9) 3. Within 24 hours of the incidence of trauma provided that the resuscitation phase is complete (post-resuscitation phase) 4. Isolated non-penetrating head injury 5. Clinical necessity for ICP management per BTF recommendations 6. Mechanically ventilated, without any evidence of respiratory dysfunction (P/F ration = 250). 7. Hemodynamically stable or on vasopressor support for standardized CPP management according to BTF recommendations: MAP = 65 mmHg 8. SBP = 90 mmHg

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36. (2019). "Free Dermal Fat Autografts in Craniofacial Wounds." Fat to the Future, Dermal Time 3: Prospective, Single-Blind, Randomised Controlled Trial of Free Dermal Fat Autografting for Treatment of Complex Craniofacial Wounds.

A complex craniofacial wound is a wound on the head or face that will not heal, despite efforts to heal the wound with standard treatments, such as antibiotics and surgery to clean the wound. Currently, there are no good treatment options for these types of complex craniofacial wounds. This study will evaluate what happens when free autologous dermal fat grafting is used to help treat complex

craniofacial wounds by evaluating the area where the graft was placed to better understand how these types of grafts function. Free autologous dermal fat grafting is the process of taking fat from under the outer layer of skin and moving it to another part of the body of the same individual. Although free autologous dermal fat grafts have been used for many decades in plastic and reconstructive surgery to help a variety of patients suffering from different problems, only one study has used them to help heal complex craniofacial wounds. This use of free autologous dermal fat grafting is not considered to be experimental or an investigational product by the US Food and Drug Administration (FDA). Still, the use of free autologous dermal fat grafting has not been formally evaluated to understand how these types of grafts help patients with complex craniofacial wounds.

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37. (2020). "ErythroPOietin Alfa to Prevent Mortality and Reduce Severe Disability in Critically Ill TRAUMA Patients." A Randomised, Double-blind, Placebo-controlled Trial of Erythropoietin Alfa Versus Placebo in Mechanically Ventilated Critically Ill Patients Following Traumatic Injury.

Trauma can cause many injuries, some of which are life-threatening and require treatment in, an intensive care unit (ICU). Despite best available treatment and therapies, people who, sustain a critical traumatic injury are at greater risk of death or long-term disability., From 2010 to 2015, approximately 9% of people admitted to an ICU in Australia and New Zealand, for treatment of their injuries, did not survive. In Victoria, 6-months post injury,, approximately 31% of people who were critically injured developed severe disabilities or, died., Following a traumatic injury, a number of complex pathways are activated by the body. These, pathways can occur over hours or weeks and may lead to damage of cells, tissues or blood, vessels and may destroy other healthy tissue. The treatment of traumatic injury focuses on, trying to minimise further damage that can occur after the initial injury., Erythropoietin is a glycoprotein hormone essential for erythropoiesis and was first purified, in 1977. Its human recombinant analogues known as erythropoiesis stimulating agents (ESAs), are approved for human therapeutic use. However, erythropoietin is also a pleiotropic, cytokine with effects beyond just erythropoiesis. Studies in animals have demonstrated the, potential protective effects of erythropoietin to organs including the brain, kidney, liver, and heart, and anti-inflammatory properties., Previous research suggests the use of the ESA called epoetin alfa, increases the number of, patients surviving severe trauma and reduces the risk of disability in those who survive., The primary aim of the study is to determine the efficacy of epoetin alfa compared to placebo, in reducing mortality and severe disability at six months in critically ill trauma patients., 2500 mechanically ventilated ICU patients admitted with a primary trauma diagnosis presenting, to the ICU will be recruited into the study from participating study centres in Australia,, New Zealand, Europe, and Saudi Arabia.

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38. (2020). "International Trial of Efficacy of Cytoflavin in Head Trauma." International, Multicenter, Randomized, Single Blind, Placebo-controlled Study of Efficacy and Safety of CITOFLAVIN® in the Acute Period of Head Injury in Adults.

The study will access the efficacy and safety of treatment with CITOFLAVIN® in patients with, non-penetrating moderately severe traumatic brain injury (TBI). The study recruits patients, 18-60 years with TBI, corresponding to the clinical diagnosis of brain contusion, with GCS, score 9 -14 at the time of inclusion , with the estimated time of initiation of therapy, within 24 hours from the estimated or established time of trauma, with post-traumatic, amnesia, confusion or disorientation and absence of indications for neurosurgery or other, surgical intervention under general anesthesia., Cytoflavin® (Inosine + Nicotinamide + Riboflavin + Succinic Acid) is a combination drug,, which improves cerebral blood flow, activates metabolic processes in the central nervous, system, restores impaired consciousness, promotes regression of neurological symptoms and, improvement of cognitive functions of the brain.

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39. (2021). "Abstracts from Issue 50 of EJVES Vascular Forum: Editors: Melina Vega de Ceniga and Anne Lejay." European Journal of Vascular and Endovascular Surgery 61(5): 867-869.

Selected Abstracts from the Journal of Vascular Surgery Extracorporeal Treatment with High Intensity Focused Ultrasound of an Incompetent Perforating Vein in a Patient with Active Venous Ulcers: Alfred Obermayer, Jean-François Aubry and Nesrine Barnat Introduction: Endovenous techniques such as ultrasound guided foam sclerotherapy, thermal methods, or glues are generally recommended to occlude incompetent veins. However, these methods can be technically challenging and risky for patients with severe atrophic skin disorders like lipodermatosclerosis or atrophie blanche. High intensity focused ultrasound (HIFU), which has been shown to coagulate and occlude veins successfully, may offer an alternative method. This case report details ultrasound guided HIFU to occlude non-invasively a refluxing perforator vein causing active ulcers. Report: A 95 year old man presented to the Institute for Functional Phlebology (Melk, Austria) with painful recurrent ulcers in his left medial calf. His limb was scored C2,3,4a, b,6, Ep, Ap, Pr,18 according to the Clinical, Etiology, Anatomic, Pathophysiology (CEAP) classification. Lower limb ultrasound revealed a refluxing posterior tibial perforating vein, measuring 2.7 mm in diameter at the level of the fascia. Extracorporeal HIFU pulses were delivered to this vein with the Sonovein device (Theraclion, Malakoff, France). Sonication was applied for eight seconds at a mean acoustic power of 80 W. The patient was followed up for three months post-treatment and occlusion was evaluated by duplex ultrasound. There were no complications during treatment or follow up. Three months after the treatment, reflux was abolished and the two initially active ulcers had healed. Discussion: Although this is an early report, this study shows that HIFU can be successful in ablation of incompetent perforator veins in the treatment of venous leg ulcers. Posterior Cerebral Circulation Stroke Secondary to Foetal Origin of Posterior Communicating Artery: An Indication for Carotid Endarterectomy: Lydia Mann, Ryan Preece, Liz Haslam, Sharath C.V. Paravastu, Richard A. Bulbulia and Sachin R. Kulkarni Introduction: Posterior cerebral circulation strokes are most commonly caused by posterior vasculature in situ thrombosis, cardiac emboli, or arterial dissection. However, the foetal origin of the posterior communicating artery is an anatomical variant of the cerebral circulation that results in communication between the internal carotid and posterior cerebral circulation. Therefore, rarely this can result in posterior cerebral territory infarction from internal carotid artery thrombo-embolism. This is the report of a case in which a patient suffered posterior circulation stroke secondary to this anatomical variation of the circle of Willis. Report: A 71 year old male patient was admitted to the stroke team with seizures, headache, and confusion. Examination revealed a left sided homonymous hemianopia. Diffusion weighted magnetic resonance imaging (MRI) of the brain 36 hours into his admission revealed an acute right posterior circulation infarct with extensive haemorrhagic transformation. Duplex ultrasound three days later revealed a heavily calcified right internal carotid artery mixed echogenicity plaque with 80%–90% stenosis. Subsequent computed tomography angiography showed a large right foetal variant posterior communicating artery. Following improvement in functional status, the patient underwent uneventful carotid endarterectomy to reduce risk of future stroke. Discussion: In patients presenting with posterior circulation infarction, clinicians should consider embolism from an atheromatous internal carotid artery via the variant foetal origin of posterior communicating artery. If detected, consideration should be given to undertaking carotid endarterectomy to reduce future stroke risk if no other source is detected. Surgical Explantation of a Fenestrated Endovascular Abdominal Aortic Aneurysm Repair Device Complicated by Aorto-Enteric Fistula: Caroline Caradu, Valérian Vosgin-Dinclaux, Emilie Lakhlifi, Vi cent Dubuisson, Eric Ducasse and Xavier Bérard Introduction: Alarming outcomes have been reported following infected endovascular aortic aneurysm repair (EVAR) device explantation. Infected fenestrated EVAR (FEVAR) exposes patients to even worse procedural risks. Report: A 67 year old man with a prior history of FEVAR presented with impaired general condition, abdominal and back pain, and increased C reactive protein. Computed tomography angiography revealed a collection around the aortic graft bifurcation and 18F-fluorodeoxyglucose–positron emission tomography (FDG-PET) revealed increased FDG uptake at this level, confirmed by labelled white blood cells, all favouring graft infection. A thoracophrenolumbotomy was performed and revealed an aorto-enteric fistula which was treated by small bowel resection. The left renal artery was transected at the distal end of the bridging stent and a

thoracorenal bypass was performed. The thoracic aorta was cross clamped above the coeliac trunk for complete graft excision. Meanwhile, the right kidney was perfused with 4°C Ringer lactate solution. In situ reconstruction was accomplished with a bifurcated antimicrobial graft sutured below the superior mesenteric artery with re-implantation of the right renal artery. The patient was left with a laparostomy for definitive abdominal closure, restoration of the digestive tract, and omental wrap 72 hours later. Broad spectrum antibiotic therapy was initiated peri-operatively and reduced to sulfamethoxazole/trimethoprim for a total duration of six weeks after one sample was positive for Moraxella osloensis. Eleven months later, the patient was free from re-infection, with no fever or inflammatory syndrome. Discussion: Total explantation of stent grafts with tissue debridement and post-operative antibiotic therapy is the gold standard when dealing with infected EVAR. As with type IV thoraco-abdominal aneurysm open repair, FEVAR device explantation requires additional protective measures to prevent visceral ischaemia and renal impairment. In agreement with the European Society for Vascular Surgery guidelines, such patients should be referred to dedicated vascular centres with expertise in surgical repair, anaesthetics, and post-operative intensive care. Histological Analysis of a Long Term Patent Subintimal Canal in the Superficial Femoral Artery: Tormod Lund, Aud Svindland, Dag Bay, Jon O. Sundhagen, Jonny Hisdal and Tor Flørenes Introduction: Subintimal angioplasty (SIA) was introduced in the late 1980s and is a supplement to bypass surgery. Adaptation of the technique has been hampered by high rates of early intervention to maintain patency, but the long term assisted patency is good. Report: The superficial femoral and popliteal artery containing a patent subintimal canal were explanted from a patient who died in the authors' ward. Histological analysis indicated that the lumen was created in the medial layer of the vessel wall. A collagen rich neointima and fragmented internal elastic lamina were observed, presumably as a result of activated smooth muscle cells. The luminal surface was partly covered by a single layer of CD31, von Willebrand factor, and partly CD144 positive cells. An early atherosclerotic lesion was observed distally in the subintimal canal. Discussion: Remodelling and neo-cellularisation of the vascular wall after SIA are described. Notably, hallmarks of early and late stage atherosclerotic disease were evident throughout the subintimal canal. These observations require confirmation in a larger number of specimens but underscore the need for surveillance after SIA. Estimating the “Pull” on a Pullthrough Wire: A Pilot Study: Arindam Chaudhuri, Frederic Heim and Nabil Chakfe Objective: Pullthrough/body floss wires are used to track endovascular devices across tortuous aorto-iliac anatomy encountered during endovascular repair of abdominal or thoracic aortic aneurysms. The tension imparted on such wires is arbitrary and has never been quantified. This pilot study attempted to quantify the tension used to stiffen the floppy hydrophilic wires typically used in such a scenario. Methods: Two linked experiments were undertaken, the first by tasking 13 blinded vascular surgeons (eight male, five female; mean age 36 ± 11 years, including nine trainees) with pulling a long floppy hydrophilic wire (Radifocus Guidewire M Stiff, Terumo UK, Bagshot, Surrey, UK) attached at the other end to a horizontally configured industrial scale (HDN-N Hanging Scale, Kern & Sohn GmbH, Balingen, Germany), to simulate what they individually felt was an “appropriate” tension; the second by using the derived average tensioning force to set up a pullthrough wire within a rigid life like aorto-iliac model to assess whether a test device (16F Sentrant Introducer Sheath, Medtronic Limited, Watford, UK) could be delivered over such a tensioned wire in both brachiofemoral and femorofemoral configurations. Results: The mean tension exerted by the group on the wire was 38.3 ± 14.8 N (equivalent to 3.9 kgf). Pullthrough wire tensioning was undertaken by fixing one end and applying a 3.9 kg weight at the other. The test device was successfully deployed into the infrarenal aortic position and also across the aortic bifurcation, via brachiofemoral and femorofemoral pullthrough configurations, respectively. Conclusion: Successful test device deliveries suggest that a minimum tension equivalent to almost 4 kgf applied to a floppy wire can provide “stiffening” to allow device tracking across tortuous aorto-iliac anatomy. More studies are needed to ascertain whether lower tensions can be applied; these results may help provide a platform for other such studies depending on configuration, aortic geometry, and device or wire/tension characteristics. A Gardening Session Turns Into a Life Threatening Aortic Transection: Ania Raszka, Theodoros Thomopoulos, Jean-Marc Corpataux, Dieter Hahnloser, Alban Longchamp and Justine Longchamp Introduction: Penetrating injuries to the sub-diaphragmatic aorta are challenging, with high mortality

rates. Most penetrating aortic trauma results from gunshots or stab wounds. This case reports a successful aortic bypass, following partial aortic transection caused by an accidental fall on a utility knife. Report: A healthy 82 year old woman was admitted to the emergency department following penetrating abdominal trauma following an accidental fall on an 18 cm long utility knife. On admission, the patient was haemodynamically stable, with no neurological deficit. Computed tomography angiography revealed multiple abdominal injuries to the stomach, duodenum, L4-L5 left vertebrae, and infrarenal abdominal aorta. The patient underwent urgent midline laparotomy, followed by successful aortic repair using a 14 mm polyester graft. The gastric and duodenal lesions were repaired with an omental patch. The post-operative course was uneventful. Discussion: Penetrating abdominal trauma with visceral lesions and aortic transection are high risk injuries, albeit rarely described in the literature. A low threshold for imaging, and multidisciplinary management by vascular and visceral surgeons are essential for timely recognition and successful intervention. Intravenous Lobular Capillary Haemangioma (Pyogenic Granuloma) of the Superior Vena Cava: Case Report and Literature Review: Elisabeth Blaya, Vincenzo Vento, Salomé Kuntz, Laurence Bruyns, Mickael Ohana, Noelle Weingertner, Anne Lejay and Nabil Chakfé Introduction: Intravascular lobular capillary haemangioma is a rare benign intravascular tumour, especially in large vessels. This is the report of a case and associated literature review. Report and literature review: This is the report of the first case of an intravenous lobular capillary haemangioma (ILCH) of the superior vena cava (SVC). A 30 year old female presented with a collateral thoraco-abdominal venous circulation. Chest computed tomography angiography, thoracic magnetic resonance imaging, and positron emission tomography revealed an intraluminal SVC tumour extending from the left brachiocephalic venous trunk to the distal third of the SVC. No re-operative biopsy was indicated. An en bloc tumour excision was performed, followed by reconstruction of the SVC with an L shaped, ringed polytetrafluoroethylene (PTFE) prosthesis. Histopathology revealed the presence of an ILCH with free margins. A review of the literature identified 64 cases of ILCH to date, all of which underwent total resection. When reported, no recurrences were found during follow up. Discussion: In this case, the ePTFE reconstruction of the SVC must be checked regularly for any adverse events. Although ILCH is a benign tumour with no risk of recurrence, regular surveillance is advised. Surgical Management of a Patient with an Internal Carotid Artery Stenosis, Eagle Syndrome, and Internal Carotid Artery Tortuosity: A Case of Four Pathologies of the Carotid Arteries: Grigol Keshelava, Rati Kurdadze and Devi Tsiklauri Introduction: In 1937, W.W. Eagle first described two clinical cases of elongated styloid process causing compression of adjacent anatomical structures. A case of left internal carotid artery (ICA) stenosis, Eagle syndrome (bilateral), ICA tortuosity, and occlusion of the right carotid arteries is presented. Report: A 67 year old man was referred following ischaemic stroke two months previously. Computed tomography (CT) revealed the pathologies described. Intervention was performed under general anaesthesia. The digastric muscle was transected, and the styloid process was resected. Carotid endarterectomy with end to end anastomosis between the crossed ends of the ICA was carried out using a temporary shunt due to occlusion of the contralateral carotid arteries. The patient was discharged on the third post-operative day. Discussion: The case described shows that one stage surgical treatment of ICA stenosis, coiling, and Eagle syndrome gives good results.

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40. (2022). "A Pilot Multicentre Cluster Randomised Trial to Compare the Effect of Trauma Life Support Training Programmes on Patient and Provider Outcomes." A Pilot Multicentre Cluster Randomised Trial to Compare the Effect of Trauma Life Support Training Programmes on Patient and Provider Outcomes.

Introduction:, Trauma accounts for nearly 10% of the global burden of disease. Several trauma life support, programs aim to improve trauma outcomes. There is no evidence from controlled trials to show, the effect of these programs on patient outcomes. We describe the protocol of a pilot study, that aims to assess the feasibility of conducting a cluster randomised controlled trial, comparing Advanced Trauma Life Support (ATLS) and Primary Trauma Care (PTC) with standard, care., Methods and analysis:, We will pilot a pragmatic three-armed parallel, cluster randomised, controlled trial in, India,

where neither of these programs are routinely taught. We will recruit tertiary, hospitals and include trauma patients and residents managing these patients. Two hospitals, will be randomised to ATLS, two to PTC, and two to standard care. The primary outcome will be, all cause mortality at 30 days from the time of arrival to the emergency department. Our, secondary outcomes will include patient, provider, and process measures. All outcomes except, time to event outcomes will be measured both as final values as well as change from baseline., We will compare outcomes in three combinations of trial arms: ATLS versus PTC, ATLS versus, standard care, and PTC versus standard care using absolute and relative differences along, with associated confidence intervals. We will conduct subgroup analyses across the clinical, subgroups men, women, blunt multisystem trauma, penetrating trauma, shock, severe traumatic, brain injury, and elderly. In parallel to the pilot study we will conduct community, consultations to inform the planning of the full-scale trial.

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41. Aarabi, B. (1987). "Comparative study of bacteriological contamination between primary and secondary exploration of missile head wounds." Neurosurgery 20(4): 610-616.

Aerobic and anaerobic bacterial contamination of scalp wounds, indriven bone fragments, and brain tracks were studied in two groups (A and B) of nonrandomized patients with missile head wounds in a 20-month study of patients from the front lines of the Iran-Iraq war. In the 53 Group B patients, the primary debridements, most of which had been performed within 24 hours after injury, were deemed insufficient and a secondary definitive exploration was performed. Group A patients (62) had primary definitive explorations at Nemazee Hospital after a mean of 66.5 hours since injury. All of the patients had been started on dexamethasone and a combination of either ampicillin and chloramphenicol or crystalline penicillin G and chloramphenicol after field evacuation. The contamination rate of scalp wounds, bone fragments and brain tracks was slightly higher in Group A (38.4%, 22.2%, and 29.6% respectively, for Group A and 31.9%, 19.5%, and 27% for Group B, respectively). Staphylococcus albus among the gram-positive and Acinetobacter among gram-negative bacteria were the most common infecting organisms. Fifty per cent of the bacteria cultured from the brain tracks of Group A and 30.8% of those cultured from Group B patients were gram-negative. A total of 125 patients in four groups was included in our overall study of victims of missile wounds that violated the dura mater. Four patients developed meningitis at Nemazee Hospital (3 postoperatively and 1 after facial penetration). Two patients in Group B were admitted with meningitis (1 with an accompanying abscess), 1 of them 20 days and the other 60 days after exploration at two different centers.(ABSTRACT TRUNCATED AT 250 WORDS)

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42. Aarabi, B. (1988). "Traumatic aneurysms of brain due to high velocity missile head wounds." Neurosurgery 22(6 Pt 1): 1056-1063.

Two hundred twenty-three of 255 consecutive patients underwent cerebral angiography 16.9 +/- 11.6 days (SD) after high velocity missile injury to the head over a 29-month study period. Shell fragments were the most frequent projectiles (73.7%), and penetrating wounds were the most frequent injuries (61%). During the study, 2 patients (1 with an ophthalmic and the other with an anterior cerebral artery aneurysm) presented with delayed traumatic intracerebral hematoma; the first patient had had negative angiography 90 days earlier, and the second patient was admitted from a rehabilitation center after operation in another center 25 days earlier for a penetrating left frontal shell fragment injury. Six of 223 patients (2.7%) had dormant aneurysms (4 middle and 2 anterior cerebral arteries). Seven of 8 patients were operated on again to exclude their aneurysms from the cerebral circulation. Two of 8 patients died postoperatively (1 within 24 hours and another 51 days after discharge from the hospital in a vegetative state). Fragments penetrating temporal, temporoparietal, or pterional areas had a significantly greater chance of causing arterial injury (chi 2 = 11.46, P less than 0.001). There was a significant chance of having an aneurysm if a hematoma was seen at operation or on computed tomography of the head (chi 2 = 4.18, P less than 0.05). The penetrating mode of injury and shell fragments crossing the midline were two variables for which the statistical significance had a P value of

0.08. It is concluded that war casualties with penetrating shell fragment injuries near the pterion, especially when harboring intracerebral hematomas, should undergo cerebral angiography to rule out vascular injuries of the brain.

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43. Aarabi, B. (1989). "Causes of infections in penetrating head wounds in the Iran-Iraq War." Neurosurgery 25(6): 923-926.

Factors seemingly influential in postoperative central nervous system infections were evaluated in 379 patients who sustained missile wounds to the head during the Iran-Iraq War. The mean wound age was 49 hours. The site of injury and presence of retained bone and/or shell fragments did not have a significant effect on infection rate. Thirty-three of 379 patients developed cerebrospinal fluid (CSF) fistulas of which 12 (36%) were associated with infection. The infection rate was 6 of 346 (1.7%) in the absence of CSF leaks. There was a statistically significant association between CSF fistula and infection. All 6 positive cultures in patients with CSF fistulas were gram-negative. Thirty-two patients died during the study, a mortality rate of 8.4%. The mortality rate from infection was 1.8%. Two hundred seventy-seven of 347 patients were followed for a mean of 22 +/- 17 months during which time 2 patients were readmitted with central nervous system infections, both due to CSF leakage. CSF fistulas were the main predisposing factor in postdebridement central nervous system infections in this study.

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44. Aarabi, B. (1990). "Surgical outcome in 435 patients who sustained missile head wounds during the Iran-Iraq War." Neurosurgery 27(5): 692-695.

Variables important in predicting the final postsurgical outcome of 435 patients who sustained missile head wounds during the Iran-Iraq War were evaluated over a 99-month period. The type of projectile, site of injury, and presence or absence of foreign material did not seem to have a significant effect on the final outcome. Of the patients with a perforating type of injury, 48.8% had a poor surgical outcome as compared with 19.9% with a penetrating type and 15.6% with a tangential type. This difference is statistically significant (chi 2 = 14.7 and 17.1, respectively; p less than 0.001). The most important factor in predicting overall outcome was the Glasgow Coma Scale (GCS) score at the time of admission. Mortality and morbidity contributing to a poor surgical outcome were noted in only 6% of patients with a GCS score at admission of 13 to 15, in 24.6% of those with a GCS score of 9 to 12, in 57% of those with a GCS score of 6 to 8, and in 65% of those with a GCS score of 3 to 5. Of the 71 patients who died, 75% had a score of 3 to 8. Perforating projectiles or those traversing two or more dural compartments were statistically significant in contributing to mortality and morbidity (chi 2 = 17.2; p less than 0.001). The incidence of focal neurological deficit was 100, 90.6, 88, and 52.2% in patients with GCS scores of 3 to 5, 6 to 8, 9 to 12, and 13 to 15, respectively. The two best predictors of mortality in this group of patients were a low GCS score and infection.

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45. Aarabi, B. (1995). "Management of traumatic aneurysms caused by high-velocity missile head wounds." Neurosurgery clinics of North America 6(4): 775-797.

Trauma is implicated as a significant factor in the genesis of fewer than 1% of intracranial aneurysms. With the introduction of powerful neuroimaging technology, slowly but definitely, predictive variables are being added to solve this seemingly deadly pathology resulting from projectile injuries of the brain. This article discusses recent literature, nonprojectile penetrating traumatic aneurysms, iatrogenically induced traumatic aneurysms, materials and methods, traumatic aneurysms, and results.

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46. Aarabi, B. (2003). "Management of missile head wounds." Neurosurgery Quarterly 13(2): 87-104.

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47. Aarabi, B. (2015). "Comments." Operative Neurosurgery 11(2): E375.

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48. Aarabi, B. (2017). "Comments." Neurosurgery 81(3): 479-480.

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49. Aarabi, B. and J. Kufera (2013). "Predictors of outcome in gunshot wounds of the head." Neuroepidemiology 41(3-4): 241.

Objective: Civilian gunshot wounds to the head (GSWH) are deadly. Predictors of clinical outcome due to GSWH were analyzed over a 24-month period. Methods: We posited two questions: 1) What percentage of subjects with GSWH died across the state of Maryland; and 2) What were the predictors of good outcome (GOS) following GSWH? Demographics, clinical, imaging and acute care data of 786 civilians who sustained GSWH were analyzed. Univariate and regression analyses were used to analyze the data. Results: Of this cohort (N = 786 patients), 594 died at the scene and 122 died following admission to 8 Level I-III Trauma Centers. Seventy patients made it to TBI rehabilitation of which 30 (3.8%) had surgery. From the 69 patients who were admitted to this Level I Trauma Center, 78.6% were male, mean age was 34.8, injury severity score 26.7, GCS 7.1, and abnormal pupillary response to light (APR) was present in 47.4% of patients. CT scan indicated midline shift in 17.5%, obliteration of basal cisterns in 42.5%, intracranial hematomas in 35% and intraventricular hemorrhage in 55% of cases. Two subsets of admissions were studied: (1) 27 patients who died during acute care and (2) 15 patients who had a good outcome when followed a mean of 39 months. Missile trajectory ($p < 0.001$), admission GCS ($p < 0.001$), APR ($p = 0.002$), patency of basal cisterns ($p = 0.01$), age ($p = 0.02$) and intraventricular bleed ($p = 0.03$) had significant relationship with outcome. Stepwise multivariable logistic regression analysis indicated that GCS and patency of basal cistern were significant determinants of outcome. Exclusion of GCS from the regression models indicated missile trajectory and APR were significant players in determining outcome. Conclusions: GCS at admission, APR to light, patency of basal cisterns and the trajectory of the missile were significant determinants of outcome in civilian GSWH.

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50. Aarabi, B., et al. (1998). "Central nervous system infections after military missile head wounds." Neurosurgery 42(3): 500-509.

OBJECTIVES: To evaluate variables instrumental in central nervous system infections after military missile head wounds, using uni- and multivariate analysis in 964 patients during the 8-year Iran-Iraq War., METHODS: Factors considered in this retrospective study were: the types of projectile, mode of injury, paranasal sinus involvement, number of lobes involved, transventricular injuries, place of exploration (base hospital or Nemazee Hospital), cerebrospinal fluid (CSF) fistulas, Glasgow Coma Scale (GCS) score, retained bone, and retained shell fragments., RESULTS: During the study period, 105 patients (11%) developed central nervous system infections, including 20 abscesses, 1 case of cerebritis, 2 cases of fungus cerebri, and 82 cases of meningitis. gram-negative organisms, especially Klebsiella pneumoniae, were the most frequent offending organisms. Forty-one percent of the 133 deaths were due to infections, but the death rate from infection was only 4.4%. Univariate analysis showed mode of injury, number of lobes involved, ventricular penetration, paranasal sinus involvement, CSF fistulas, place of exploration, GCS score, and retained bone fragments to have significant bearing on the incidence of central nervous system infections. On the other hand, multivariate regression analysis disclosed the following factors each enhancing infection: CSF fistulas ($chi2 = 46.526$), transventricular injuries ($chi2 = 13.4790$), and paranasal petrous sinuses involvement ($chi2 = 4.2221$). When compared with primary exploration at the Nemazee Hospital, both exploration at a base hospital and no exploration at all were associated with increased chances of infection ($chi2 = 4.7629$ and 8.3220, respectively). Additionally, when tangential, crossed penetrating, and uncrossed penetrating injuries were compared with through-and-through injuries, the uncrossed penetrating mode was associated with less infection ($chi2 = 0.1652$, 2.6353, and 5.0817, respectively). Only two patients were readmitted for

new evidence of infection 3 and 5 months after missile head wounds, one definitely due to and the other on suspicion of CSF fistulas. One hundred and thirty-seven of 587 patients with retained bone fragments were followed a mean of 42 months with no evidence of delayed infection., CONCLUSION: In this study, CSF fistulas and transventricular and paranasal sinus injuries all were associated with increased chances of central nervous system infections after military missile head wounds. Infection rate was lower in penetrating injuries not crossing into another dural compartment. Exploration at the Nemazee Hospital, despite delays in evacuation, had less incidence of infection than surgery at a base hospital within the first 24 hours of injury. Retained bone and metal fragments, a lower GCS score at the time of admission, secondary exploration at the Nemazee Hospital, and number of lobes involved were less important when evaluated in a multivariate regression model.

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51. Aarabi, B., et al. (2000). "Prognostic factors in the occurrence of posttraumatic epilepsy after penetrating head injury suffered during military service." Neurosurgical focus 8(1): e1.

In this retrospective study, the authors evaluated confounding risk factors, which are allegedly influential in causing unprovoked posttraumatic epilepsy, in 489 patients from the frontlines of the Iran-Iraq War. Four hundred eighty-nine patients were followed for 6 to154 months (mean 39.4 months, median 23 months), and important factors precipitating posttraumatic epilepsy were evaluated using uni- and multivariate regression analysis. One hundred fifty-seven (32%) of 489 patients became epileptic during the study period. The results of univariate analysis indicated a significant relationship between epilepsy and Glasgow Outcome Scale (GOS) score ($X2 = 76.49$, $p < 0.0001$, $df = 2$), Glasgow Coma Scale score at admission ($X2 = 19.48$, $p < 0.0001$, $df = 3$), motor deficit ($X2 = 11.79$, $p < 0.001$, $df = 1$), mode of injury ($X2 = 10.731$, $p < 0.05$), transventricular injury ($X2 = 6.9$, $p < 0.008$, $df = 1$), dysphasia ($X2 = 5.3$, $p < 0.02$), central nervous system infections ($X2 = 5.3$, $p < 0.02$), and early-onset seizures ($X2 = 4.1$, $p < 0.04$, $df = 1$). The results of multivariate analysis, on the other hand, indicated that the GOS score and motor deficit were of greater statistical importance ($X2 = 35.24$, $p < 0.0001$; and $X2 = 7.1$, $p < 0.07$, respectively). Factors that did have much statistically significant bearing on posttraumatic epilepsy were the projectile type, site of injury on the skull, patient age, number of affected lobes, related hemorrhagic complications, and retained metallic or bone fragments. Glasgow Outcome Scale score and focal motor neurological deficit are of particular importance in predicting posttraumatic epilepsy after missile head injury.

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52. Aarabi, B., et al. (2014). "Predictors of outcome in civilian gunshot wounds to the head." Journal of neurosurgery 120(5): 1138-1146.

OBJECT: Civilian gunshot wounds to the head (GSWH) are often deadly, but some patients with open cranial wounds need medical and surgical management and are potentially good candidates for acceptable functional recovery. The authors analyzed predictors of favorable clinical outcome (Glasgow Outcome Scale scores of 4 and 5) after GSWH over a 24-month period., METHODS: The authors posited 2 questions: First, what percentage of civilians with GSWH died in the state of Maryland in a given period of time? Second, what were the predictors of favorable outcome after GSWH? The authors examined demographic, clinical, imaging, and acute care data for 786 civilians who sustained GSWH. Univariate and logistic regression analyses were used to analyze the data., RESULTS: Of the 786 patients in this series, 712 (91%) died and 74 (9%) completed acute care in 9 trauma centers. Of the 69 patients admitted to one Maryland center, 46 (67%) eventually died. In 48 patients who were resuscitated, the Injury Severity Score was 26.2, Glasgow Coma Scale (GCS) score was 7.8, and an abnormal pupillary response (APR) to light was present in 41% of patients. Computed tomography indicated midline shift in 17%, obliteration of basal cisterns in 41.3%, intracranial hematomas in 34.8%, and intraventricular hemorrhage in 49% of cases. When analyzed for trajectory, 57.5% of bullet slugs crossed midcoronal, midsagittal, or both planes. Two subsets of admissions were studied: 27 patients (65%) who had poor outcome (25 patients who died and 2 who had severe disability) and 15 patients (35%) who had a favorable outcome when followed for a mean period of 40.6 months. Six patients were

lost to follow-up. Univariate analysis indicated that admission GCS score ($p < 0.001$), missile trajectory ($p < 0.001$), surgery ($p < 0.001$), APR to light ($p = 0.002$), patency of basal cisterns ($p = 0.01$), age ($p = 0.01$), and intraventricular bleed ($p = 0.03$) had a significant relationship to outcome. Multivariable logistic regression analysis indicated that GCS score and patency of the basal cistern were significant determinants of outcome. Exclusion of GCS score from the regression models indicated missile trajectory and APR to light were significant in determining outcome., CONCLUSIONS: Admission GCS score, trajectory of the missile track, APR to light, and patency of basal cisterns were significant determinants of outcome in civilian GSWH.

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53. Aarabi, B., et al. (2014). "Predictors of outcome in civilian gunshot wounds to the head: Clinical article." Journal of neurosurgery 120(5): 1138-1146.

Object. Civilian gunshot wounds to the head (GSWH) are often deadly, but some patients with open cranial wounds need medical and surgical management and are potentially good candidates for acceptable functional recovery. The authors analyzed predictors of favorable clinical outcome (Glasgow Outcome Scale scores of 4 and 5) after GSWH over a 24-month period. Methods. The authors posited 2 questions: First, what percentage of civilians with GSWH died in the state of Maryland in a given period of time? Second, what were the predictors of favorable outcome after GSWH? The authors examined demographic, clinical, imaging, and acute care data for 786 civilians who sustained GSWH. Univariate and logistic regression analyses were used to analyze the data. Results. Of the 786 patients in this series, 712 (91%) died and 74 (9%) completed acute care in 9 trauma centers. Of the 69 patients admitted to one Maryland center, 46 (67%) eventually died. In 48 patients who were resuscitated, the Injury Severity Score was 26.2, Glasgow Coma Scale (GCS) score was 7.8, and an abnormal pupillary response (APR) to light was present in 41% of patients. Computed tomography indicated midline shift in 17%, obliteration of basal cisterns in 41.3%, intracranial hematomas in 34.8%, and intraventricular hemorrhage in 49% of cases. When analyzed for trajectory, 57.5% of bullet slugs crossed midcoronal, midsagittal, or both planes. Two subsets of admissions were studied: 27 patients (65%) who had poor outcome (25 patients who died and 2 who had severe disability) and 15 patients (35%) who had a favorable outcome when followed for a mean period of 40.6 months. Six patients were lost to follow-up. Univariate analysis indicated that admission GCS score ($p < 0.001$), missile trajectory ($p < 0.001$), surgery ($p < 0.001$), APR to light ($p = 0.002$), patency of basal cisterns ($p = 0.01$), age ($p = 0.01$), and intraventricular bleed ($p = 0.03$) had a significant relationship to outcome. Multivariable logistic regression analysis indicated that GCS score and patency of the basal cistern were significant determinants of outcome. Exclusion of GCS score from the regression models indicated missile trajectory and APR to light were significant in determining outcome. Conclusions. Admission GCS score, trajectory of the missile track, APR to light, and patency of basal cisterns were significant determinants of outcome in civilian GSWH.

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54. Aaronson, A., et al. (2016). "Aggression following traumatic brain injury: Could seizures play a role?" Journal of Neuropsychiatry and Clinical Neurosciences 28(3): e33.

Background: Aggression following penetrating TBI (pTBI) occurs in up to 1/3 of pTBI patients. The link between frontal lobe lesions and aggression has been demonstrated, however some people with lesions in parts of the brain not generally associated with disinhibition, violence or fear will also show aggressive behavioral changes. It has also been noted that some forms of post-TBI aggression and posttraumatic epilepsy may stem from overlapping network connectivity, leading some to theorize that the brain areas involved in seizures may also play a role in aggression. Objective: Compare patients who developed seizures following pTBI to those who did not develop seizures following pTBI on the Neuropsychiatric Inventory (NPI) aggression subscale to determine if presence of seizures predicts aggressive behavior. Determine if location of lesion has an effect on this correlation. Methods: 159 patients with pTBI were drawn from the Vietnam Head Injury Study registry. Patients with pTBI were divided according to presence (N=69) or absence (N=90) of seizures following injury. Aggression was

assessed using the aggression subscale of the NPI. Lesion location was determined using voxel-by-voxel assessment of CTs. Results: A chi-square analysis indicated that patients who developed seizures following TBI were more likely to have elevated NPI aggression scores than patients without seizures (x2 = 9.563, p value=0.003). There was no statistically significant correlation between NPI score and location of lesion in the population with seizures. Conclusion: Patients who developed seizures following pTBI were more likely to engage in aggressive behavior postinjury, regardless of lesion location.

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55. Aaronson, D., et al. (2022). "Lead Toxicity Due to Retained Intracranial Bullet Fragment: A Case Report and Review of the Literature." Brain injury 36(SUPPL 1): 60.

Background: Lead toxicity (plumbism) secondary to retained lead bullet fragments is a rare complication in patients with gunshot wounds. To our knowledge, there has not been a definitive case reported of lead toxicity due to retained intracranial bullet fragments. Case Description: A 23-year-old man presented after being found down. Computed tomography scan of the head revealed bullet fragments within the calvarium adjacent to the left transverse sinus. During follow-up he developed symptoms of plumbism with paraesthesias in his bilateral hands and thighs, abdominal cramping, and labile mood. Plumbism was confirmed with sequentially elevated blood lead levels. The patient opted for surgical removal of the bullet fragments, which lead to a reduction in blood lead levels and resolution of his symptoms. Conclusions: Although rare, lead toxicity from retained intracranial bullet fragments should be considered in patients who have suffered a gunshot wound to the head and have symptoms of lead toxicity with elevated blood lead levels. For safe and easily accessible intracranial bullet fragments in patients with plumbism, surgical intervention may be indicated.

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56. Abarca-Olivas, J., et al. (2011). "Perforating brain injury from a speargun. A case report." Neurocirugia (Asturias, Spain) 22(3): 271-275.

A case of a perforating brain injury caused by a speargun in a suicide attempt is described. Although this kind of injuries has been previously reported, the present case is specially interesting because the patient showed no neurological deficit after surgery. Some advices about the medical and surgical management are proposed based on this case and our literature review. The use of antibiotics and antiepileptic drugs and the anterograde extraction of the harpoon aided by the performance of a craniotomy surrounding the exit point are recommended.

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57. Abd Elaziz, M. S., et al. (2017). "Stromal lenticule transplantation for management of corneal perforations; one year results." Graefe's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle Ophthalmologie 255(6): 1179-1184.

PURPOSE: To study application of stromal lenticules extracted by femtolaser small incision lenticule extraction (SMILE) surgery as a surgical adjuvant to seal corneal perforations., METHODS: Corneal stromal lenticules obtained through SMILE surgery with central thickness 100 mum or more were fixed over corneal perforation sites using 10-0 nylon interrupted stitches with an overlying single layer of amniotic membrane. Seven patients who had been followed up for a minimum of 12 months were assessed using slit-lamp biomicroscopy, fluorescein stain, tonometry, and best spectacle-corrected visual acuity (BSCVA) measurements. Postoperative complications were recorded throughout the follow up period., RESULTS: Corneal perforations had successfully been sealed in all 7 patients; 3 patients (42.9%) exhibited improved postoperative BSCVA. During the follow-up period of one year, no signs of re-perforation or infections were detected in any patient., CONCLUSIONS: These early findings suggest that the use of corneal stromal lenticules could be a safe and efficient surgical adjuvant for corneal perforation closure with potential clinical application, together with amniotic membrane, as relatively simple and low cost temporary measures to prepare perforated corneas for further definitive procedures.

58. Abdali, H. A., et al. (2018). "Cranial gravitational (falling) bullet injuries: Point of view." Journal of neurosciences in rural practice 9(2): 278-280.

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59. Abdallah, O. I., et al. (2022). "Surgical Reconstruction of a Traumatic Superior Sagittal Sinus Injury Using Synthetic Vascular Graft in a Resource-Limited Civilian Field Hospital During the Syrian Civil War." World neurosurgery 159: 126-129.

BACKGROUND: Traumatic dural sinus injuries following penetrating brain injury are rare but are often associated with significant morbidity and mortality. The management of significant defects is operative and can be challenging. In modern civilian practice, patients with these injuries typically receive extensive preoperative investigation and advanced perioperative monitoring., METHODS: We report a case of successful operative management in a frontline civilian field hospital of a 33-year-old man who sustained a shrapnel injury to the junction of the middle and posterior thirds of the superior sagittal sinus during the Syrian Civil War., RESULTS: The injury was repaired successfully with a polytetrafluoroethylene graft. The postoperative course was uncomplicated. Anticoagulation was commenced 2 days postoperatively. The patient was discharged 5 days postoperatively with a GCS of 15 and mild weakness of the limbs bilaterally., CONCLUSIONS: Immediate repair of dural sinus injuries is feasible in the context of a low-resource wartime environment and should be attempted without delay. To our knowledge, this is the first case of successful use of a synthetic vascular graft for repair of a dural venous sinus injury in an ill-equipped hospital.

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60. Abderakhman, S. (1983). "[Diagnosis of penetrating gunshot injuries of the skull and brain using computerized tomography]." Diagnostika pronikaiushchikh ognestrel'nykh ranenii cherepa i golovnogo mozga s pomoshch'iu kompiuternoi tomografii.(6): 52-53.

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61. Abdoli, A. and A. Amirjamshidi (2009). "Work-related penetrating head trauma caused by industrial grinder tool." Archives of Iranian medicine 12(5): 496-498.

Nonmissile low-velocity penetrating brain injuries are unusual among civilian population. Work-related penetrating head wounds are rarer among this group. Here, we report two rare cases of penetrating head wounds caused by industrial grinder tool. The patients (both men) were struck to the head by detached blades of the grinder tool. Depressed fractures, penetrated bone fragments, and dural lacerations were all treated by the routine fashion. Paranasal sinus damage and further cerebrospinal fluid leakage were also treated conservatively. The reported cases are unexpected variants of injuries that neurosurgeons may come across and their management is still beyond the scope of textbooks. Skill and experience of the general neurosurgeons can handle the cases properly but prevention of such incidents using safer and guarded instruments should be stressed to manufacturers.

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62. Abdulazeez, M. M., et al. (2018). "Intracranial ricocheted-bullet injuries: An overview and illustrative case." Journal of Acute Disease 7(5): 186-190.

The impact of a bullet by firearm is a mortal entity that in recent years has been on the rise due to the increase in crime, confrontations, among other acts of violence. Brain injuries by firearm account for 33.3% of all fatal injuries from this type of weapon. This resulted in a significant number of disabilities with its burden cost at a global level. The types of bullet injuries to the head include: penetrating (inlet without outlet), perforating (through and through), tangential (not enter the skull, causing coupe injury), ricochet (intracranial bouncing of bullet) and careening (rare, enter skull but not brain, runs in the subdural space). There are several situations that can occur once the bullet enters the body or into the intracranial cavity. Unmatched association of the bullet trajectory with the final position of the bullet

within the body raise the suspicion for additional phenomena involvement, this can be explained by either internal bullet ricochet or internal bullet migration. The former usually represents an active movement and the latter is a passive movement. Intracranial ricocheting of bullets forms up to 25% of all penetrating bullet injuries to the skull. Such bullets types are commonly tumbling and have an unpredictable trajectory. The surgical management for intracranial bullet injury developed over decades from the time of Harvey Cushing and the World War I till the present. Now, the accepted intervention ranges from simple wound care to a proper surgery that includes hematoma evacuation, removal of only accessible bone fragments and foreign bodies, dural repair and wound debridement with or without decompressive craniectomy. Also, intracranial pressure monitoring is generally indicated. We reported a thirty-three years old male, victim of homicidal bullet injury to the head, presented with Glasgow Coma Scale score of 8 (best eye response: 2, best motor response: 4, best verbal response: 2), upon examination a right parietal (near vertex) inlet without outlet was found. The poor prognostic factors in this patient included bi-hemispheric involvement, associated acute subdural hematoma with interhemispheric extension, ricochet type of injury and effacement of sulci. Intracranial ricocheted-bullet injury is a special entity of bullet injury to the head with its particular ballistics and management that deserve highlighting by the trauma team to gain fluent treatment and better outcome.

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63. Abdulbaki, A., et al. (2012). "Transorbital craniocerebral occult penetrating injury with cerebral abscess complication." Case reports in ophthalmological medicine 2012: 742186.

Transorbital intracranial penetrating injury is an uncommon mechanism of head injury. These injuries can be occult during the initial clinical presentation. Certain patients develop an intracranial cerebral infection. Herein, we report a 5-year-old child with an occult transorbital intracranial penetrating injury caused by a pen. A retained pen tip was found at the superior orbital roof and was not noticed at initial presentation. This was complicated by a right frontal lobe cerebral abscess. This paper emphasizes the importance of orbitocranial imaging in any penetrating orbital injury. A review of the literature on intracranial infection locations in relation to the route and mechanism of injury is included to complement this report.

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64. Abdulla, M. A. H., et al. (2017). "Cellular inflammatory response to penetrating trauma caused by transplantation surgery in the brain." British journal of neurosurgery 31(2): 122.

Objectives: Large proportion of cells that are transplanted surgically into the brain die early after procedure. The remainder display suboptimal survival and integration patterns owing to ongoing inflammatory and immunological processes. This study aimed to probe cellular contribution to inflammation induced by surgical trauma. Design: Laboratory experiment. Subjects: 64 adult female SD rats. Methods: Rats were assigned to 3 groups. Each group underwent a unilateral stereotactic procedure on the striatum: 1) Needle insertion for 2 minutes, 2) Excitotoxic (Quinolinic acid) lesion induction, 3) Lesion induction followed by needle insertion after 2 weeks. Immunohistochemistry and stereology were undertaken at 4 time points post-procedure: 1 hour, 24 hours, 72 hours and 1 week. Groups were compared to matched controls on respective time points. Analysis was done using 2way ANOVA with Bonferroni and Tukey's tests. Results: Significant recruitment of microglia, macrophages and circulating monocytes to injury site was noted 72 hours after needle insertion ($P<0.05$), this response was augmented upon lesion induction ($P< 0.001$). Cell numbers appeared to be fading by 1 week and approached baseline by 2 weeks. A second surgery at 2 weeks resulted in an amplified cellular response compared to first procedure ($P<0.001$). Conclusions: Although delayed, inflammatory cells reaction to surgical trauma contributes to neural graft site hostility. Cells appear to be primed after first injury and subsequent trauma tends to result in a more enhanced response.

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65. Abe, T., et al. (1986). "Partial disconnection syndrome following penetrating stab wound of the brain." European neurology 25(3): 233-239.

A case of callosal disconnection syndrome caused by a penetrating stab wound of the brain is reported. A portion of the genu and the inferior splenium of the corpus callosum were sectioned by an ice pick without any other significant cerebral damage. We could detect incomplete disconnection left visual alexia by tachistoscopy. It would now appear that the inferior part of the splenium has a significant functional role in transmitting visual verbal codes from the right to the left cerebral hemisphere, but the remaining superior fibers of the splenium may carry some information, albeit less efficiently than the intact structure.

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66. Abla, A. A., et al. (2011). "Delayed presentation of traumatic cerebral and dural arteriovenous fistulae after a BB gun accident in a pediatric patient: case report." Neurosurgery 68(6): E1750-1755.

BACKGROUND AND IMPORTANCE: To present a case of traumatic cortical and dural arteriovenous fistula (AVF) after a BB gun accident., CLINICAL PRESENTATION: The patient presented with a small left frontal subdural hematoma and small contusions in the left frontal lobe after he was shot with a BB. He had no skull fractures or significant midline shift. The patient, who was neurologically intact, was discharged after 3 days of observation and having undergone serial computed tomography imaging. Five days later, the patient developed lethargy and emesis. Computed tomography showed a 5 x 3 x 5 cm intraparenchymal hematoma in the left frontal lobe. Emergency evacuation of the hematoma revealed a cortical AVF, which was resected. Postoperative angiography showed a dural AVF of the left middle meningeal artery, draining into the superior ophthalmic vein and a dural vein. The dural AVF was embolized with n-butyl cyanoacrylate. The patient was discharged after 3 days with no deficits., CONCLUSION: The subdural hematoma and contusions were caused by a BB, which often are used in low-velocity and small caliber weapons. Not all BB guns are low velocity, and the consequences can be dramatic. The BB gun used here was pneumatic. The patient had no skull fractures. Several days of stable imaging and normal examinations suggested nothing sinister. His initial bleeds appeared disproportionate to the mechanism. The delayed presentation of the debilitating hematoma in this case stresses the need for vigilance on the part of practitioners and families when patients have a suspicious bleed.

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67. Abookasis, D., et al. (2013). "Monitoring hemodynamic and morphologic responses to closed head injury in a mouse model using orthogonal diffuse near-infrared light reflectance spectroscopy." Journal of biomedical optics 18(4): 045003.

The authors' aim is to assess and quantitatively measure brain hemodynamic and morphological variations during closed-head injury (CHI) in mice using orthogonal diffuse near-infrared reflectance spectroscopy (o-DRS). CHI is a type of injury to the head that does not penetrate the skull. Usually, it is caused by mechanical blows to the head and frequently occurs in traffic accidents, falls, and assaults. Measurements of brain optical properties, namely absorption and reduced scattering coefficients in the wavelength range from 650 to 1000 nm were carried out by employing different source-detector distance and locations to provide depth sensitivity on an intact scalp over the duration of the whole experiment. Furthermore, alteration in both cortical hemodynamics and morphologic markers, i.e., scattering power and amplitude properties were derived. CHI was induced in anesthetized male mice by a weight-drop model using ~50 g cylindrical metal falling from a height of 90 cm onto the intact scalp producing an impact of 4500 g cm. With respect to baseline, difference in brain physiological properties was observed following injury up to 1 h post-trauma. Additionally, the reduced scattering spectral shapes followed Mie scattering theory was quantified and clearly shows changes in both scattering amplitude and power from baseline indicating structural variations likely from evolving cerebral edema during CHI. We further demonstrate high correlation between scattering amplitude and scattering power, with more than 20% difference in slope in comparison to preinjury. This result indicates the possibility of using the slope also as a marker for detection of structural changes. Finally, experiments investigating brain function during the first 20 min postinjury were conducted and changes in chromophore concentrations and scattering were observed. Overall, our experiments demonstrate the potential of using the proposed

technique as a valuable quantitative noninvasive tool for monitoring brain physiology following CHI injury at the bedside and/or at the field.

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68. Aboud, N. D., et al. (1995). "Assessment and management of manual traumatic enucleation." Australian and New Zealand journal of ophthalmology 23(1): 55-57.

BACKGROUND: Gouging injuries represent a rare, severe form of orbital trauma. We report a case of manual traumatic enucleation., METHOD: Records of the patient were reviewed., RESULTS: The outcome of this case was loss of the globe with an uncomplicated recovery., CONCLUSIONS: Without attention to the particular principles of assessment and management outlined in this report, a satisfactory outcome is not assured.

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69. Abraham, Z. S., et al. (2021). "Jael's syndrome: Case report and literature review." International journal of surgery case reports 88.

Introduction and importance: Jael's syndrome, an intentional injury caused by a knife in the face or skull is a rare encounter in clinical and forensic practice, rarely involving an impacted knife. Clinical and radiographic diagnosis is essential to identify severity of injury and location of the retained knife. To the best of our knowledge, this is the first reported novel case of Jael's syndrome in Tanzania. Case presentation: We present the case of a 31-year old man admitted at Muhimbili National Hospital following an impacted knife. The stab wound extended to the medial wall of left orbit and ended just before the optic foramen associated with vitreous hemorrhage and the retained knife caused superoposterior displacement of the globe. Multidisciplinary management was instituted including prompt evaluation, imaging and surgical removal of the knife under general anesthesia. Clinical discussion: Plain skull X-ray revealed an extensive retained blade and computerized tomography (CT) showed the tip of the blade adjacent to the right styloid process with no neurovascular compromise. Initial concern was the left eye that was reported to be viable by ophthalmologists. Incredibly, the patient had no initial sequelae from such an extensive injury and had unremarkable recovery with no complications apart from the wound to left inferior rectus muscle that was conservatively managed. Simple withdrawal of the retained knife was successful. Conclusion: Craniofacial retained knives are rare. Thorough prompt initial evaluation and intervention is vital since improper management can be devastating.

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70. Abrames, E. L., et al. (2008). "Radiology corner. Traumatic carotid pseudoaneurysm post gun shot wound to the head / neck." Military medicine 173(5): xv-xvi.

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71. Abramowicz, S., et al. (2017). "Facial Fractures in Patients With Firearm Injuries: Profile and Outcomes." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons 75(10): 2170-2176.

PURPOSE: Firearm injuries (FAIs) are a major public health issue in the United States. The objective of this study was to examine characteristics and outcomes of patients presenting to emergency departments (EDs) with facial fractures attributed to FAIs., MATERIALS AND METHODS: The Nationwide Emergency Department Sample for the years 2008 to 2013 was used. All patients who visited EDs with FAIs and facial fractures were selected. The study focused on the following variables: 1) demographic characteristics, 2) types of facial fractures, 3) disposition status after ED visit or subsequent hospitalization, 4) charges (ED and hospitalization), and 5) patient outcomes. The inclusion criteria were a visit to a hospital-based ED with facial fractures and an external cause of FAI. Descriptive statistics were used to summarize findings. Multivariate logistic regression analysis was used to examine the simultaneous effects of patient-related factors on ED death., RESULTS: During the study period, a total of 15,469 patients (mean age, 34 years) visited hospital-based EDs with facial

fractures attributed to FAIs. Most were uninsured male patients. The most common etiology of FAIs was assault. The most common facial fractures were open mandibular fractures and open maxillary and/or malar bone fractures. Approximately 27% of patients had a concomitant intracranial injury. After the ED visit, 74% were admitted. The mean ED charge per patient was $6,403, and the total ED charge across the United States was $76.48 million. The mean hospitalization charge per patient was $167,203. The total hospitalization charge across the United States was $1.9 billion. Patients with intracranial injuries (odds ratio [OR], 21.21; 95% confidence interval [CI], 7.16 to 62.85; P < .01), uninsured patients (OR, 4.24; 95% CI, 1.44 to 12.51; P < .01), and patients residing in areas with high household incomes (OR, 5.60; 95% CI, 2.51 to 12.46; P < .01) were high-risk groups for ED death., CONCLUSIONS: FAIs require substantial resources for stabilization and treatment by EDs. This study highlights the burden and impact of facial fractures in patients with FAIs in the United States.

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72. Abu-Judeh, H. H., et al. (1998). "Cerebral perfusion imaging in asymptomatic carotid artery occlusion following gun shot." Journal of nuclear medicine : official publication, Society of Nuclear Medicine 39(4): 629-631.

Recognition of brain injury in asymptomatic carotid artery injuries with conventional methods can be difficult. We present a case of angiographically proven asymptomatic left internal carotid artery occlusion with normal CT after a gunshot wound. The SPECT brain perfusion imaging showed mild generalized supratentorial hypoperfusion of the bilateral cerebral cortices on the left side and severe left temporal lobe hypoperfusion.

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73. Acar, N., et al. (2020). "Early and Ultraearly Administration of Tranexamic Acid in Traumatic Brain Injury: Our 8-Year-Long Clinical Experience." Emergency medicine international 2020: 6593172.

INTRODUCTION: The most important result of head trauma, which can develop with a blunt or penetrating mechanism, is traumatic brain injury. Tranexamic acid (TXA) can be used safely in multiple trauma. Recent studies showed that TXA can be useful in management of intracerebral hemorrhage, especially in reducing the amount of bleeding. The TXA given in the first 3 hours has been shown to reduce mortality. The aim of our study was to evaluate the effectiveness of tranexamic acid used in patients with traumatic brain injury., METHOD: Patients with trauma in the emergency room between January 2012 and January 2020 were screened in this retrospective study. The inclusion criteria were being over the age of 18 years, tranexamic acid administration in the emergency department, and traumatic brain injury on brain computerized tomography (CT) and control CT imaging after 6 hours., RESULTS: The number of study patients was 51. The median score of GCS was 12.00 (8.00-15.00). Subdural hemorrhage and subarachnoid hemorrhage were the most common findings on brain CT scans. In the group TXA treatment for less than 1 hour, the arrival MAP was low and the pulse was high (p=0.022 and p=0.030, respectively). All the patients were admitted with multiple trauma. None of the 51 patients had thrombotic complications and died due to head injury., CONCLUSION: TXA appears to be a safe drug with few side effects in the short term in head injuries. According to our experience, it comes to mind earlier in multiple trauma, especially in head trauma with pelvic trauma.

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74. Acarturk, S., et al. (1994). "Reconstruction of the wide palate defects with temporal osteocutaneous island flaps." European Journal of Plastic Surgery 17(4): 195-198.

The temporal osteocutaneous island (TOCI) flap was first performed in reconstruction of palatal defects by Furnas. It consists of temporoparietal fascia, galea, pericranium and the cortical layer of parietal bone covered with pericranium. In this study, we present five patients with wide palatal defects treated by TOCI flaps. The causation of the wide palatal defects were gun-shot wounds in two patients

and unsuccessful reconstruction of congenital cleft palate during early childhood in three patients. All patients were adult. TOCI flaps were performed in two stages. At first, the TOCI flap was elevated and covered with a split thickness skin graft. In the second stage (approximately 1.5 months later), the flap was elevated based on the superficial temporal artery as an island flap. It was then transferred to the palatal defect via a cheek tunnel and sutured to the edges of the defect. There was no need for bone fixation. The length of the pedicle of the flap was sufficient in size to easily reach the anterior part of the palate. No serious complications were seen. One minor oronasal fistula occurred; this was repaired by local flaps. The TOCI flaps improved speech only partially. In conclusion, we believe this procedure is a good method for reconstruction in wide palatal defects which need three layer closure. This procedure is not a satisfactory solution for complete correction of speech defects.

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75. Acharya, A., et al. (2020). "An Unusual Case of Penetrating Injury Skull with Metallic RCC Rod in A Child - A Rare Case Scenario with Review of Literature." Neurology India 68(6): 1462-1464.

Penetrating head injuries can be the result of numerous intentional or unintentional events, including missile wounds, stab wounds, and motor vehicle or occupational accidents (nails, screw-drivers). Penetrating head injuries in children constitute even a smaller part of the total number of traumatic head injuries seen in casualty. We report a case of neuro-trauma who was operated in our institution. A 6-year-old female presented in casualty with an iron rod penetrating into the skull.

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76. Acharya, M. and A.-F. Popov (2021). "Traumatic brain injury donation is not associated with poorer outcomes following orthotopic heart transplantation." International journal of cardiology 323: 192-193.

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77. Achola, K. A., et al. (2022). "Implementing the WHO Safe Childbirth Checklist modified for preterm birth: lessons learned and experiences from Kenya and Uganda." BMC health services research 22(1): 294.

BACKGROUND: The WHO Safe Childbirth Checklist (SCC) contains 29 evidence-based practices (EBPs) across four pause points spanning admission to discharge. It has been shown to increase EBP uptake and has been tailored to specific contexts. However, little research has been conducted in East Africa on use of the SCC to improve intrapartum care, particularly for preterm birth despite its burden. We describe checklist adaptation, user acceptability, implementation and lessons learned. METHODS: The East Africa Preterm Birth Initiative (PTBi EA) modified the SCC for use in 23 facilities in Western Kenya and Eastern Uganda as part of a cluster randomized controlled trial evaluating a package of facility-based interventions to improve preterm birth outcomes. The modified SCC (mSCC) for prematurity included: addition of a triage pause point before admission; focus on gestational age assessment, identification and management of preterm labour; and alignment with national guidelines. Following introduction, implementation lasted 24 and 34 months in Uganda and Kenya respectively and was supported through complementary mentoring and data strengthening at all sites. PRONTO® simulation training and quality improvement (QI) activities further supported mSCC use at intervention facilities only. A mixed methods approach, including checklist monitoring, provider surveys and in-depth interviews, was used in this analysis. RESULTS: A total of 19,443 and 2229 checklists were assessed in Kenya and Uganda, respectively. In both countries, triage and admission pause points had the highest rates of completion. Kenya's completion was greater than 70% for all pause points; Uganda ranged from 39 to 75%. Intervention facilities exposed to PRONTO and QI had higher completion rates than control sites. Provider perceptions cited clinical utility of the checklist, particularly when integrated into patient charts. However, some felt it repeated information in other documentation tools. Completion was hindered by workload and staffing issues. CONCLUSION: This study highlights the feasibility and importance of adaptation, iterative modification and complementary activities to reinforce SCC use. There are important opportunities to improve its clinical utility by the addition of prompts specific to the needs of different contexts. The trial assessing the PTBi EA

intervention package was registered at ClinicalTrials.gov NCT03112018 Registered December 2016, retrospectively registered.

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78. Achram, M., et al. (1980). "Angiographic aspects of traumatic intracranial aneurysms following war injuries." The British journal of radiology 53(636): 1144-1149.

Intracranial aneurysms following head injuries occur very rarely. Only 15 cases following injuries by missiles or shrapnel have been reported in the world literature. The angiographic findings in seven cases injured during the recent fighting in Lebanon, are described. The relatively high frequency of occurrence of these aneurysms in our cases might be explained by the fact that they were injured by low velocity missiles. A high velocity missile would disrupt an artery completely. It is also of interest that most of the aneurysms originated from arterial branches along the path of the foreign body, but not in contact with it. Unlike congenital aneurysms, they bore no relationship to arterial bifurcations and, unlike aneurysms following closed-head injuries, none involved the large basal arteries. None of them had a neck, and a mass effect due to bleeding was found in six of the cases.

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79. Ackall, F., et al. (2017). "Laryngeal gunshots: Case report and literature review." Otolaryngology - Head and Neck Surgery (United States) 157(1): P228.

Objectives: Penetrating laryngeal injuries secondary to gunshot wounds (GSWs) are rare, especially in the postwar era. This study presents a case of GSW to the larynx as well as a review of the current literature. Methods: We present a case of laryngeal trauma secondary to a GSW. Institutional medical records were reviewed and analysis of the current literature was performed. Results: A 29-year-old man was shot multiple times at close range. One GSW involved the anterior neck and larynx. He did not have stridor or dyspnea on presentation. Direct laryngoscopy was performed, and findings included significant glottic edema and anterior laryngeal injury with injury to the anterior thyroid cartilage. Tracheotomy was performed, and postoperative laryngeal computed tomography confirmed destruction of the anterior thyroid lamina. The anterior commissure soft tissue appeared intact and stent was not placed. Staged transcervical open reduction internal fixation was performed. A gastric feeding tube was placed and the patient remained nil per os for 3 weeks without allowing for tracheotomy speaking valve use. At 1 month followup, the patient had a raspy voice but was swallowing without difficulty. Indirect laryngoscopic examination revealed mild glottic edema with good glottic closure. Conclusions: Acutely, laryngotracheal trauma secondary to GSWs can be life threatening and requires urgent airway stabilization. Maintaining a patent airway as well as voice and swallow function are long-term goals but can be challenging to accomplish. In cases of major laryngeal trauma, early surgical exploration of the larynx and repair should be considered to reduce the risk of glottic web formation.

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80. Acosta, J. A., et al. (1998). "Lethal injuries and time to death in a level I trauma center." Journal of the American College of Surgeons 186(5): 528-533.

BACKGROUND: The purpose of this study was to identify the causes and time to death of all trauma victims who died at a level I trauma center during an 11-year period., STUDY DESIGN: Autopsies were performed on all patients who died secondary to trauma. Retrospective review of these autopsies was carried out and appended to existing trauma registry data. Standard definitions were used to attribute the cause of death in each case. Preventable deaths were determined by a standardized peer review process., RESULTS: Between January 1985 and December 1995, a total of 900 trauma patients died. This represented 7.3% of all major trauma admissions (12,320). Seventy percent of these patients died within the first 24 hours of admission. Thoracic vascular and central nervous system (CNS) injuries were the most common causes of death in the first hour after admission to the hospital. CNS injuries were the most common causes of death within the 72 deaths after admission. Acute inflammatory processes (multiple organ failure, acute respiratory distress syndrome, and pneumonia) and pulmonary emboli were the leading causes of death after the first 72 hours. Overall, 43.6% (393 of 900) of all

trauma deaths were caused by CNS injuries, making this the most common cause of death in our study. The preventable death rate was 1%., CONCLUSIONS: The first 24 hours after trauma are the deadliest for these patients. Primary and secondary CNS injuries are the leading causes of death. Prevention, early identification, and treatment of potentially lethal injuries should remain the focus of those who treat trauma patients.

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81. Adakal, O., et al. (2022). "Concurrent impalement of two orbits in a child: A case report." International journal of surgery case reports 90: 106727.

INTRODUCTION: Orbital impalement is a serious and potentially life-threatening trauma if the brain or vessels at the base of the skull are affected. The authors report the results and aftermath of the management of a case of post-traumatic retention of an intra-orbital metallic foreign body., CASE PRESENTATION: A 5-year-old boy was struck by a motorcycle while crossing a road. His head struck the handlebars of the motorcycle with a left facial-orbital impact point. The examination revealed a foreign body penetrating the orbit at the level of the left upper eyelid with limitation of adduction. The radiological assessment confirmed the intra-orbital presence of the foreign body with probable fracture of the inner wall of the eyeball. Surgical exploration through the palpebral wound revealed an intact eyeball and an incarceration of the medial rectus muscle by a fracture of the internal wall. After delicate and meticulous removal of the foreign body, hemostasis was ensured and the wound was sutured. The evolution was satisfactory, without sequelae or visual prejudice., DISCUSSION: Imaging, i.e. a CT scan and a standard X-ray, is necessary to evaluate the lesions before adapting a therapeutic attitude. The choice of the approach for extraction must meet two cardinal concerns: extraction of the foreign body and minimal dissection or manipulation of the noble structures of the eye and its adnexa., CONCLUSION: Intra-orbital foreign bodies are rare but potentially serious. The type of the foreign substance, its intra-orbital extension and related lesions, as well as the extraction process, all influence the prognosis.

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82. Adam, A., et al. (2016). "Incidence of traumatic brain injury in a Ghanaian Tertiary Hospital." Journal of Medical and Biomedical Sciences 5(2): 5-12.

Traumatic brain injury (TBI) is considered as one of the most silent epidemics and its incidence is rising worldwide due to injuries associated with the increased use of motor vehicles and bad road network, particularly in middle-income and low-income countries including Ghana. The aim of this study was to assess the incidence of TBI, cause of injury as well as outcomes of patient's care in the Tamale Teaching Hospital in Ghana. This retrospective study was carried out at the Tamale Teaching Hospital, the only Tertiary referral hospital in the whole of the savanna ecological zone of Ghana over 43 months from January 2009 to July 2012. All patients admitted into the hospital and diagnosed as having TBI were included in the study. The medical records of a total of 671 patients who were diagnosed with TBI were reviewed. Information regarding the age, sex, occupation and initial external cause of injury was retrieved. Data regarding length of hospital stay and treatment outcome were also retrieved. External cause of injury was classified according to International Classification of Diseases (ICD) guidelines as Road Traffic Accidents (RTA) (irrespective of type), fall from height, assault, gunshot, game or sport related accident and other causes. Road traffic accident accounts for relatively high incidence of hospitalized TBI. Majority of the patients were male within the 21-30 year age group. The high number of Intensive Care Unit (ICU) fatalities may indicate that more resources and facilities (intensive care nurses and equipment to monitor intracranial pressure) are needed to help in the management of cases particularly head injuries.

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83. Adam, J. C., et al. (1999). "[Accidental intracerebral penetration of a nasal hemostatic probe]." Penetration intracerebrale accidentelle d'une sonde de tamponnement nasal. 18(4): 436-439.

We report a case of inadvertent intracerebral introduction of a haemostatic device (Brighton tube) inserted into a nasal cavity for control of epistaxis in a patient with major craniofacial trauma. This complication remained unrecognized in the unconscious patient until the subsequent CT-scan control. In unconscious patients with a major facial trauma, intranasal haemostatic probes should be inserted under direct visual control by a ENT specialist and their position checked by digital palpation of the inflated cuffs behind the soft palate.

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84. Adams, G. and C. R. Nelms (1976). "Complicated mandibular fractures." Otolaryngologic clinics of North America 9(2): 453-464.

In many mandibular fractures, proper alignment of the fragments is only a portion of the management program. Consideration must be given to the possibility of numerous other complications, and the patient should be carefully evaluated for injuries of the cervical spine, skull, head, and chest. The medical background, age, and other factors, such as the patient's ability to cooperate and follow the physician's instructions, may determine the method of applied treatment.

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85. Adams, J. E., et al. (1974). "Stimulation of internal capsule for relief of chronic pain." Journal of neurosurgery 41(6): 740-744.

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86. Adams, R. F., et al. (2001). "Screwdriver headache: a case of traumatic intracranial hypotension." Clinical radiology 56(8): 676-680.

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87. Adeagbo, B. A., et al. (2008). "Homicides committed by youth assailants: a retrospective study." The American journal of forensic medicine and pathology 29(3): 219-223.

The pediatric population has received considerable attention in the forensic community; the youth assailant of homicide, however, is understudied. The authors retrospectively reviewed all cases referred to the Forensic Pathology Section of the Medical University of South Carolina between January 1991 and May 2006. Cases included in the study were homicides in which 1 or more assailants were 19 years of age or younger. The cases were examined as to the cause and manner of death, victim age, gender, race, incident location, weapon used, assailant-victim relationship, assailant age, gender, race, motive, and postmortem toxicology results. Assailant information was obtained from forensic records at Medical University of South Carolina, police department records, and online search engines of South Carolina State newspaper archives confirmed by law enforcement reports. The youth assailants were predominantly black men, 15 to 19 years of age (range, 4-19 years). Most victims were black male acquaintances, and the motive was most often an argument. The most common cause of death was cerebral laceration because of a gunshot wound. The incident occurred in the home in 41% of cases, followed by the street in 31%. Victim toxicology was frequently positive for cocaine, marijuana, and alcohol.

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88. Adebonojo, S. A. (1993). "Management of chest trauma: a review." West African journal of medicine 12(2): 122-132.

The incidence of chest trauma has increased significantly since the turn of the century especially in developed countries where rapid means of transportation has become part of daily life. Although gunshot wounds (GSWs) were the commonest causes of chest trauma in wartime, road traffic accidents (RTAs) have become the scourge of peacetime and modern civilization. Chest trauma is more common in males during the 2nd to the 5th decades of life with an average age of 40 years reducing their life expectancy by another 40 years at the most productive and active period of their lives. Despite improvement in ambulance service and rapid mobilization of victims from the scene of accident, about

10% of chest injured patients will die on the spot and another 5% die within an hour of reaching the hospital. Of the remaining 85%, five percent will require emergency thoracotomy for various reasons while 80% will respond to resuscitative measures and tube thoracostomy drainage alone. The primary aims in the management of chest trauma are prompt restoration of normal cardiorespiratory functions, control of haemorrhage, treatment of associated injuries and prevention of sepsis. Although the overall survival rate of trauma has improved in recent years, deaths are often due to airway obstruction, exsanguinating haemorrhage, flail chest, tension pneumothorax, cardiac tamponade and associated intracranial, intraabdominal and skeletal injuries.

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89. Adeloye, A. (1972). "Mortality in missile wounds of the head." The British journal of surgery 59(3): 201-205.

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90. Adeloye, A. (1972). "Visual disturbances after missile head injuries." The British journal of ophthalmology 56(12): 905-910.

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91. Adeloye, A. and E. L. Odeku (1971). "The radiology of missile head wounds." Clinical radiology 22(3): 312-320.

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92. Adeloye, A. and E. L. Odeku (1971). "A syndrome characteristic of tangential bullet wounds of the vertex of the skull." Journal of neurosurgery 34(2 Pt 1): 155-158.

Six patients with tangential missile wounds of the vertex of the skull presented symptoms of limb paresis which were more marked proximally in the arms and distally in the legs where there was also sensory loss of a cortical type. Carotid cerebral angiography and operative treatment showed patency of the longitudinal sinus and injury to the medial aspects of the frontoparietal cortex. The term "longitudinal sinus syndrome" formerly applied to these cases is therefore a misnomer since the main underlying cause is cortical injury and not thrombotic occlusion of the superior longitudinal sinus, as previously suspected.

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93. Adelson, P. D. (2015). "Severe traumatic brain injury and decompressive craniectomy." Journal of Neurosurgery: Pediatrics 16(5): 505-506.

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94. Adem, C., et al. (1999). "[The persistence of a spheno-occipital synchondrosis in an adult]." Persistance de la synchondrose spheno-occipitale chez l'adulte. 80(8): 863-865.

The postnatal development of the central skull base is a complex process: at least 25 separate ossification centers are assimilated in the maturing sphenoid and occipital bones. Some synchondroses may only be partially fused and persist during adulthood. We report the case of a 30-year-old man with a penetrating trauma of the central skull base. Skull computed tomography demonstrated a rare anatomic variant: incomplete fusion of the spheno-occipital synchondrosis. Knowledge of the normal skull base development and of its variants may prove helpful in differentiating a post-traumatic injury from a normal variant.

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95. Adeolu, A. A., et al. (2013). "Epidemiology of neurotrauma in Ife-Ijesha zone of Nigeria." World neurosurgery 80(3-4): 251-254.

BACKGROUND AND OBJECTIVE: Trauma remains one of the important causes of severe disability and high mortality. In this study, we looked at the epidemiology of neurotrauma in our region

so as to highlight essential factors for trauma prevention program., METHODOLOGY: This is a cross-sectional study of all neurotrauma cases admitted to the neurosurgery service of our hospital over an 18-month period. Information was obtained on patients' demographic data, etiology of injury, duration of injury, site, and cause of accident among others., RESULTS: One hundred forty-three patients were included in the study. The injuries occurred mostly in males and in the third decade. Most of the patients were students and traders. Eighty-one percent of the accidents were due to road traffic crash (RTC), and the most common contributory factors were head-on collision (46.2%) and overtaking (28.6%). Five of six patients who had RTC in the first decade of life were pedestrians. There were more crashes within the cities. None of the patients who had motorcycle accidents used helmet and only four patients used seatbelts at the time of the accident. Transfer to hospital was mostly in vehicles other than ambulance., CONCLUSION: Neurotrauma in our study was mostly due to RTC and it is most common in young male students. Contributory factors were head on collision and overtaking.

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96. Adeolu, A. A. and O. C. Akinbo (2012). "Gun shot injury as a cause of elevated skull fracture." Journal of neurosciences in rural practice 3(2): 219-220.

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97. Adeosun, O. O. and H. O. Olasoji (2001). "Delayed repair of lip avulsion following gun-shot injury--a case report." Nigerian journal of medicine : journal of the National Association of Resident Doctors of Nigeria 10(3): 141-143.

A case of delayed repair of lower lip repair tissue avulsion following gun shot injury in a 35 year old commercial driver is presented. The report illustrates the need for adequate wound debridement over a period of time to demarcate viable tissues before surgical reconstruction. It also serves as a reminder of the problems that may be faced in managing facial gun shot injuries in the civilian population in our environment.

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98. Adeshina, A. M., et al. (2013). "Multimodal 3-D reconstruction of human anatomical structures using SurLens Visualization System." Interdisciplinary sciences, computational life sciences 5(1): 23-36.

In the medical diagnosis and treatment planning, radiologists and surgeons rely heavily on the slices produced by medical imaging devices. Unfortunately, these image scanners could only present the 3-D human anatomical structure in 2-D. Traditionally, this requires medical professional concerned to study and analyze the 2-D images based on their expert experience. This is tedious, time consuming and prone to error; expecially when certain features are occluding the desired region of interest. Reconstruction procedures was earlier proposed to handle such situation. However, 3-D reconstruction system requires high performance computation and longer processing time. Integrating efficient reconstruction system into clinical procedures involves high resulting cost. Previously, brain's blood vessels reconstruction with MRA was achieved using SurLens Visualization System. However, adapting such system to other image modalities, applicable to the entire human anatomical structures, would be a meaningful contribution towards achieving a resourceful system for medical diagnosis and disease therapy. This paper attempts to adapt SurLens to possible visualisation of abnormalities in human anatomical structures using CT and MR images. The study was evaluated with brain MR images from the department of Surgery, University of North Carolina, United States and CT abdominal pelvic, from the Swedish National Infrastructure for Computing. The MR images contain around 109 datasets each of T1-FLASH, T2-Weighted, DTI and T1-MPRAGE. Significantly, visualization of human anatomical structure was achieved without prior segmentation. SurLens was adapted to visualize and display abnormalities, such as an indication of walderstrom's macroglobulinemia, stroke and penetrating brain injury in the human brain using Magentic Resonance (MR) images. Moreover, possible abnormalities in

abdominal pelvic was also visualized using Computed Tomography (CT) slices. The study shows SurLens' functionality as a 3-D Multimodal Visualization System.

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99. Adler, J. S., et al. (1992). "Inadvertent intracranial placement of a nasogastric tube in a patient with severe head trauma." CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 147(5): 668-669.

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100. Adrie, C., et al. (2010). "Immune status and apoptosis activation during brain death." Shock (Augusta, Ga.) 33(4): 353-362.

The present study evaluates the role of the inflammatory status and apoptosis activation in the development of organ dysfunction after brain death using plasma assays and macroarray analysis on skeletal muscle biopsies to look for evidence of remote tissue damage in two intensive care units in France and one in Belgium. As controls, we used patients undergoing hip surgery and healthy volunteers. Causes of brain death in the 85 consecutive patients included in the study were cardiac arrest (n = 29; 34%), stroke (n = 42; 49%, with 38 patients having hemorrhagic stroke), and head injury (n = 14; 17%). Of the 85 patients, 45 donated 117 organs. Plasma endotoxin and cytokine levels indicated a marked systemic inflammatory response in brain-dead patients, which was strongest in the cardiac arrest group. Leukocyte dysfunction, as assessed by cytokines production in response to various stimuli, was noted in a subgroup of patients with brain death after stroke. Interestingly, skeletal muscle biopsies showed no increase in mRNAs for genes related to inflammation, whereas mRNAs for both antiapoptotic and proapoptotic genes were increased, the balance being in favor of apoptosis induction. The increased activation of the proapoptotic caspase 9 was further confirmed by Western blot. In conclusion, the presence of inflammation and apoptosis induction may explain the rapid organ dysfunction seen after brain death. Both abnormalities may play a role in organ dysfunction associated with brain death. However, the level of systemic inflammation or the presence of circulating endotoxin was not associated with lower graft survival.

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101. Adua, S., et al. (2019). "MA09.06 Adaptive Mechanisms of Resistance to Targeted Therapy in EGFR Mutant Brain Metastasis." Journal of Thoracic Oncology 14(10): S283.

Background: A subset of non-small cell lung cancers (NSCLCs) can be effectively treated with EGFR tyrosine kinase inhibitors (TKIs). However, a significant proportion of patients with brain metastasis progress after front-line treatment, underscoring the central nervous system (CNS) as a unique sanctuary site for persistent disease. Herein, we performed an integrated examination of the cellular, pharmacological, and molecular causes of resistance to targeted therapies in brain metastases. Method: The efficacy of osimertinib, a brain penetrant third generation TKI, was studied in mice using EGFR mutant NSCLC models derived from cell lines or patient biopsies. Animals with multi-organ metastases were treated continuously until disease progression was detected in the brain parenchyma. We also developed an in situ transcriptomic approach, referred to as Brain Metastasis Xenograft-RNA Sequencing (BMX-seq), to distinguish the transcriptome of tumor versus stroma in vivo. Molecular and biological responses were integrated with pharmacological analysis of loco-regional distribution of osimertinib in and around brain lesions. Result: In EGFR mutant models with multi-organ metastases, extra-cranial tumors could be effectively controlled, while brain metastases eventually progress despite strong osimertinib penetrance into the normal and tumor bearing CNS. Importantly, tumor cells isolated from progressing brain metastases did not exhibit resistance in vitro. However, these cells exhibited an enhanced resistant capacity when transplanted into the brain, demonstrating that this resistant phenotype is selected for and that exposure to the brain is a requirement for drug resistance in vivo. BMX-seq reveals that the stroma of drug resistant brain metastasis is characterized by activation of innate pro-inflammatory pathways. Reciprocally, we identified stromal induced activation of cytoskeletal and interferon response genes in drug resistant tumor cells. Interestingly, several of these genes are induced

in situ independently of drug treatment, suggesting that the brain metastatic niche can precondition tumor cells for ensuing drug resistance. Finally, we demonstrate that inhibiting mediators of interferon and cystoskeletal signaling increases the sensitivity of brain metastasis to osimertinib in vivo. Conclusion: Although advances have been made in the brain penetrating abilities of targeted therapies, acquired resistance in this unique TME still develops. Our results suggest that adaptive molecular interactions within the brain TME preconditions metastatic cells for TKI resistance and that targeting such pathways in combination with osimertinib should be explored to treat NSCLC patients suffering from or at risk for brain relapse. Keywords: brain metastasis, Drug resistance, Osimertinib

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102. Adua, S. J., et al. (2019). "Uncovering adaptive mechanisms of resistance to targeted therapy in brain metastasis." Cancer Research 79(13).

A subset of lung adenocarcinoma (LUAD) can be effectively treated with EGFR tyrosine kinase inhibitors (TKIs). However, the incidence of brain metastasis increases in patients that relapse after frontline treatment, underscoring the central nervous system (CNS) as a unique sanctuary site for persistent disease. We sought to perform an integrated examination of the cellular and molecular causes of resistance to targeted therapies in brain metastasis. Results The efficacy of osimertinib, a brain penetrant third generation TKI, was studied in mice using two different EGFR mutant LUAD models. In the H1975 (EGFR L858R/T790M) model of secondline osimertinib treatment, subcutaneous tumors achieved complete response rates while H1975 brain metastases continued to grow despite strong drug penetrance into the CNS. Similarly, in the PC9 BrM4 (EGFR ex19del) model of firstline osimertinib treatment, most responding animals developed osimertinib resistance preferentially in the brain following significant regression of multiorgan metastatic lesions. Importantly, tumor cells isolated from progressing brain metastases did not exhibit resistance in vitro. However, these cells exhibited significantly enhanced resistant capacity in comparison to controls when serially transplanted into the brain demonstrating both that this resistant phenotype is selected for and that exposure to the brain metastatic niche is a requirement for drug tolerance in vivo. We utilized our recently optimized transcriptomic approach, referred to as Brain Metastasis XenograftRNA Sequencing (BMXseq), to comprehensively distinguish the transcriptome of tumor versus stroma in intact drug resistant brain lesions. Accordingly, our analysis reveals that the stroma of drug resistant brain metastasis is characterized by activation of proinflammatory pathways implying that resistant cells induce and/or coopt stromal inflammatory responses for their own benefit. Reciprocally, we identified stromal induced alterations in the expression of cytoskeletal and interferon response genes in drug resistant tumor cells. Interestingly, most of these genes are induced by the brain tumor microenvironment (TME) independently of drug treatment suggesting that the brain metastatic niche can precondition tumor cells for ensuing drug resistance. Conclusions Though advances have been made in the brain penetrating abilities of targeted therapies, acquired resistance in this unique metastatic niche still develops. Our results suggest that specific interactions between the tumor cells and stromal cells are required for the manifestation of this adaptive resistant phenotype. Furthermore, transcriptomic profiling has revealed potential regulators and molecular drivers that mechanistically explain how the brain TME preconditions metastatic cells for resistance.

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103. Adwanikar, H., et al. (2011). Traumatic brain injury in animal models and humans. 50: 237-265.

Clinical/behavioral measures have traditionally been used to assess neurologic outcomes after human traumatic brain injury (TBI) as well as in experimental models of TBI. In this chapter, we address the metrics to assess injury/recovery in human TBI and consider the determinants of outcome. Further, we describe the commonly used experimental rodent models of TBI and the behavioral assays employed in these models for three major categories of neurologic assessments: sensorimotor (aggregate and individual tests), cognitive (memory and avoidance paradigms), and affective (novelty, social interaction, and anxiety) behaviors. Finally, we discuss the issues underlying use of behavioral assays in successful translation of candidate therapeutics from experimental models to human TBI.

104. Aesch, B., et al. (2014). "Fatal gunshot wound to the head with lack of immediate incapacitation." The American journal of forensic medicine and pathology 35(2): 86-88.

Investigation of deaths caused by penetrating gunshot wounds to the head often raises the possibility of foul play. The forensic pathologist may be asked if the victim was able to perform certain acts after the gunshot, and how quickly this person might have become incapacitated. The possibility of a suicidal act can depend on these answers. We report the case of a 45-year-old woman whose body was found with a right temporal entrance wound. A shotgun was found 60 ft from the body location. The question of knowing if this woman had been able to shoot herself in the head and then walk a distance of 60 ft before dying was essential for the investigation, as suicide was the first hypothesis. The autopsy and a careful neuropathology investigation allowed to answer this question. In the literature, multiple publications report cases of victims who were able to act following penetrating ballistic head injury.

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105. Afsar, M., et al. (2021). "Neuropsychological and Linguistic Outcomes after Gunshot Injury to Cerebellum: A Case Report." Indian Journal of Neurotrauma.

Craniocerebral gunshot injuries (CGIs) are highly fatal and mostly seen in the military settings. CGIs to the posterior cortical regions and cerebellum in civilian population are uncommon. Cerebellum once thought to be mediating the motor and vestibular functions is increasingly seen as an important structure for human cognition and affect. We present a case of a 53-year-old police inspector who sustained a gunshot injury in the suboccipital region with resulting damage to predominantly left cerebellum and right occipital lobe. Patient presented with complaints of neck pain, reduced clarity of speech, and mild forgetfulness for day-to-day affairs after 7 months of injury. A comprehensive neuropsychological assessment revealed impairments in motor speed, processing speed, sustained attention, executive functions (verbal fluency, working memory), and encoding component of memory functions. The speech-language assessment revealed mild dysarthria and mild word finding difficulties. His profile with mild to moderate deficits in neuropsychological and speech language functioning was partly congruent with the cerebellar cognitive affective syndrome or Schmahmann's syndrome. The spontaneous recovery and extent of damage to cerebellum may explain the milder form of the syndrome. The case highlights the need to routinely screen for cognitive-affective disturbances in patients with traumatic lesions to cerebellum.

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106. Afzelius, L. E., et al. (1972). "[A case of spontaneous healing of traumatic common carotid artery aneurysm]." Ein Fall von spontaner Heilung von traumatischen Aneurysmen der Arteria Carotis Communis. 12(2): 57-58.

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107. Agarwal, A., et al. (2017). "INTRAOCULAR LENS SCAFFOLD TO PREVENT INTRAOCULAR FOREIGN BODY SLIPPAGE." Retinal cases & brief reports 11(1): 86-89.

PURPOSE: To report the application of intraocular lens (IOL) scaffold technique in intraocular foreign body (IOFB) removal., METHODS: Patient with IOFB in posterior segment is included. The IOFB is retrieved from the posterior segment (pars plana vitrectomy and exteriorization of the IOFB from the retinal surface using an intravitreal forceps via the posterior capsulotomy) and placed on the iris. A three-piece posterior chamber IOL is placed in the sulcus via the clear corneal incision. IOFB is then removed from the anterior chamber over the IOL by forceps., RESULTS: Metallic IOFB of 4 mm x 3 mm has been retrieved by IOL scaffold technique after rescuing it from the posterior segment. There has been no drop or slip of IOFB in the vitreous during removal. Posterior chamber IOL served as scaffold during IOFB removal from anterior chamber., CONCLUSION: The IOL scaffold maneuver has shown to prevent slippage by acting as a barrier between the IOFB and the vitreous.

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108. Agarwal, P. K., et al. (1993). "Unusual orbital foreign bodies." Indian journal of ophthalmology 41(3): 125-127.

Retained intraorbital organic foreign bodies, particularly wooden, are commonly encountered in ophthalmologic practice. We treated two children who had sustained such injury while playing. They presented to us with non-healing sinus with purulent discharge. In one of the patients, X-rays and CT scan helped to clinch the diagnosis, whereas in the other patient diagnosis was possible by correlating history with clinical findings. Surgical exploration in both patients helped us to remove the foreign bodies. Surprisingly, both the foreign bodies were 7 cm long wooden pieces. We, however, caution that management of such cases should be conservative and that surgical exploration be done only in case of complication. From our experience, we recommend proper localisation by all possible means, blunt dissection, careful haemostasis coupled with excellent lighting and exposure in the atraumatic removal of intraorbital foreign bodies.

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109. Agarwal, S., et al. (2020). "Allogenic Simple Limbal Epithelial Transplantation Versus Amniotic Membrane Grafting in the Early Management of Severe-Grade Ocular Chemical Injuries-A Retrospective Comparative Study." American journal of ophthalmology 217: 297-304.

PURPOSE: To compare outcomes of management in the early stage of severe chemical injury (grade 4 and worse; Dua classification) with amniotic membrane grafting (AMG) alone vs allogenic simple limbal epithelial transplantation (alloSLET)., DESIGN: Retrospective comparative interventional case series., METHODS: Retrospective comparative interventional series. Records of patients with severe ocular chemical injury who underwent AMG alone (between 2009 and 2013) vs alloSLET (between 2013 and 2017) were analyzed for grade of injury, time of and interventions for epithelial healing, ocular surface status post healing (grade of symblepharon, and limbal stem cell deficiency [LSCD]), and type of and need for interventions in the chronic stage., RESULTS: Among patients presenting in early stage of severe chemical injury, 38 eyes (median age 11 years) managed with AMG alone were compared with 39 eyes (median age 8 years) managed with alloSLET. The mean time of presentation post injury was 33.85 +/- 27.5 and 40.6 +/- 23.5 days in the AMG and alloSLET group, respectively. The rate of epithelial healing was faster in the alloSLET group and the difference was noted to be statistically significant (odds ratio [OR] 0.966, P = .001). Similarly, the lower occurrence of LSCD (OR 0.137, P = .004) and need for keratoplasty (OR 0.093, P = .003) favored alloSLET over AMG. Final best-corrected visual acuity of >20/200 was achieved in 39.4% and 53.8% in the AMG and alloSLET groups, respectively., CONCLUSION: AlloSLET helps in faster epithelialization of the surface, thus reducing the need for subsequent surgeries in the chronic stage and aiding faster visual rehabilitation. The outcomes of alloSLET appear superior to amniotic membrane grafting alone and should be considered in eyes with grade 4 and above (Dua classification) chemical injuries in the early stage.

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110. Aggrawal, A., et al. (2015). "Nail injury to the brain obfuscated by a fall from height - homicide or suicide? a case report." Medicine, science, and the law 55(1): 40-43.

Penetrating head injuries caused by unconventional objects such as a nail generate speculation and doubt regarding the manner of infliction. We report a case of a 24-year-old woman alleged to have committed suicide by a fall from height. Autopsy revealed an unprecedented penetrating intracranial injury caused by a nail over the right temporal region, confounding the manner of death. The underlying intersecting pattern of fractures determined the chronological sequence of events. In this paper, we discuss the manner, incidence and pathology of nail injuries to the brain.

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111. Aghabiklooei, A., et al. (2012). "Multiple nails in the brain: an unusual suicidal attempt." The American journal of forensic medicine and pathology 33(1): 88-89.

We describe dangerous multiple self-inflicted brain-penetrating injuries caused by a nail gun device after a suicidal attempt for the first time in Iran. At the first forensic visit, we could not explain the manner of injuries. The authors reviewed the literature on the topics, and clinical presentation, radiographic findings, and forensic medical records are discussed.

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112. Agimi, Y., et al. (2021). "Estimates of Long-Term Disability Among US Service Members With Traumatic Brain Injuries." The Journal of head trauma rehabilitation 36(1): 1-9.

BACKGROUND: Traumatic brain injury (TBI) is a significant health issue in the US military. The purpose of this study was to estimate the probability of long-term disability among hospitalized service members (SMs) with TBIs, using the South Carolina Traumatic Brain Injury and Follow-up Registry (SCTBIFR) model developed on civilian hospitalized patients., METHODS: We identified military patients in military or civilian hospitals or theater level 3 to 5 military treatment facilities (MTFs) whose first TBI occurred between October 1, 2013, and September 30, 2015. TBI-related disability at 1-year post-hospital discharge was estimated using regression coefficients from the SCTBIFR., RESULTS: Among the identified 4877 SMs, an estimated 65.6% of SMs with severe TBI, 56.2% with penetrating TBI, 31.4% with moderate TBI, and 12.0% with mild TBI are predicted to develop long-term disability. TBI patients identified at theater level 4 and 5 MTFs had an average long-term disability rate of 56.9% and 61.1%, respectively. In total, we estimate that 25.2% of all SMs hospitalized with TBI will develop long-term disability., CONCLUSION: Applying SCTBIFR long-term probability estimates to US SMs with TBIs provides useful disability estimates to inform providers and health systems on the likelihood that particular subgroups of TBI patients will require continued support and long-term care.

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113. Agner, C., et al. (2002). "Neurocognitive assessment before and after cranioplasty." Acta neurochirurgica 144(10): 1033-1040.

OBJECTIVE: This paper addresses the possible value of neurocognitive tests on the evaluation of patients before and after cranioplasty for large cranial defects., METHODS: In a single patient with a large corrected cranial defect a detailed neurocognitive analysis was performed utilizing the EXIT interview and Cognistat before and after surgery. Planning and development of the surgical prosthesis were based on the pre-operative reconstruction of the head CT and on pre-operative pictures of the patient. Xenon-CT anatomical and quantitative cerebral blood flow (CBF) analysis was performed before and periodically after cranioplasty., FINDINGS: A significant improvement in major cognitive functions was observed after surgery., INTERPRETATION: Cognistat is a detailed neuropsychological battery that permits a better assessment of patients in diverse neurological conditions. The EXIT interview gives a better rapid assessment of cognition not provided by other methods, such as the mini-mental status examination (MMSE). The utilization of these techniques permits a better understanding of long-term outcomes for patients with diverse neurological conditions, including post-cranioplasty patients.

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114. Agrawal, A., et al. (2008). "Unusual mode of firearm injury from the recoiled rear end of a gun barrel." Singapore medical journal 49(9): e238-241.

Atypical gunshot wounds are caused by a diverse set of parameters relating to weapons and ammunition. We report a previously-unreported and atypical mode of gunshot wound produced by a detached rear end of the barrel of a gun following accidental gun fire, and discuss the difficulties in the management. A 36-year-old man presented to the emergency department with an alleged history of injury on the forehead with the rear end of a gun barrel following accidental gunfire while cleaning the nozzle. Since the time of injury, the patient was in an altered sensorium and had weakness on the right

side of the body. There was minimal but continuous bleeding from the wound, with extrusion of brain matter. Skull radiograph showed that the rear end of the barrel had entered the left frontal bone, with associated depressed fracture of the frontal bone. The patient underwent a bicoronal, bifrontal craniotomy with a T-shaped extension towards the barrel to facilitate the reflection of the scalp flap and to avoid any movement of the barrel as it might further injure the brain. Necrotic brain, dura and bone pieces were removed. The patient was doing well at follow-up except for mild residual motor deficits. This case illustrates that while working with limited facilities, particularly in underdeveloped countries, a careful clinical assessment, interpretation of available images and a judicious operative approach can help to save the patient.

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115. Agrawal, A., et al. (2017). "Epidemiological characteristics affecting outcome in traumatic brain injury." JMS - Journal of Medical Society 31(1): 28-31.

Background: Traumatic brain injury (TBI) is affected by multiple injury factors. Geography and vehicle prone to the accident may have an important role on the outcome. Aims: This study aims to study the details of place and mechanism of injury and their effect on discharge outcome. Settings and Design: Prospective study. Methods: This is a prospective study where 337 patients diagnosed with TBI were selected from an emergency department, after obtaining their consent. The details of place and cause of injury data was recorded on standard proforma using FileMaker Pro Advanced 13 software. Statistical Analysis: The data were analyzed using Stats Direct version 3.0.150. Results: The study reports that age, gender, and severity of the injury as per Glasgow coma scale was significant with the outcome at discharge. Higher number of patients was from rural setup (72.6%). Roadside accidents account for about 56% of injuries. About 77% of injuries were due to accidents. Two-wheeler was cause for accidents in 54% of injuries. Mechanism of injury like motor vehicle accident, fall, blunt, and the penetrating injury was significant with discharge outcome. Conclusion: The study addresses that majority of TBI patients are from rural areas and injuries are due to accidents. Mechanism of injury has significance with discharge outcome.

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116. Agrawal, A., et al. (2007). "Transorbital orbitocranial penetrating injury due to bicycle brake handle in a child." Pediatric neurosurgery 43(6): 498-500.

Transorbital orbitocranial penetrating injuries (TOPI) are relatively rare and can be caused by a variety of unusual objects. Diagnosis of TOPI should be based on a detailed history and evaluation of available investigations as the penetrating injury may be overlooked. In the present case, a child sustained a penetrating injury with the brake handle of a bicycle due to the accidental fall of the bicycle on him and was managed conservatively. Copyright (c) 2007 S. Karger AG, Basel.

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117. Agrawal, A., et al. (2016). "Transorbital Orbitocranial Penetrating Injury with an Iron Rod." Craniomaxillofacial Trauma and Reconstruction 9(2): 145-148.

Transorbital orbitocranial penetrating injuries (TOPIs) are relatively rare, can be caused by high-speed projectile foreign bodies to low-energy trauma (which is rarer), and account for 24% of penetrating head injuries in adults and approximately 45% in children. We report an uncommon nonfatal case of TOPI where a 16-year-old male child sustained injury due to accidental penetration of metal bar into the forehead. A bicoronal flap was raised to remove the metal bar. The patient recovered well, had normal vision, and doing well at follow-up.

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118. Agrillo, A., et al. (2006). "Complex-type penetrating injuries of craniomaxillofacial region." The Journal of craniofacial surgery 17(3): 442-446.

Craniofacial traumas are one of the most common clinical events of the 21st century. The possibility of associated injuries of the head and neck may also determine functional and cosmetic

problems in these patients. The most frequent pathologic conditions observed are contusions, lacerations, abrasions, avulsions, and the inclusion of foreign bodies. In particular, penetrating injuries represent a rare but complex variety of craniofacial trauma. Generally, the penetrating material is stiff enough to cross through different anatomic structures during a particularly violent collision caused by a road or work accident or during an attack. The therapeutic strategy adopted for this type of patient depends mainly on diagnostic procedures such as skull radiograms in different projections, computerized tomography, magnetic resonance imaging, and, occasionally, echotomography. However, on arrival at the emergency department, the clinical conditions of the patient will determine the type of investigation to be carried out. Last, to prevent any postoperative infections, wide spectrum antibiotic therapy is advisable. Ideally, imaging should be repeated postoperatively to confirm resolution of the initial clinical condition. In this article, the authors describe three unusual clinical cases of patients with penetrating injuries of the head and face together with the protocol adopted for treatment of such complex craniofacial injuries. The three cases described demonstrate that, despite the initial appearance of penetrating wounds, a correct diagnostic assessment followed by a suitable therapeutic protocol can reduce cosmetic and functional defects to a minimum.

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119. Agüloğlu, B., et al. (2014). "Rare head and neck trauma due to construction nail: Case report." Akademik Acil Tip Olgu Sunumlari Dergisi 5(7): 203-205.

Introduction: Oropharyngeal penetrating trauma is encountered more often in children under the age of 5 due to lack of their selfprotection. Case Report: In this paper, a 2-year-old girl who had penetrating oropharyngeal trauma after falling on a construction nail was presented. As a consequence of the physical examination and radiological examination applied to the patient, it was seen that the foreign body reached the clivus in the base of the skull, through the nasopharynx, passing by the hard and soft palate junction. In the status of the patient, who was operated on, no additional clinical aspects or neurological or lack of visual activity was observed in the post-operative period. As there was no complication during the follow-ups, the patient was discharged with recommendations. Conclusion: Oropharyngeal penetrating trauma should be careful in terms of mortality and morbidity due to the proximity to vital organs.

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120. Agyabeng-Dadzie, K., et al. (2020). "Antiplatelet Agent Reversal Is Unnecessary in Blunt Traumatic Brain Injury Patients Not Requiring Immediate Craniotomy." The American surgeon 86(7): 826-829.

BACKGROUND: The need to reverse the coagulation impairment caused by chronic antiplatelet agents in traumatic brain injury (TBI) patients with acute traumatic intracerebral hemorrhage (TICH) remains controversial. We sought to determine whether emergent platelet transfusion reduces the incidence of hemorrhage expansion, mortality, or need for neurosurgical intervention such as intracranial pressure (ICP) monitoring, burr holes, or craniotomy., METHODS: All adult blunt TICH patients (age >=16 years) over a 4-year period were retrospectively reviewed. Patients with penetrating TBI, blunt TBI without TICH on admission computed tomography (CT), receiving warfarin, not on antiplatelet agents, or requiring immediate operative intervention were excluded. Patients were divided into 2 groups depending on whether they received a platelet transfusion: reversal group (RV) versus no reversal group (NR). Patient outcomes were analyzed using Mann-Whitney U and Fisher's exact tests., RESULTS: 169 blunt TBI patients on chronic antiplatelet therapy were studied (102 RV group, 67 NR group). The groups were well matched with regard to age, Injury Severity Score, Abbreviated Injury Scale-head, Glasgow Coma Score, mechanism of injury, need for intubation, time to initial CT scan, and hospital length of stay. Immediate platelet transfusion did not alter the occurrence of TICH extension on follow-up CT (26% vs 21%, P = .71), TBI-specific mortality (9% vs 13%, P = .45), need for ICP monitor (2% vs 3%, P = 1.0), burr hole (1% vs 3%, P = .56), or craniotomy (1% vs 3%, P = .56)., DISCUSSION: Immediate platelet transfusion is unnecessary in blunt TBI patients on chronic antiplatelet therapy who do not require immediate craniotomy.

121. Aharonson-Daniel, L., et al. (2006). "Different AIS triplets: Different mortality predictions in identical ISS and NISS." The Journal of trauma 61(3): 711-717.

BACKGROUND: Previous studies demonstrated different mortality predictions for identical Injury Severity Scores (ISS) from different Abbreviated Injury Scale (AIS) triplets. This study elaborates in both scope and volume producing results of a larger magnitude, applicable to specific injury subgroups of blunt or penetrating, traumatic brain injury, various age groups, and replicated on NISS., METHODS: All patients hospitalized after trauma at 10 hospitals, with ISS/NISS (new ISS) generated by two AIS triplets, excluding patients with isolated minor or moderate injuries to a single body region were studied. Patients were separated into two groups based on the different triplets. Inpatient-mortality rates were calculated for each triplet group. Odds ratios were calculated to estimate the risk of dying in one triplet group as compared with the other. The chi test determined whether the difference in mortality rate between the two groups was significantly different. Differences were further explored for various subgroups., RESULTS: There were 35,827 patients who had ISS/NISS scores generated by two different AIS triplets. Significant differences in death rates were noted between triplet groups forming identical ISS/NISS. Odds ratio for being in the second group (always containing the higher AIS score) ranged from 2.3 to 7.4., CONCLUSIONS: ISS and NISS that are formed by different AIS triplets have significantly different inpatient-mortality rates. The triplet with the higher AIS score has higher inpatient-mortality rates, overall and in several sub-populations of varying vulnerability. The comparison of populations and the interpretation of ISS/NISS based outcome data should take this important information into account and the components of AIS triplets creating each ISS and NISS should be reported.

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122. Aharonson-Daniel, L., et al. (2003). "Epidemiology of terror-related versus non-terror-related traumatic injury in children." Pediatrics 112(4): e280.

OBJECTIVE: In the past 2 years hundreds of children in Israel have been injured in terrorist attacks. There is a paucity of data on the epidemiology of terror-related trauma in the pediatric population and its effect on the health care system. The objective of this study was to review the accumulated Israeli experience with medical care to young victims of terrorism and to use the knowledge obtained to contribute to the preparedness of medical personnel for future events., METHODS: Data on all patients who were younger than 18 years and were hospitalized from October 1, 2000, to December 31, 2001, for injuries sustained in a terrorist attack were obtained from the Israel National Trauma Registry. The parameters evaluated were patient age and sex, diagnosis, type, mechanism and severity of injury, interhospital transfer, stay in intensive care unit, duration of hospitalization, and need for rehabilitation. Findings were compared with the general pediatric population hospitalized for non-terror-related trauma within the same time period., RESULTS: During the study period, 138 children were hospitalized for a terror-related injury and 8363 for a non-terror-related injury. The study group was significantly older (mean age: 12.3 years [standard deviation: 5.1] v 6.9 years [standard deviation: 5.3]) and sustained proportionately more penetrating injuries (54% [n = 74] vs 9% [n = 725]). Differences were also noted in the proportion of internal injuries to the torso (11% in the patients with terror-related trauma vs 4% in those with non-terror-related injuries), open wounds to the head (13% vs 6%), and critical injuries (Injury Severity Score of 25+; 25% vs 3%). The study group showed greater use of intensive care unit facilities (33% vs 8% in the comparison group), longer median hospitalization time (5 days vs 2 days), and greater need for rehabilitative care (17% vs 1%)., CONCLUSIONS: Terror-related injuries are more severe than non-terror-related injuries and increase the demand for acute care in children.

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123. Ahlawat, A., et al. (2015). "Predictors of survival after civilian penetrating brain injuries: A two-center cohort study." Neurocritical care 23(1): S35.

Introduction Predictors of survival in penetrating brain injury are poorly defined. In blunt traumatic brain injury(bTBI), admission motor GCS(mGCS), pupillary reactivity, hypoxia, hypotension, and Marshall CT score are validated independent predictors of outcome. We aimed to identify predictors of survival after PBI at hospital discharge and 6-months post-injury at two Level-1 trauma centers. Methods A retrospective cohort of 413 PBI patients from Maryland Shock/Trauma Center (n=377) and University of Massachusetts Medical School (UMass;n=36) between 1/2000-4/2013 were analyzed. Significant variables identified in univariate analyses were added in a stepwise fashion into clinically meaningful multivariable models, and compared to a base model using validated predictors of bTBI. Results The cohort's mean age was 32.5 years, 87.4% were men, 61.5% of the Maryland cohort was black and 75% of the UMass cohort was Caucasian. Median admit GCS and Injury Severity Score (ISS) were 3 (Q1,Q3:3,12) and 26 (Q1,Q3:25,34) respectively. Independent predictors of survival identified in multivariate analysis were: mGCS-6(OR=92;95%CI 39.19-216.15), bilateral reactive pupils(OR=77.68;95%CI 35.08-172.01), female gender(OR=2.1;95%CI 1.17,3.79), lowerlSS(OR=0.95;95%CI 0.94-0.97), lack of self-inflicted injury(OR=3.01;95%CI 1.89-4.77), transferfrom OSH(OR=3.3;95%CI 1.92-5.66), lackof IVH(OR=8.93;95%CI 5.35-14.9), tangential bullet trajectory(OR=10.2;95%CI 4.22-24.76), absence of multiple intracranial injuries(OR=2.57;95%CI 1.17-5.67), open cistems(OR=41.84;95%CI 19.79-88.48), and lower INR(OR=0.61;95%CI 0.54-0.69). After adjusting for known bTBI predictors, independent predictors of survival in the base model were pupillary reactivity and mGCS(C-statistic 0.935). Parsimonious clinically meaningful models were subsequently formed and added to the base model: clinical model (BaseModel+ISS+self-inflicted injury+transfer+sex;C-statistic 0.96); radiological model (BaseModel+bullet trajectory+IVH+cisterns+multiple intracranial injuries;C-statistic 0.96); laboratory model (BaseModel+INR;C-statistic 0.955); combined clinical/laboratory model (BaseModel+INR+ISS+self-inflicted injury+transfer+sex;C-statistic 0.97). Conclusions Using a sizable two-center cohort, we identified independent predictors of survival after PBI. Compared to pupillary reactivity and mGCS, additional predictors minimally added to the base model's strength. Further validation is warranted as well as future studies aimed at identifying modifiable risk factors for poor outcome.

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124. Ahmad, A. Z., et al. (2000). "Penetrating orbital injury by automobile wiper-control stalk." Archives of ophthalmology (Chicago, Ill. : 1960) 118(12): 1701-1703.

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125. Ahmad, F. U., et al. (2005). "Fatal penetrating brainstem injury caused by bicycle brake handle." Pediatric neurosurgery 41(4): 226-228.

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126. Ahmad, K., et al. (2015). "Effect of early correction of hyponatremia on neurological outcome in traumatic brain injury patients." Intensive Care Medicine Experimental 3.

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127. Ahmad, M., et al. (2008). "Two years review of facial fractures at a tertiary care Hospital in Islamabad, Pakistan." Journal of the Liaquat University of Medical and Health Sciences 7(1): 13-17.

OBJECTIVE: To present the experience of characteristics and management of facial fractures in a tertiary care Hospital in Islamabad, Pakistan. METHODS: Study was conducted in the department of Plastic Surgery at Pakistan Institute of Medical Sciences, Islamabad, Pakistan from January 2002 to December 2003. Only adult patients of either sex were included who presented with facial fractures. Patients below 12 years of age and those having only facial lacerations were excluded. In all cases, plain X-rays, OPG (Orthopantomogram), Water's view and CT scan (in more severe cases) were obtained. Majority of the patients was operated on routine operation days (Monday to Saturday). All other fractures were managed by Open Reduction Internal Fixation (ORIF) via intra-oral approach (gingivobuccal incision). Only those fractures were approached from the external wound when the

wound lied on the line of fracture. RESULTS: Total 133 fractures were noted in 96 patients. Most of the patients were males (76%) with a male to female ratio of 3.1:1. Mean age of the patients was 36.5 years (range 13 - 79 years). The commonest cause was road traffic accident (53.1%) followed by assault (21.9%). Mandible was the commonest facial bone to be involved (59.4%).. Various associated injuries were also noted in these patients with facial lacerations (29.9%) being the most common. Various treatment modalities were employed including Maxillo-Mandibular Fixation (n=37), lag screws (n=21), microplates (n=23). The most frequent complication was pain and or lower lip paraesthesia. CONCLUSION: Patients with these injuries must undergo early interventions including reduction and stabilization of fractures. Moreover, ORIF should also be undertaken wherever possible not through an external approach but the intraoral approach.

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128. Ahmad, Z., et al. (2018). "Penetrating midface trauma-knife puncture with soft tissue injury." Laryngo- Rhino- Otologie 97: S218.

Fall-related injuries in the field of ear, nose and throat medicine are the third most frequent trauma causes across all sexes. With increasing age, there is a significant rise in fall accidents. We present a case of a 47-year-old patient with spinal muscular atrophy, who accidentally stabbed himself a knife in the face due to tripping. The ER Treatment consisted of a primary Body Check and then a second survey According to ATLS Guidelines followed by CT imaging of the head, neck and vessels. The knife could be traced entering on the left side below the zygomatic bone, running medial to the lower jaw and opening smaller mastoid cells on the left. Vascular injury to the large brain-supplying vessels was Ruled out. Subsequently, together with the colleagues of the Oral and Maxillofacial Surgery, surgical treatment of the patient was carried out. In the further course, the patient could be extubated and transferred to the peripheral ward and, after a further four days, discharged to outpatient follow-up. After discharge, the patient presented for follow-up in our outpatient consultation with a non-irritating scar and intact facial nerve on both sides. This case presentation represents an exceptional injury pattern due to a fall event with a neurological underlying disease. It is to be expected that tumbling accindents due to demographic change as well as the correlating systemic pre-existing diseases will increase. Penetrating injuries in the civilian environment are so far rare in our experience, but a rise is expected due to political and demographic change. Preclinical care with a wide indication for securing the airway, CT imaging, angio-CT and subsequent interdisciplinary care in a head and neck trauma center seem to us to be inevitable for impalement traumas.

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129. Ahmadabadi, M. N. and A. K. Valeshabad (2011). "Evaluation and management of mechanical globe injury: comment." Clinical & experimental ophthalmology 39(5): 479-480.

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130. Ahmadi, J., et al. (1985). "Evaluation of cerebrospinal fluid rhinorrhea by metrizamide computed tomographic cisternography." Neurosurgery 16(1): 54-60.

Seven interesting and instructive cases of cerebrospinal fluid rhinorrhea evaluated by metrizamide computed tomographic cisternography are presented. The rhinorrhea was spontaneous in three patients and was related to previous head trauma or surgical procedures in four patients. The anatomical site and the extent of the fistula were demonstrated precisely by directly showing metrizamide passing through the bony defect. A combination of bone dehiscence and metrizamide within the adjacent paranasal sinuses or the nasal cavity is also useful in localization. Distortion of the interhemispheric fissure, sylvian fissure, or basal sulci indicates the probability of brain herniation through the defect.

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131. Ahmed, A., et al. (2015). "Using FDA approved human neural stem cells for repair in a penetrating TBI." Journal of neurosurgery 123(2): A538-A539.

Introduction: Penetrating traumatic brain injuries (PTBI) are associated with the worst outcomes with both high mortality and severe disability. No treatment strategies are available, but stem cell transplantations have emerged as putative therapeutic approaches. In this rodent study, we evaluated the engraftment of FDA approved human fetal neural stem cells (hNSC; Neuralstem Inc.) in a rat model of PTBI. Methods: 3 rat strains (Sprague-Dawley (SD), Fischer and Athymic SD) underwent a unilateral penetrating ballistic brain injury (PBBI). Immunosuppression was established before stereotactic injection of control or hNSCs into the PBBI penumbra. Animals were sacrificed at defined time points post-transplantation. Brains were sectioned and assessed for graft cell number, graft survival, maturation and potential tumor formation. Results: 8 weeks after transplantation, grafted cells could be detected in 100% SD, 80% Athymic and 50% Fischer rats. Robust engraftment of 15% of cells was observed in all three strains. No overgrowth of undifferentiated cells/teratomas was observed. The transplanted cells stained predominantly for neuronal rather than astrocytic markers. Immature neurons with simple processes as well as mature neurons with complex dendritic arborizations were observed projecting towards the PBBI lesion. The graft volume in SD rats and athymic rats was comparable. Conclusion: 1) Robust engraftment at 8 week post transplantation was observed; 2) No transplant derived tumors were seen; 3) Immunosuppressed SD rats had a preserved graft size, making them suitable for further studies. We conclude that PTBI may be treated with NSC transplants. We are currently determining whether transplantation results in functional improvement.

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132. Ahmed, Z., et al. (2017). "The mysterious mediastinal mass." Journal of General Internal Medicine 32(2): S620.

LEARNING OBJECTIVE #1: Recognize atypical presentation of renal cell carcinoma. LEARNING OBJECTIVE #2: Distinguish renal cell carcinoma as a differential diagnosis for anterior mediastinal mass CASE: A 46-year-old male with past medical history significant for hypertension, multiple urinary tract infections and quadriplegia secondary to gunshot wound presented with palpitations, hiccups and unintentional weight loss. Physical exam was remarkable for tachycardia with irregularly irregular rhythm. Laboratory data was significant for hemoglobin of 9.7gm/dl, TSH <0.01IU/ml, T3> 20 pg/ml. Initial EKG demonstrated atrial fibrillation with rapid ventricular response. Chest x-ray was notable for right paratracheal mass. CT chest showed thyroid gland enlargement and right anterior mediastinal mass measuring 8.2 × 6.0 × 4.9cm. Thyroid ultrasound showed enlarged heterogeneous thyroid gland with increased vascularity. Patient was treated for new onset atrial fibrillation associated with hyperthyroidism. CT abdomen done for unexplained weight loss, revealed hypo-densities in bilateral kidneys. Biopsy of mediastinal mass showed renal cell carcinoma and the patient was referred to oncology for further management. IMPACT: Certain neoplasms are commonly found in the anterior mediastinum. This case is a reminder to expand the differential ofmediastinalmasses beyond the expected neoplasms. DISCUSSION: Mediastinal masses can be divided into three categories depending on their location: anterior, middle and posterior, with anterior mediastinal masses being the most common. These typically include neoplasms of thymus or thyroid, germ cell tumors (notably teratoma), lymphoma or hemangioma. Renal cell carcinoma (RCC) presents with a wide array of symptoms with most common presentation of flank pain, abdominal mass, hematuria and weight loss. Around 16% of RCC patients have advanced disease with metastasis at the time of presentation. Common sites of metastasis include lung, lymph node, liver, bone, and brain. Chest cavity involvement of renal cell carcinoma usually manifests as pulmonary parenchymal disease with or without hilar lymphadenopathy. Renal cell carcinoma manifesting as an anterior mediastinal mass is rare with only two reported cases. One third of patients with renal cell carcinoma do not have the typical triad of presentation. Incidental findings of renal cell carcinoma are now being increasingly reported. This case illustrates an unusual presentation of renal cell carcinoma. It highlights the need to broaden the differential diagnosis of anterior mediastinal masses and merit renal cell carcinoma as one of the differentials.

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133. Aiyagari, V., et al. (2005). "Treatment of severe coagulopathy after gunshot injury to the head using recombinant activated factor VII." Journal of critical care 20(2): 176-179.

PURPOSE: Patients with severe penetrating head injury often have a coagulopathy that is difficult to correct. In this report, we describe 3 such patients who were treated with activated factor VII (FVIIa) to stop ongoing hemorrhage that was refractory to conventional treatment., SUBJECTS AND METHODS: We treated 3 patients with severe head injury secondary to gunshot wounds to the head. All 3 patients had ongoing bleeding secondary to a severe consumptive coagulopathy that was refractory to treatment with fresh frozen plasma, platelets, and cryoprecipitate. Recombinant FVIIa was then administered to achieve hemostasis., RESULTS: Administration of FVIIa (90-120 microg/kg) was successful in rapidly achieving hemostasis and correcting abnormal laboratory parameters indicative of coagulopathy in all patients. Although all 3 patients died, control of bleeding made organ donation possible in 2 patients., CONCLUSION: In patients with a severe head injury and coagulopathy, use of FVIIa may help in correction of coagulopathy and decrease transfusion requirements. In patients where ongoing bleeding precludes the declaration of brain death, the use of this agent might help in achieving hemodynamic stability and preserve the possibility of organ donation. The ethical implications of using FVIIa in this situation are discussed.

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134. Ajtai, B. M., et al. (1997). "Capability for reactive gliosis develops prenatally in the diencephalon but not in the cortex of rats." Experimental neurology 146(1): 151-158.

In this study, the glial reactions to stab wounds were investigated on a large population of newborn (P0) and fetal rats, by the immunohistochemical staining of the glial fibrillary acidic protein. The lesions penetrated both the cortex and the diencephalon. The fetuses were lesioned in utero from the 17th embryonic day (E17) and were born on E22 or E23 in the natural way. In the cortex usually no reactive gliosis developed although definitive tissue destructions remained after the lesion. Weak and incomplete glial reactions were observed in a few cases of E20 or P0 lesions only. In the diencephalon, however, the same stabbings provoked massive glial reactions. The timing and the morphology of this reaction were similar to those found in adult animals. At E17 the lesion did not result in reactive gliosis even in the diencephalon. Our study highlights two phenomena: (i) depending on the brain area servere glial reactions can already follow fetal lesions, and (ii) the appearance of the capability for glial reactions may be a stage of the local tissue maturation in every brain area and cannot be considered as a function of brain development in general. Probably, the capability for glial reactions can take place only when certain histogenetic processes (e.g., cell migration, axon growth, apoptosis) have been at least mostly accomplished, but which of the local development events are the determining ones remains to be investigated.

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135. Akbay, E., et al. (2013). "Orbitomaxillomandibular reconstruction with free osteomyocutaneous fibular flap and lower trapezius myocutaneous flap." The Journal of craniofacial surgery 24(4): e438-441.

Several types of flaps and techniques have been used in the reconstruction of maxillomandibular defects. Myocutaneous flaps of the fibula, the scapula, the rib, the iliac bone, the radial forearm, the rectus abdominis, the anterolateral thigh, the latissimus dorsi, and the pectoralis major have been used either alone or in combination for this purpose. The aim of the current study was to discuss a 17-year-old patient with a gunshot injury who underwent orbitomaxillomandibular bone reconstruction using free fibular graft shaped as 3 pieces and soft tissue reconstruction using lower trapezius myocutaneous flap in conjunction with the surgical approach used.

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136. Akbik, O. S., et al. (2020). "Treatment of unusually located traumatic intracranial aneurysms and severe vasospasm following a gunshot wound to the head: A case report." Surgical neurology international 11(57).

Background: Traumatic intracranial aneurysms (TICAs) represent up to 1% of all intracranial aneurysms. They can be the result of non-penetrating and penetrating brain injury (PBI). Approximately 20% of TICA are caused by PBI. Endovascular treatments as well as surgical clipping are reported in the literature. Other vascular complications of PBI include vasospasm although the literature is lacking on this topic. Case Description: The authors present a unique case of multiple TICAs after a PBI in a 15-year-old patient who sustained a gunshot wound to the head. The patient sustained injury through the middle cranial fossa and was taken emergently for a right-sided decompressive hemicraniectomy. Diagnostic cerebral angiogram (DCA) identified multiple TICAs along the right internal carotid artery (ICA) terminus and right middle cerebral artery as well as severe vasospasm. The patient was taken for clipping of those aneurysms and intraoperative treatment of vasospasm. Intraoperative blood flow measurements were taken before and after administration of intracisternal papaverine and arterial soft tissue dissection showing a significant increase in blood flow and improvement of vasospasm. Conclusion: While the literature has shifted towards endovascular treatment for TICAs, surgery still offers a safe and efficacious treatment strategy especially when TICAs present at large vessel bifurcation points where parent vessel sacrifice and stent assisted coiling are less favorable strategies. Severe flow limiting vasospasm can be seen in post-traumatic setting specifically PBI. Vasospasm can be treated during open surgery with intracisternal papaverine and arterial soft dissection as confirmed in this case report with intraoperative micro-flow probe measurements.

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137. Akdogan, O., et al. (2008). "Orbital foreign body penetrating from the cheek." The Journal of craniofacial surgery 19(2): 439-440.

This study emphasizes the importance of diagnostic first aid procedures to avoid the consequences of trauma due to foreign body. A 20-year-old man referred to our hospital with a history of having a sharp penetrating injury to his right eye. Computed tomography evaluation reported right globe perforation and intraorbital glass foreign body measuring 4 x 7 cm was removed. Perforated eye was repaired and traumatic cuts were sutured. Orbital and ocular injuries are common, and delays in management may lead to complication. A team approach is the best technique for these patients.

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138. Akhlaghi, F., et al. (2019). "Prevalence of maxillofacial fractures and related factors: A five-year retrospective study." Trauma Monthly 24(4).

Objectives: The aim of the current study was to assess the prevalence and causes of maxillofacial fractures in a five-year period among patients referring to Taleghani Hospital, Tehran, Iran. Methods: This retrospective study was conducted on patients with maxillofacial fractures from the beginning of 2013 until the end of 2017. Demographic factors, fracture site, fracture type, the cause of fracture, and performed treatment were recorded. Results: There were 708 patients with maxillofacial fractures; most cases were in men (85.2%) and in the second and third decades of life (53.8%). The majority of the fractures were in the mandible with the incidence rate of 64.7%. In addition, the most causes of maxillofacial fractures were due to car accident (CA) (29.4%), motor vehicle accident (MVA) (28.7%), and falling down (FD) (21%). No significant difference was observed in the type of fracture between the sex and age groups ($P > 0.05$). Conclusions: Maxillofacial fractures were associated with serious health problems, specifically in young males following CA and MVA.

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139. Akhmedkhanov, L. A. (1992). "[The relationship between the fluoride level in the jaw and the metabolic activity of the "supporting skeleton"]." Zavisimost' mezhdu soderzhaniem ftora v cheliusti i metabolicheskoi aktivnost'iu "opornogo skeleta".(3-6): 11-12.

Experiments with 118 rats revealed a reduction of fluorine levels in the jaw and the symmetrical femoral bone in reduced metabolism due to hypodynamia, elevated metabolism due to femoral bone injury, and in combination exposure. These findings should be borne in mind when prescribing fluorine.

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140. Akhter, N., et al. (2022). "Frequency of Intracranial Hemorrhages in Medico-Legal Death Cases." Pakistan Journal of Medical and Health Sciences 16(5): 727-729.

Objective: To analyze the occurrence of cerebral bleeding in medically assisted deaths. Study Design: Cross-sectional Place of Study: Department of Forensic Medicine & Toxicolgy, Peoples University of Medical & Health Sciences for Women (PUMHSW), SBA and Peoples Medical College Hospital (PMCH) Nawabshah, Sindh, Pakistan from 1st October 2021 to 31st March, 2022. Materials and Methods: For this research, 94 people were enrolled. After obtaining written permission, all of the patient's demographic information was gathered. Analysis of all patients' tissue specimens. Toxicology and alcohol testing were performed on the blood sample. All cases were evaluated using X-rays and autopsy were carried out for all of them. Decomposed remains were not included in our research. Results: Among 94 cases, there were 60 (63.8%) males and 30 (36.2%) females. Included patient had mean age 31.45±13.43 years and had mean BMI 22.19±20.48. Frequency of deaths with intracranial lesion was found in 14 (14.9%) cases. We found that frequency of traumatic cases were higher than that of non-traumatic (cerebro-vascular accidents). Frequency of intracranial lesions alone was found in 31 (32.9%) cases. Hemorrhages in the subarachnoid space were the most frequent intracranial pathology. The most prevalent cause of delayed death is pneumonia. Conclusion: The number of deaths that were caused by cerebral trauma was found to be very low in this research; nevertheless, the bulk of deaths were caused by injuries to other anatomical regions.

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141. Akincioglu, D., et al. (2022). "Combat-related ocular trauma and visual outcomes during counter-terrorism urban warfare operations in Turkey." Turkiye'de meskun mahalde terorle mucadele esnasinda gorulen okuler travma olgulari ve gorsel sonuclari. 28(5): 648-653.

BACKGROUND: The study was to report the clinical features and post-operative outcomes in military personnel admitted to the Ocular Trauma Center of Gulhane Training and Research Hospital after sustaining combat injuries in urban warfare., METHODS: This is a retrospective, non-comparative, interventional case series analyzing Turkish military personnel transferred to our tertiary ocular trauma center from the warfare zone and combat support hospitals. Ocular injuries were subdivided into zones and ocular trauma classification., RESULTS: There were 103 combat ocular injuries in 74 military personnel. The average age was 27.31+/-4.64 years (range; 21-48 years), and all were men (100%). The average follow-up was 529.34+/-213.98 days (288-1464 days). There were 84 open-globe and 19 closed-globe injuries. Thirty-six (34.9%) had final vision of 20/40 or better. Pars plana vitrectomy was the most common surgery (79.6%). Five eyes underwent evisceration, and seven eyes developed phthisis bulbi. The globe survival rate was 88.3%. Zone III injuries (32.2%) were the most common cause of unfavorable visual outcomes, and most injuries were caused by improvised explosive devices (IEDs) (59.2%). These devices also had the worst impact on globe survival and visual improvement. These eyes had a higher likelihood ratio of requiring globe removal surgery or developing phthisis bulbi [odds ratio: 21.5 (95% CI: 1.23-373)]. Two eyes that underwent keratoprosthesis-assisted pars plana vitrectomy followed by penetrating keratoplasty (PKP) during the same session developed PKP failure while failure was not seen in any of the cases that underwent PKP in a later session., CONCLUSION: Ocular injuries related to IEDs had the most significant impact on both visual and anatomic prognoses, and globe survival was less likely in eyes with zone III trauma, in which intraocular foreign bodies penetrated the choroid. There is a higher pos-sibility of PKP failure if this procedure is performed during the same session as other ocular surgery.

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142. Akkari, R. and E. Kyereme-Tuah (2019). "Russian roulette sparks fever and tachycardia." American Journal of Respiratory and Critical Care Medicine 199(9).

19 year old male presented with self-inflicted gunshot wound to the head during a game of Russian roulette. Entry wound through right temporal area and exited in left posterior orbital area. Brain imaging showed ballistic missile injury through the low anterior frontal lobe with comminuted fractures,

injury to the frontal lobe, pneumocephalus, and bilateral frontal subarachnoid and temporal hematoma, parafalcine subdural hematoma with 6 mm leftward shift. Despite maximum medical management patient continued to have intermittent elevated intracranial pressure (ICP) requiring 3 repeat separate craniotomies and pentobarbital. Neurological exam gradually improved from comatose state to alert and localized with RUE intermittently following commands. During hospitalization he started presenting episodic bouts of fever, diaphoresis, tachycardia, hypertension and tachypnea. These resolved with narcotics and would recur multiple times through the day. Paroxysmal sympathetic hyperactivity (PSH) is common in patients with severe traumatic brain injury (TBI)[1], hypoxia [2] as well as Subarachnoid hemorrhage (SAH)[3]. It is seen in 1/3 of patients with severe TBI and diffuse axonal injury, and other critical neurologic diseases [4]. The onset of symptoms can be as early as on 3rd-day post-TBI [5] or within the rehabilitation phase. PSH is more frequent in younger patients and is associated with prolonged duration of fever [4]. The clinical diagnosis encompasses at least four following features: fever, tachycardia, hypertension, tachypnea, hyperhidrosis and motor features of extensor or flexion posturing, and dystonia consisting of spasticity or hypertonia [1-3] occurring transiently without any other cause [4]. The pathophysiology is thought to be due to disinhibition of subcortical sympathoexcitatory structures [6]. The excitatory/inhibitory ratio model suggests disconnection of descending inhibitory pathways causing spinal circuit excitation; paroxysms resolve in response to the recovery of the inhibitory drivers [8]. PSH has been shown to respond to combined nonselective beta-blockers, that minimize episodes and opiate agonists that abort the episodes [1,7,8]. GABAergic agents, dopamine agonists, benzodiazepines, clonidine, and baclofen may also be helpful but with less consistent results [1]. Once dysautonomic manifestations dissipate, the treatment can be tapered. Awareness and early recognition of this rare diagnosis yet commonly seen complication in TBI patients are crucial. The treatment with morphine and propranolol during acute episodes did not cease symptoms, but adding Dilaudid, Neurontin, and Clonidine improved symptoms substantially. The patient remained alert, not oriented though following commands with his RUE, on a chronic ventilator with tracheostomy and eventually transferred to a long-term care facility.

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143. Al Jishi, A., et al. (2012). "Therapeutic challenge of orbito-cranial penetrating injuries." Canadian Journal of Neurological Sciences 39(3): S47.

Background: Penetrating head injury (PHI) with retained foreign body are uncommon cause of traumatic brain injury, yet they present a therapeutic dilemma between risk of infection and the operative risk of significant hemorrhage and further damage, whenever orbitocranial neurovascular structures are involved. Method: Two cases of orbito-cranial PHI with retained wood are presented. Because of the nature of the retained object, a surgical removal was favored to decrease the risk of infection. The pre-operative evaluation, and imaging, the intra-operative anatomy and management, the postoperative outcome, and a review of the literature will be presented. Results: Although the foreign body penetrated the intracranial content from the orbit through the superior orbital fissure (SOF), the trajectory was different, and the surgical approach was extradural for one and intradural for the other. None developed intra- or postoperative hemorrhage or infection. However, both remained with some degree of impairment of ocular motility and vision. Conclusion: Retained wooden objects through the SOF pose a therapeutic challenge. A meticulous analysis of the imaging is crucial for adequate surgical planning in order to minimize the risk of complications.

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144. Al Mulla, A., et al. (2001). "Fireworks injury: temporal bone penetration and a wooden intra-cranial foreign body." Journal of the Royal College of Surgeons of Edinburgh 46(4): 249-251.

We describe a case of a teenager sitting in a car, who was struck by a fireworks missile. The unusual presentation of a large wooden foreign body penetrating through the temporal bone and lodging in the brain is detailed. The management is discussed.

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145. Al Nimer, F., et al. (2004). "MHC expression after human neural stem cell transplantation to brain contused rats." Neuroreport 15(12): 1871-1875.

Human neural stem cells survive and improve motor function after transplantation to the contused brain. However, the transplants might be rejected and that depends on the graft immunogenicity, the host immunological status and the immunosuppression strategy. We transplanted human neural stem cells to rats with brain contusion and analyzed the donor and host MHC antigen expression and the effect of a short-term immunosuppression with cyclosporine. In vitro human neural stem cells expressed only MHC-II antigens. This expression was down-regulated 6 weeks after transplantation. The host response was characterized by an increased MHC-II expression which was down-regulated by a longer term of immunosuppression. These findings are novel and necessary in order to understand the immunogenicity of human neural stem cell grafts.

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146. Alabi, S. B., et al. (2012). "Palatal avulsion injury by a foreign body in a child." BMJ case reports 2012.

A 6-year-old girl who claimed to have fallen while playing with metal rod that resulted in palatal avulsion injuries was presented. Neither of the parents was around when the incidence happened. She was brought to the hospital because of pain, bleeding from the mouth, drooling of saliva mixed with blood and inability to feed or phonate appropriately. Examinations of the oral cavity revealed a triangular area of avulsion in the posterior aspect of the hard palate extending to the soft palate. She had examination under anaesthesia and wound repaired with 3-0 vicryl interrupted sutures after thorough wound debridement. She did well and was discharged from the clinic.

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147. Alaca, R., et al. (2002). "Anterior hypopituitarism with unusual delayed onset of diabetes insipidus after penetrating head injury." American journal of physical medicine & rehabilitation 81(10): 788-791.

Neuroendocrine dysfunctions are among the various complications that occur after traumatic brain injury. We report a case of onset of diabetes insipidus during acute rehabilitation of a 20-yr-old patient with a traumatic brain injury caused by a gunshot wound. Our case is the latest onset of diabetes insipidus after traumatic brain injury that has been reported in the literature.

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148. Alafaci, C., et al. (2010). "Penetrating head injury by a stone: case report and review of the literature." Clinical neurology and neurosurgery 112(9): 813-816.

Traumatic intracranial penetration of foreign objects of non-missile intracranial nature rarely occurs. Haemorrhages, major vascular injury and contusions can be causes of death in early stage, epileptic seizures and infections are possible complications in later stages. Complete excision of the foreign body should be performed. Possible dural and vascular injuries should be repaired during surgical treatment. In the present study, we report a rare case of traumatic intracranial stone as a foreign object. A brief review of the literature is presented.

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149. Al-Afif, S., et al. (2017). "Severe Cerebral Complications Secondary to Perforation Injury of the Anterior Skull Base During Sinonasal Surgery: An Underappreciated Problem?" World neurosurgery 108: 783-790.

OBJECTIVE: Functional endonasal sinus surgery (FESS) is widely practiced and is considered a generally safe procedure. Skull base injuries occur in <1% of procedures and are typically associated with cerebrospinal fluid leaks. Rarely, skull base injuries might result in cerebral lesions. Here we present a series of 4 patients with iatrogenic perforating injuries of the anterior skull base and cerebral lesions after routine FESS., METHODS: Four patients with iatrogenic perforating cerebral lesions after routine FESS, performed at other institutions, were referred to a tertiary neurosurgery department. Within a 10-year period these procedures were performed in 3 patients as endoscopic FESS and as a

microscopic FESS in 1 patient., RESULTS: There were 3 men and 1 woman. Mean age at the time of surgery was 50 years. In 3 instances (in which an endoscope was used), the ear, nose, and throat physician had noted perforation of the skull base during surgery, but it went unnoticed in 1 patient operated with the microscope. Frontal lobe hematoma occurred in all patients, and in 3 of them cerebral infarction developed secondary to injury of branches of the anterior cerebral artery. Three patients developed acute hydrocephalus. Two had rapid global brain swelling and they succumbed within days. The other 2 patients survived without apparent neurological deficits., CONCLUSIONS: Cerebral lesions during FESS still occur in contemporary surgery and they are possibly underreported. Even with prompt conservative and surgical measures, these lesions may result in catastrophic outcome. Associated vascular injuries have a worse prognosis. The only risk factor associated with lethal outcome in our series was younger age.

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150. Alagoz, F., et al. (2016). "A case of delayed carotid cavernous fistula after facial gunshot injury presented as loss of vision with symptom resolution after endovascular closure procedure." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 22(2): 199-201.

Carotid cavernous fistulas (CCFs) are abnormal connections between the carotid artery and the cavernous sinus (CS), and can occur as a result of blunt and penetrating head injuries. While occurrence is rare, diagnosis can be made in the emergency department. Described in the present report is the case of a 26-year-old man who presented with complaints of pain, redness, blurred and loss of vision in the right eye, and swelling of the upper face due to a gunshot injury he had sustained 35 days prior.

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151. Alain, J., et al. (2018). "Bilateral nail gun traumatic brain injury presents as intentional overdose: A case report." CJEM 20(5): 788-791.

This report describes a rare but life-threatening case of a suicide attempt initially considered as intentional overdose at the emergency department. Persistent altered mental status, despite normal toxicology investigations, led the attending team to order a head computed tomography scan, which revealed a bilateral penetrating nail gun injury with a right temporal hematoma for which a decompressive craniectomy was performed. Although voluntary intoxication is the most frequent form of suicide attempt, emergency physicians must be alert and maintain a broad differential diagnosis. Although rare, penetrating head injuries have increased in recent decades. As neurological symptoms can be minimal and penetration wounds small, this type of injury could potentially be overlooked.

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152. Al-Ali, S. and N. Robinson (1978). "Response of cortical astrocytes to a needle wound seen ultrastructurally [proceedings]." Journal of anatomy 126(Pt 2): 420-421.

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153. Alam, D. S., et al. (2009). "The technical and anatomical aspects of the World's first near-total human face and maxilla transplant." Archives of facial plastic surgery 11(6): 369-377.

OBJECTIVE: To discuss the technical and anatomical analysis and design of an osteocutaneous allograft transplant incorporating the donor maxilla and the execution of the operative protocol during the transplant., METHODS: The Cleveland Clinic reported the world's first successful combined face and maxilla transplant in December 2008. Unlike the 3 prior face transplants, this surgical procedure was done as a salvage operation in a patient who had undergone 23 major reconstructive procedures. The additional complexity due to significant postoperative scarring and recipient vessel depletion presented a unique challenge in this case. The extensive 3-dimensional losses of facial structures in multiple tissue planes required a Le Fort III osteomyocutaneous allotransplant incorporating the donor maxilla., RESULTS: We report the first successful transfer of a complete bony framework and soft-tissue envelope. The allograft has shown excellent integration and no long-term rejection. The

traditional conception based on anatomical studies suggested that this transfer would require independent dissection of the internal maxillary vascular system. This was not required in our patient whose allograft was based solely on the facial arterial system and its arcades., CONCLUSIONS: Successful near-total face and maxilla allograft transplant can be accomplished based on the facial arterial system and its arcades. This presents a novel method for reconstructing massive facial injuries with significant involvement of the facial skeleton.

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154. Alam, H. B., et al. (2008). "Putting life on hold-for how long? Profound hypothermic cardiopulmonary bypass in a Swine model of complex vascular injuries." The Journal of trauma 64(4): 912-922.

BACKGROUND: Rapid induction of profound hypothermia for emergency preservation and resuscitation can improve survival from uncontrolled lethal hemorrhage in large animal models. We have previously demonstrated that profound hypothermia (10 degrees C) must be induced rapidly (2 degrees C/min) and reversed gradually (0.5 degrees C/min) for best results. However, the maximum duration of hypothermic arrest in a clinically relevant trauma model remains unknown., METHODS: Uncontrolled lethal hemorrhage was induced in 22 swine by creating an iliac artery and vein injury, followed 30 minutes later (simulating transport time) by laceration of the descending thoracic aorta. Through a thoracotomy approach, a catheter was placed in the aorta, and cold organ preservation solution was infused using a roller pump to rapidly induce profound hypothermia (10 degrees C) which was maintained with low-flow cardiopulmonary bypass. Vascular injuries were repaired during the asanguinous hypothermic low flow period. Profound hypothermia was maintained (n = 10-12 per group) for either 60 minutes or 120 minutes. After repair of injuries, animals were rewarmed (0.5 degrees C/min) and resuscitated on cardiopulmonary bypass, and whole blood was infused during this period. Animals were monitored for 4 weeks for neurologic deficits, organ dysfunction, and postoperative complications., RESULTS: The 4-week survival rates in 60- and 120-minute groups were 92% and 50%, respectively ($p < 0.05$). The surviving animals were neurologically intact and had no long-term organ dysfunction, except for one animal in the 120-minute group. The animals subjected to 120 minutes of hypothermia had significantly worse lactic acidosis, displayed markedly slower recovery, and had significantly higher rates of postoperative complications, including late deaths because of infections., CONCLUSION: In a model of lethal injuries, rapid induction of profound hypothermia can prevent death. Profound hypothermia decreases but does not abolish metabolism. With current methods, the upper limit of hypothermic arrest in the setting of uncontrolled hemorrhage is 60 minutes.

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155. Al-Anee, A. M., et al. (2018). "Mandibular war injuries caused by bullets and shell fragments: a comparative study." Oral and maxillofacial surgery 22(3): 303-307.

PURPOSE: Is to compare the patterns, severity, and management of the high- and low-velocity mandibular war injuries managed at Al Shaheed Gazi Al-Hariri Hospital in Baghdad Medical City, Iraq, during a 2-year period., METHODS: Forty-one patients with a history of mandibular war injuries treated by our maxillofacial team were reviewed during a period of 2 years (2015-2017). All patients were treated in the Maxillofacial Unit of the Hospital of Specialized Surgeries in Baghdad Medical City., RESULTS: A 2-year retrospective study evaluated 41 patients with mandibular war injuries with a total of 94 fractures (comminution represents 79.06% of the bullet injuries, while it is only 62.74% with IED injuries). Management of these injuries was varied according to the severity of the injuries and resources available. Close reduction was used in 72.72% of the linear fracture cases, whereas open technique was used in 56.6% of the comminuted fractures., CONCLUSIONS: Bullet injuries were associated with a higher number of mandibular comminuted fractures, in addition to more extensive bone loss. While shell injuries of IED (improvised explosive devices), on the other hand, were associated with higher infection rate and more postoperative complication.

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156. Alar, T., et al. (2013). "Acute and delayed traumatic diaphragmatic ruptures presenting at the emergency service: What are we missing?" Hong Kong Journal of Emergency Medicine 20(3): 172-177.

Introduction: Diaphragmatic rupture is rarely a cause of death by itself. It is especially difficult to diagnose diaphragmatic ruptures in patients with unstable vital signs who present at the emergency service with concurrent chest, abdomen, and extremity injuries as a result of blunt trauma. We evaluated the diagnostic processes, clinical findings and treatment results of acute and delayed traumatic diaphragmatic ruptures (TDR) cases that presented at the emergency service. Methods: A total of 29 patients that underwent surgical treatment with a diagnosis of TDR among 1021 patients that presented at the Canakkale State Hospital Emergency Service with acute or delayed thoracoabdominal trauma were retrospectively investigated. The age, gender, trauma etiology, diagnosis duration, injury severity score (ISS), rupture location, accompanying organ injuries, operation type, inpatient duration, morbidity and mortality were recorded on prepared forms to analyse the cases. Results: The mean age of the 29 patients with TDR was 45.31 + 17.76 years with and 20 (69%) males and 9 (31%) females. The trauma was blunt in 22 (76%) and penetrating in 7 (24%) cases. The TDR was acute in 16 (55%) and delayed in 13 (45%) patients. The surgery for TDR treatment consisted of with thoracotomy in 16 (55%) patients, laparotomy in 11 (38%) patients and both thoracotomy and laparotomy in 2 (7%) cases. Mortality occurred in 3 (10%) patients that presented at the acute stage. Conclusions: The patients undergoing thoracoabdominal trauma, should be explained the probability, although low, of rupture of the diaphragm. These patients should be followed up and it should be emphasized that they should absolutely tell this trauma history to the physician who examines them when they present at the emergency service.

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157. Al-Bahrani, A. Z., et al. (2006). "Acute pancreatitis: An under-recognized risk of percutaneous transhepatic distal biliary intervention." HPB 8(6): 446-450.

Objective: Percutaneous transhepatic biliary intervention (PTBI) plays an important role in the management of biliary obstruction, and this may be complicated by acute pancreatitis. The aim of this study was to assess the incidence of acute pancreatitis following PTBI. Patients and methods: Patients who underwent PTBI between January 1992 and December 2003 in a tertiary referral centre were identified from the hospital database. Patients who did not have their amylase measured post-procedure were excluded, as acute pancreatitis might have been missed. Acute pancreatitis was defined as hyperamylasaemia of three times or more above normal in association with abdominal pain. Results: Over a 12-year period, 331 patients underwent 613 procedures. Serum amylase was measured after 134 procedures (21.9%) and was elevated in 26 of those (19.4%). There was no difference in the frequency of hyperamylasaemia between proximal and distal PTBI (14/73 [19.2%] vs 12/61 [19.7%] procedures, p=NS). However, acute pancreatitis developed after 4 of 61 (6.6%) distal PTBI (stent, n=3; internal-external catheter insertion, n=1) but not after proximal PTBI (cholangiography or external drainage) (p=0.041). The attacks were mild in three of the four patients. No pancreatitis-related deaths occurred. Conclusion: The risk of acute pancreatitis after distal PTBI is under-recognized and should be considered as a consent issue in patients scheduled for distal PTBI and when post-procedure abdominal pain ensues.

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158. AlBayar, A., et al. (2019). "Risk of Vertebral Artery Injury and Stroke Following Blunt and Penetrating Cervical Spine Trauma: A Retrospective Review of 729 Patients." World neurosurgery 130: e672-e679.

BACKGROUND: Cervical spine trauma (CST) may result in vertebral artery injury (VAI), increasing the risk of developing stroke. Stroke risk following CST is poorly reported., METHODS: In total, 729 patients with CST were retrospectively analyzed, including rates of VAI, age at injury, cause of injury, cardiovascular history, smoking history, substance abuse history, embolization therapy, and antiplatelet or anticoagulant therapy prior or after injury. VAIs were identified and graded following the Modified Denver Criteria for Blunt Cerebrovascular Injury using magnetic resonance angiography and

computed tomography angiography. Brain scans were reviewed for stroke rates and statistically significant variations., RESULTS: Thirty-three patients suffered penetrating trauma, whereas 696 patients experienced blunt trauma. In total, 81 patients met the criteria for analysis with confirmed VAI. VAI was more common in penetrating injury group compared with blunt injury group (64% vs. 9%, P < 0.0005). However, low-grade VAI (less than grade III) was more common in blunt injury group versus penetrating group (37% vs. 14%, P < 0.05). The frequency of posterior circulation strokes did not vary significantly between groups (26.3% vs. 13.8%, P = 0.21). Cardiovascular comorbidities were significantly more common in the blunt group (50%, P = 0.0001) compared with the penetrating group (0%)., CONCLUSIONS: VAI occurs with a high incidence in penetrating CST. Although stroke risk following penetrating and blunt CST did not vary significantly, they resulted in serious complications in a group of patients. Further study of this patient population is required to provide high-level, evidence-based preventions for VAI complications.

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159. Alberth, B. and J. Damjanovich (1990). "[Complications of retrobulbar injections. Possibilities for prevention]." Komplikationen retrobulbarer Injektionen. Moglichkeiten der Beseitigung. 196(2): 92-93.

The authors advocate the use of a new needle developed specifically to avoid complications with retrobulbar injections. In cases with high myopia sonography is performed to determine whether the patient has a posterior staphyloma, which can aggravate the risk of injury. In such cases the retrobulbar injection is performed with the patient's gaze directed downward and outward.

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160. Albertina, L., et al. (2022). "Low-dose levetiracetam versus phenytoin for early seizure prophylaxis after traumatic brain injury." Critical care medicine 50(1 SUPPL): 773.

INTRODUCTION: Brain Trauma Foundation Guidelines recommend phenytoin (PHE) for the prevention of early posttraumatic seizures (PTS). Levetiracetam (LEV) has gained popularity in recent years for this indication owing to its lack of serum drug monitoring, ease of administration, minimal drug interactions, and fewer reported adverse effects when compared to PHE. However, the effective dose of LEV remains unclear. The purpose of this study was to compare the incidence of early PTS in patients receiving either lowdose LEV (500 mg twice daily) or PHE for the first seven days after traumatic brain injury (TBI). METHODS: A retrospective chart review was conducted on adult TBI patients receiving either low-dose LEV or PHE for the prevention of early PTS between January 2016 and September 2020. TBI patients were identified using diagnosis-related group codes. RESULTS: 200 patients were evaluated with 100 patients in each group. Overall, most patients (98%) sustained blunt TBIs. The LEV cohort had a lower median Glasgow Coma Scale (GCS) score on admission (13 vs 15), in addition to a lower median best GCS score (14 vs 15) and worst GCS score (8 vs 13) within 24 hours of admission. The LEV group more frequently received hyperosmolar agents (47% vs 21%) and underwent neurosurgical intervention (35% vs 18%) when compared to the PHE group. The incidence of clinical seizures occurred in a fewer proportion of patients receiving LEV (1% vs 8%, p = 0.035). While there was an increased median intensive care unit (ICU) length of stay (LOS) in the LEV group (6 vs 3 days, p < 0.001), there was no significant difference in median hospital LOS between groups (7 vs 5 days, p = 0.067). CONCLUSIONS: Low-dose LEV demonstrated a similar rate of early PTS in comparison to PHE when used for the first seven days after TBI. Differences in ICU and hospital LOS were more likely attributable to the LEV cohort's severity of injury, as measured by lower median GCS scores within the first 24 hours of admission in addition to an increased need for hyperosmolar and neurosurgical intervention. Larger, prospective studies involving more patients with penetrating TBIs would be necessary in order to validate observations made in this study.

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161. Albrecht, J. S., et al. (2018). "Association of Alcohol With Mortality After Traumatic Brain Injury." American journal of epidemiology 187(2): 233-241.

Although alcohol exposure results in reduced mortality after traumatic brain injury (TBI) in animal models, clinical trials based on proposed mechanisms have been disappointing and have reported conflicting results. Methodological issues common to many of these clinical studies may have contributed to the spurious results. Our objective was to evaluate the association between blood alcohol concentration (BAC) and in-hospital mortality after TBI, and overcome methodological problems of prior studies. We conducted a retrospective cohort study on individuals treated for isolated TBI (n = 1,084) at the R Adams Cowley Shock Trauma Center (Baltimore, Maryland) from 1997 to 2012. We excluded individuals with injury to other body regions and examined multiple cutpoints of BAC. Our primary outcome was in-hospital mortality. In adjusted logistic regression models, the upper level of each blood alcohol categorization from 0.10 g/dL (odds ratio = 0.63, 95% confidence interval: 0.40, 0.97) through 0.30 g/dL (odds ratio = 0.25, 95% confidence interval: 0.08, 0.84) was associated with reduced risk of mortality after TBI compared with individuals with undetectable BAC. In sensitivity analyses among individuals without penetrating brain injuries (95% firearm-related) (n = 899), the protective association was eliminated. This study provides evidence that the observed protective association between BAC and in-hospital mortality after TBI resulted from bias introduced by inclusion of penetrating injuries.

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162. Al-Darazi, F. and S. Koshy (2016). "Reverse takotsubo cardiomyopathy in a young organ donor." Journal of the American College of Cardiology 67(13): 1063.

Background: Takotsubo cardiomyopathy (TCM) is caused by the significant production of catecholamines that lead to myocardial hypokinesis through cardiomyocytes toxicity and coronary microvascular dysfunction. We present an organ donor who developed reverse TCM (a variant of TCM) following major head trauma. Case: 22 year old healthy man who sustained a gunshot to the head causing brain death was considered for organ donation. His Troponin-I peaked at 15 (μg/L) and echocardiogram showed basal-mid wall hypokinesis with sparing of the mid ventricle to apex. Patient had no family history of cardiomyopathy or sudden cardiac death, and no history of substance abuse. The patient's heart was rejected for transplantation based on the echocardiogram findings. Cardiac autopsy showed multifocal single cell death with contraction band necrosis along with foci of neutrophilic infiltrate most consistent with catecholamine surge, and there was no evidence of epicardial coronary artery disease. Decision Making: The clinical presentation and the echocardiographic findings were commensurate with reverse TCM. Tissue pathology confirmed the diagnosis. This variant comprises 1% of TCM. Recovery is the rule (96%), commonly within the first four weeks. Reverse TCM tends to occur in younger people, higher level of troponin is reported, and is more common with brain injury. Left ventricular systolic dysfunction that develops after the acute neurologic event limits the use of the donor hearts, hence decreasing the pool of potential heart donor by 20% to 40% by most reports. However, this dysfunction may be reversible once the catecholamine surge subsides. If there are better prediction models to assess recovery and recurrence rates there is a potential that these hearts could be used for transplantation. Conclusions: We suggest that young healthy adults with TCM or its variants, and a clearly identified catecholamine mediated stressful event may still be considered for heart donation as recovery is a likely to happen. There is a need for a prediction model that incorporates demographic, anatomical and pathological data including tissue biopsy findings to better assess the probability of recovery and recurrence.

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163. Aldekhayel, S., et al. (2014). "Evolving trends in the management of orbital floor fractures." The Journal of craniofacial surgery 25(1): 258-261.

BACKGROUND: The management of orbital floor fractures is diverse and continues to evolve. The purpose of the current study was to provide an updated summary of the literature, with a focus on interspecialty differences, and contrast that with current treatment strategies of actively practicing plastic

surgeons., METHODS: A survey was conducted of surgeons who currently manage orbital floor fractures. The results are summarized and compared with a 10-year literature review (2002-2012) of surgical approaches, indications and timing of surgery, and implant selection in various surgical disciplines. Inclusion criteria included studies in English language with 10 or more patients., RESULTS: The survey response rate was 56%, of which 86 surgeons were identified to currently manage orbit fractures. A third of participants reported they are less likely to operate on these fractures relative to earlier in their career. Six factors were found to have the greatest influence on surgeon's operative decision: enophthalmos, hypophthalmos, positive forced duction, defect size, motility restriction, and persistent diplopia. The most common preferred approach to the orbit is midlid/infraorbital (45%) followed by transconjunctival (31%) and subciliary (24%). Medpor and titanium are the most preferred implants (83%) compared with autologous bone (5%)., CONCLUSIONS: Significant interdisciplinary and intradisciplinary differences in the management of orbital fractures exist. The most significant trends are the growing popularity of alloplastic versus autogenous materials for orbital floor reconstruction and the fact that one-third of surgeons are more likely to opt for a nonoperative (conservative) approach compared with earlier in their careers.

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164. Aldemir, M., et al. (2004). "Predicting factors for mortality in the penetrating abdominal trauma." Acta chirurgica Belgica 104(4): 429-434.

PURPOSE: penetrating abdominal trauma (PAT) is still a serious problem all over the world. This study was made to define and discuss the factors that could affect mortality in the PAT., METHODS: the records of 1048 patients hospitalized and operated for PAT at Dicle University Hospital (DUH) between January 1990 and December 2001 were retrospectively reviewed. Patients (n = 1048) were divided into two groups: "Healthy Group" (HG) (n = 942) and "Deathly Group" (DG) (n = 106). The epidemiological and clinical features were evaluated as probable risk factors for mortality. The risk factors for mortality were revealed using univariate and multivariate analyses., RESULTS: a total of 1048 patients [937 (89.4%) male, 111(10.6%) female] with PAT were included in this study. The mortality rate (22.5%) of female patients was significantly higher than (8.6%) that of male patients (p = 0.000). The mean age was 30.01+/-63.9 (14-74) years and 30+/-12.5(15-71) years in the HG and DG consecutively (p = 0.85). The average interval between injury and operation (IBIO) was 2.09+/-1.3 (0.5-3) and 6.9+/-11.4 (1-6.1) hours in the HG and DG respectively (p = 0.000). Presence of shock on admission (PSDA) was determined in 87 patients and in 96 patients in the HG and DG respectively (p = 0.000). The mortality rate (14.9%) in patients presenting gunshot wounds (GSW) was significantly higher than (2.7%) that of patients with stab wounds (SW) (p = 0.000). The average number of injured intraabdominal organs (NIAOI) was 1.98+/-1.08 (1-7) and 4.67+/-1.99 (1-13) in the HG and DG respectively (p = 0.000). Mortality rates were 72.7% in cardiac injury, 30% in great vessels injuries, 32.6% in cranial injury, and 21.5% in major extremity and pelvic injury (p = 0.000). The average penetrating abdominal trauma index (PATI) was 11.78+/-9.44 (1-58) and 46.24+/-22.18 (15-119) in the HG and DG respectively (p = 0.000). In multivariate analyses, female gender [Odds Ratio (OR) = 10.74, 95% Confidence Interval (CI) = 3.03-38.12, P = 0.000], the long IBIO (OR = 1.82, CI = 1.39-2.40, P = 0.000), PSDA (OR = 94.45, CI = 28.32-314.95, P = 0.000), presence of cranial injury (OR = 0.03, CI = 0.002-0.363, P = 0.006) and high PATI (OR = 1.14, CI = 1.09-1.19, P = 0.000), were found significantly important for mortality., CONCLUSION: we determined that conditions such as, female gender, long interval between injury and operation, presence of shock on admission, presence of cranial injury and high PATI were predicting factors for mortality in PAT.

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165. Alderazi, Y. J., et al. (2015). "Endovascular therapy for cerebrovascular injuries after head and neck trauma." Trauma (United Kingdom) 17(4): 258-269.

Cerebrovascular injuries after blunt or penetrating head and neck trauma often lead to significant disability from ischemic stroke, hemorrhagic stroke and uncontrolled extracranial hemorrhage. Trauma causes carotid or vertebral dissection, occlusion, pseudoaneurysm, arteriovenous fistula, vessel

transection, traumatic epistaxis, venous sinus thrombosis and carotid cavernous fistula. The rapid development of neuroendovascular techniques over the past two decades has led to effective therapies for each of these injuries. Controlled lesion embolization may use coils, liquid embolics (onyx or n-butyl cyanoarcrylate), polyvinyl alcohol particles or detachable balloons; there is stent angioplasty with uncovered, overlapping and covered stents or mechanical thrombolysis using stent-retrievers or aspiration catheters and the use of balloon occlusion tests and supraselective angiography to delineate safety of vessel sacrifice and to diagnose occult lesions respectively. Furthermore, the proliferation of stroke centers has increased local availability of rapid neuroendovascular expertise at many major trauma centers. Neuroendovascular therapies are less invasive than surgery, can often preserve the injured parent vessels and aid in treating conditions where surgery may be limited. In the absence of randomized controlled trials we present a narrative review of current endovascular therapeutic applications for each of these injuries. This expands the therapies at trauma teams' disposal in the continued effort to control bleeding, reduce secondary injury and prevent disability after trauma. Further research is necessary to inform the role of endovascular techniques after trauma. In particular, comparative studies are necessary to quantify the risk and benefits in conditions where surgical options also exist.

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166. Aldrich, E. F., et al. (1992). "Predictors of mortality in severely head-injured patients with civilian gunshot wounds: a report from the NIH Traumatic Coma Data Bank." Surgical neurology 38(6): 418-423.

Predictors of outcome were examined in this prospective study of 151 patients severely injured by civilian gunshot wounds. Of the 151 patients, 133 (88%) died. Of the 123 patients with an initial Glasgow Coma Scale score of 3-5, 116 (94%) died, whereas of the 20 with an initial Glasgow Coma Scale score of 6-8, 14 (70%) died. There were no good outcomes, and only three moderate recoveries in patients who had initial scores of 8 or less. In those patients who survived long enough for intracranial pressure monitoring, intracranial hypertension predicted a very poor outcome. Computed tomographic scan characteristics such as midline shift, compression or obliteration of the mesencephalic cisterns, the presence of subarachnoid blood, intraventricular hemorrhage, and the presence of hyperdense or mixed-density lesions greater than 15 mL, either bilateral or unilateral, were all associated with a poor outcome. However, neither the caliber of gun nor the distance of the gun from the head significantly affected the risk of dying.

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167. Aldridge, P., et al. (2021). "Head home: implementation during COVID-19 pandemic." Emergency medicine journal : EMJ 38(9): 692-693.

BACKGROUND: Recent research suggests that between 20% and 50% of paediatric head injuries attending our emergency department (ED) could be safely discharged soon after triage, without the need for medical review, using a 'Head Injury Discharge At Triage' tool (HIDAT). We sought to implement this into clinical practice., METHODS: Paediatric ED triage staff underwent competency-based assessments for HIDAT with all head injury presentations 1 May to 31 October 2020 included in analysis. We determined which patients were discharged using the tool, which underwent CT of the brain and whether there was a clinically important traumatic brain injury or representation to the ED., RESULTS: Of the 1429 patients screened; 610 (43%) screened negative with 250 (18%) discharged by nursing staff. Of the entire cohort, 32 CTs were performed for head injury concerns (6 abnormal) with 1 CT performed in the HIDAT negative group (normal). Of those discharged using HIDAT, four reattended, two with vomiting (no imaging or admission) and two with minor scalp wound infections. Two patients who screened negative declined discharge under the policy with later medical discharge (no imaging or admission). Paediatric ED attendances were 29% lower than in 2018., CONCLUSION: We have successfully implemented HIDAT into local clinical practice. The number discharged (18%) is lower than originally described; this is likely multifactorial. The relationship between COVID-19 and paediatric ED attendances is unclear but decreased attendances suggest those for whom the tool was

originally designed are not attending ED and may be accessing other medical/non-medical resources.

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168. Aldunate, D., et al. (2020). "10 Years of Implementation of the "Glasgow 7" Quality Guarantee Program in the Mendoza Central Hospital: Epidemiology and Evolution of Neurocrytic Patients." Transplantation proceedings 52(4): 1053-1055.

INTRODUCTION: In 2003, the Glasgow 7 Quality Guarantee Program was put into effect in Argentina with the objective of standardizing the donation and transplant process throughout the country, establishing the observation and registration of all neurocritical patients with a score on the Glasgow Coma Scale of 7 of 15 or less admitted to critical beds of selected establishments., MATERIALS AND METHODS: The following study is retrospective, observational, and cohort-based. It was developed in the Central Hospital of Mendoza, in the critical units, including guard, coronary, cardiovascular surgery recovery, and intensive care therapy. The inclusion criteria were admission to the institution with a score on the Glasgow Coma Scale of 7 or less with a structural cause of coma. Data collection was carried out in the national online database SINTRA., RESULTS: From January 1, 2008, to December 31, 2018, 1757 patients were enrolled at the Central Hospital of Mendoza, Argentina with Glasgow scores of 7 or less. The most frequent cause of coma was brain trauma (934 patients; 53%), followed by stroke (614 patients; 35%). Of those who scored 3 of 15 in the GCS upon admission, 65% progressed to brain death, whereas 72% of those who scored 7 were discharged. Of all these patients, 270 became donors, accounting for 43% of all brain deaths, whereas 187 had refused to become organ donors (30.6%). Of the total real donors, 55% were multiorganic (150 donors).

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169. Alegro, J. V., et al. (2019). "Successful treatment of carbapenem-resistant klebsiella pneumoniae (CRKP) aortic valve endocarditis with ceftazidime-avibactam." Open forum infectious diseases 6: S110.

Background. The emergence of carbapenem-resistant Klebsiella pneumoniae (CR-Kp) presents significant clinical challenges with our limited antibiotic armamentarium. Infective endocarditis caused by CR-Kp is rare, with few cases reported in the literature. The use of the novel β-lactam/β-lactamase inhibitor combination ceftazidime- avibactam (CAZ-AVI) in this setting has only been described in one 2018 case in Italy. Guidance in how these novel antibiotics should be used becomes more prudent as the prevalence of complicated CR-Kp infections increases. Methods. A 51-year-old male with a past medical history of a gunshot wound to the neck, type 2 diabetes, and osteomyelitis status post right below-the-knee and left toe amputations presented to the emergency department with altered mental status and right upper extremity weakness. The patient's hospital course was complicated by hemorrhagic stroke, left above-the-knee amputation, and intraoperative cardiac arrest. Subsequently, blood cultures on hospital days 41 and 43 grew CR-Kp and a transthoracic echocardiogram (TTE) showed moderate to severe aortic regurgitation. Results. Antimicrobial therapy was changed from imipenem-cilastatin and colistin to CAZ-AVI and amikacin. The organism was found to be susceptible to CAZ-AVI and amikacin, intermediate to colistin, and resistant to all carbapenems. A transesophageal echocardiogram (TEE) confirmed the presence of a small mobile vegetation on the aortic valve with perforation and severe regurgitation. CAZ-AVI and amikacin were continued for two weeks, and then switched to CAZ-AVI and ertapenem for an additional four weeks. Follow-up blood cultures on and after day 44 were negative for CR-Kp. A TTE performed after therapy completion no longer demonstrated aortic regurgitation; however, the valves were poorly visualized. The patient then suffered anoxic brain injury after a second cardiac arrest, thought to be unrelated to endocarditis. The patient's family then decided on hospice care and the patient expired. Conclusion. We report the successful treatment of CR-Kp endocarditis with CAZ-AVI and amikacin for two weeks followed by CAZ-AVI and ertapenem for four weeks. This regimen can be a viable option for patients that present with this rare multidrug-resistant infection.

170. Aleksandrov, L. N., et al. (1970). "[Mechanism of gunshot wounds of the cranium and brain (experimental study)]." O mekhanizme ognestrel'nykh ranenii cherepa i golovnogo mozga (eksperimental'noe issledovanie) 104(5): 81-85.

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171. Alessi, G., et al. (2002). "Home-made gun injury: spontaneous version and anterior migration of bullet." British journal of neurosurgery 16(4): 381-384.

We report a unique case of a self-inflicted brain injury using an ingenious home-made gun with spontaneous anterior migration of the intact bullet. On admission, the patient was fully conscious with no neurological deficits. Computed tomography (CT) confirmed a penetrating missile injury with transventricular across midline trajectory and multi-lobe injury with the bullet lodged in the occipital lobe. Serial CT revealed spontaneous version with anterior migration of the bullet from the occipital lobe to finally come to rest in the ipsilateral frontobasal region. The bullet was removed via a left supra-orbital craniotomy. The patient experienced good outcome. Home-made gun injuries, although uncommon today, represent a special form of missile injury with unique low velocity terminal ballistics. As these weapons are seen infrequently today, surgeons should be alerted to their existence as patients with this form of injury usually have a good prognosis if vital brain structures are spared.

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172. Alexandrakis, G., et al. (1998). "An intraocular foreign body masquerading as idiopathic chronic iridocyclitis." Ophthalmic surgery and lasers 29(4): 336-337.

The authors report a case of presumed idiopathic chronic iridocyclitis in which an intraocular foreign body (IOFB) was finally identified. There was no history of prior eye trauma. Ophthalmologic and laboratory evaluations were inconclusive. Seven months following unsuccessful medical treatment of the iritis and given the patient's occupational history, a skull x-ray was performed followed by computed tomography of the orbits. A metallic IOFB was identified in the pars plicata and was surgically removed with resolution of the inflammation. The possibility of an IOFB should always be entertained in idiopathic iridocyclitis refractory to medical treatment, even when there is no history of ocular trauma.

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173. Alexandrakis, G. and J. L. Davis (2000). "Intracranial penetrating orbital injury." Ophthalmic surgery and lasers 31(1): 61-63.

The authors report a case of double-penetrating injury of the globe with intracranial involvement from a pellet gun. A 16-year-old boy had a visual acuity of bare light perception in the left eye after being hit by a pellet. There was an inferior limbal entry site, dense hyphema, and no view of the fundus. Computed tomographic scan showed the pellet intracranially close to the left cavernous sinus. After neurosurgical clearance, the patient underwent primary closure of the corneoscleral entry site followed 3 weeks later by pars plana vitrectomy, lensectomy, and repair of a rhegmatogenous retinal detachment. At 12 months postoperatively, visual acuity was 20/300 and the retina was attached. Our case demonstrates the potential for significant visual recovery in some patients with a penetrating orbital injury and intracranial involvement. Complete radiographic evaluation with neurosurgical consultation is important in the management of these patients prior to ophthalmologic intervention with possible foreign body removal. There is a need for more public awareness regarding the potentially harmful effects of pellet guns.

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174. Alexandru-Abrams, D., et al. (2019). "Scalp Intravenous Catheter Infiltration Leading to Subdural and Intraparenchymal Fluid Collection and Severe Neurologic Sequelae: A Case Report." The Permanente journal 23.

INTRODUCTION: Preterm infants require intravenous (IV) access for administration of medications, IV fluids, and parenteral nutrition. The scalp is a common site for obtaining IV access, and in children with hydrocephalus or wide fontanelles and sutures, there is a high probability of penetrating the meninges and brain matter with the scalp IV needle. If this penetration occurs and remains unnoticed, the contents of the IV infusion can infiltrate into the brain and cause severe brain damage., CASE PRESENTATION: A 3-day-old female neonate, born with myelomeningocele, was receiving total parenteral nutrition through a scalp-vein IV. She experienced a sudden increase in head circumference, a bulging fontanelle, and respiratory distress. Magnetic resonance images demonstrated subdural fluid collection, and the patient underwent emergency surgery. The dura, when opened, exuded milky-white fluid consistent in color with parenteral nutrition. Postoperative imaging showed a parenchymal abnormality caused by the intracranial and intraparenchymal infusion of parenteral nutrition. Four years later, the child had a shunt and had mild cognitive impairment., DISCUSSION: In cases of accidental intracranial administration of parenteral nutrition, we recommend that aggressive therapy be pursued to minimize the risks of developing comorbidities such as meningitis and to allow for maximal functional recovery.

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175. Alexopoulos, G., et al. (2020). "Ballistic lobar trajectory outcomes in civilian firearm penetrating brain injury." Journal of neurosurgery: 1-10.

OBJECTIVE: Penetrating brain injury (PBI) is the most lethal of all firearm injuries, with reported survival rates of less than 20%. The projectile trajectory (PT) has been shown to impact mortality, but the significant lobar tracks have not been defined. The aim of this retrospective case-control study was to test for associations between distinct ballistic trajectories, missile types, and patient outcomes., METHODS: A total of 243 patients who presented with a PBI to the Saint Louis University emergency department from 2008 through 2019 were identified from the hospital registry. Conventional CT scans combined with 3D CT reconstructions and medical records were reviewed for each patient to identify distinct PTs., RESULTS: A total of 65 ballistic lobar trajectories were identified. Multivariable regression models were used, and the results were compared with those in the literature. Penetrating and perforating types of PBI associated with bitemporal (t-statistic = -2.283, $p = 0.023$) or frontal-to-contralateral parietal (t-statistic = -2.311, $p = 0.025$) projectile paths were universally found to be fatal. In the group in which the Glasgow Coma Scale (GCS) score at presentation was lower than 8, a favorable penetrating missile trajectory was one that involved a single frontal lobe (adjusted OR 0.02 [95% CI 0.00-0.38], $p = 0.022$) or parietal lobe (adjusted OR 0.15 [95% CI 0.02-0.97], $p = 0.048$). Expanding or fragmenting types of projectiles carry higher mortality rates (OR 2.53 [95% CI 1.32-4.83], $p < 0.001$) than do nondeformable missiles. Patient age was not associated with worse outcomes when controlled by other significant predictive factors., CONCLUSIONS: Patients with penetrating or perforating types of PBI associated with bitemporal or frontal-to-contralateral parietal PTs should be considered as potential donor candidates. Trauma patients with penetrating missile trajectories involving a single frontal or parietal lobe should be considered for early neurosurgical intervention, especially in the circumstances of a low GCS score (< 8). Surgeons should not base their decision-making solely on advanced patient age to defer further treatment. Patients with PBIs caused by nondeformable types of projectiles can survive multiple simultaneous intracranial missile trajectories.

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176. Algattas, H. N., et al. (2021). "Impact of Coronavirus Disease 2019 Shutdown on Neurotrauma Volume in Pennsylvania." World neurosurgery 151: e178-e184.

OBJECTIVE: The 2020 coronavirus disease 2019 (COVID-19) pandemic resulted in state-specific quarantine protocols and introduced the concept of social distancing into modern parlance. We assess the impact of the COVID-19 pandemic on neurotrauma presentations in the first 3 months after shutdown throughout Pennsylvania., METHODS: The Pennsylvania Trauma Systems Foundation was queried for registry data from the Pennsylvania Trauma Outcomes Study between March 12 and June 5 in each year from 2017 to 2020., RESULTS: After the COVID-19 shutdown, there was a 27% reduction

in neurotrauma volume, from 2680 cases in 2017 to 2018 cases in 2020, and a 28.8% reduction in traumatic brain injury volume. There was no significant difference in neurotrauma phenotype incurred relative to total cases. Injury mechanism was less likely to be motor vehicle collision and more likely caused by falls, gunshot wound, and recreational vehicle accidents ($P < 0.05$). Location of injury was less likely on roads and public locations and more likely at indoor private locations ($P < 0.05$). The proportion of patients with neurotrauma with blood alcohol concentration >0.08 g/dL was reduced in 2020 (11.4% vs. 9.0%; $P < 0.05$). Mortality was higher during 2020 compared with pre-COVID years (7.7% vs. 6.4%; $P < 0.05$)., CONCLUSIONS: During statewide shutdown, neurotrauma volume and alcohol-related trauma decreased and low-impact traumas and gunshot wounds increased, with a shift toward injuries occurring in private, indoor locations. These changes increased mortality. However, there was not a change in the types of injuries sustained.

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177. Al-Ghamdi, A., et al. (2007). "Primary pediatric keratoplasty: indications, graft survival, and visual outcome." Journal of AAPOS : the official publication of the American Association for Pediatric Ophthalmology and Strabismus 11(1): 41-47.

BACKGROUND: Penetrating keratoplasty in children has been documented to have a higher rate of graft failure and a worse visual prognosis than adult keratoplasty., METHODS: We undertook a retrospective review of all cases of primary penetrating keratoplasty performed in children 12 years of age or younger at the King Khaled Eye Specialist Hospital between January 1, 1990, and December 31, 2003., RESULTS: One hundred sixty-five primary penetrating keratoplasties were performed in 134 children during the study interval. The surgical indications were congenital opacities in 130 eyes (78.8%), acquired, traumatic opacities in 18 eyes (10.9%), and acquired, nontraumatic opacities in 17 eyes (10.3%). Among congenital opacities, 35 cases were caused by congenital hereditary endothelial dystrophy (CHED). The median follow-up for 73 grafts (44.2%) that remained clear was 50 months (range, 12-50 months), whereas the median follow-up for 92 grafts (55.8%) that failed was 6 months (range, 1-54 months). Kaplan-Meier graft survival was significantly higher at all postoperative intervals in eyes with CHED than for other surgical indications ($p < 0.001$). Eyes with CHED were significantly more likely to achieve ambulatory vision or vision >20/200 than eyes with other indications ($p < 0.001$)., CONCLUSIONS: Pediatric keratoplasty was associated with an excellent prognosis for graft survival in eyes with CHED and a fair prognosis for graft survival in eyes with non-CHED congenital opacities and acquired opacities. The best visual prognosis was obtained in eyes with CHED and the worst prognosis was for non-CHED congenital opacities.

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178. Alhillo, H. T., et al. (2018). "Direct head injury caused by a tear gas cartridge. Questions on safety: A case report from Iraq and review of the literature." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia 56: 179-182.

INTRODUCTION AND BACKGROUND: Primary injuries from tear gas weapons include injuries to the visual and respiratory systems and skin. However, few studies have reported direct mechanical brain injuries from tear gas weapons., CASE REPORT: A 27-year-old male presented to the emergency department of a neurosurgery teaching hospital in Baghdad, Iraq, with a penetrating head injury of unknown source., DISCUSSION: Tear gas weapons are considered safe, but tear gas exposure causes severe complications. Traumatic brain injuries as a direct effect of tear gas bombs are rarely reported in the literature. Tear gas cartridge injuries should be managed in the same manner as any penetrating brain injury, with appropriate neuromonitoring. This monitoring is crucial for the detection and prevention of secondary brain insults., CONCLUSION: Emergency medicine specialists and neurosurgeons should be aware that tear gas weapons are not always safe, and they should anticipate chemical, thermal and mechanical side effects of tear gas weapons. The literature and our results suggest that these weapons should not be considered civil and harmless.

179. Ali, A. S., et al. (2013). "Clinico-imaging and EEG characteristics of intractable epilepsy following closed head injury." Epilepsia 54: 132-133.

Purpose: Post traumatic epilepsy (PTE) is seen in 2-20% following head trauma. Risk factors include injury severity, depressed skull fracture, intracranial hematoma, penetrating trauma, coma >24 h, early post traumatic seizures, focal EEG and neuroimaging abnormalities. However, not much data is available in such patients with intractable seizures following closed head injury (CHI). Method: Consecutive patients with intractable (seizure freedom <1 year in spite of treatment with at least two AEDs) PTE following closed head injury were selected from our Epilepsy Clinic over past 1 year. Their demographic, clinico-imaging and EEG data were reviewed and correlated. Results: Eleven patients (five males & six females) with mean age (±SD) 22 (±9) years presented with intractable epilepsy of 29 (±33) months average duration, fulfilling the methodology. Age of CHI was 37.4 (±33.6) months with time to onset of seizures as 17.3 (±14.2) months following the injury. Etiologies of CHI were Motor Vehicle Accident in eight and fall in three patients. All but two patients had either physical or cognitive sequeale following CHI. Neuroimaging showed lesions in all, with multi-lobar involvement in 8/12 (66.6%) patients. The EEG revealed epileptogenic abnormalities in 9/12 (75%) that were multifocal in 6/9 patients. Conclusion: All patients with intractable PTE following CHI revealed MRI abnormality and three quarter had epileptogenic abnormalities on EEG. Two-thirds of the patients had Motor Vehicle Accident as the etiology in our cohort.

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180. Ali, D., et al. (2021). "CD300f immune receptor inhibition induce exacerbation of penetrating cortical injury." Glia 69(SUPPL 1): E196-E197.

Immune receptors play a critical role in regulating immune and inflammatory processes in the central nervous system (CNS). CD300f is of particular interest given its capacity to transmit activating and inhibitory signals. We previously demonstrated that the ligands of CD300f are present in the normal CNS and that the overexpression of CD300f has a neuroprotective role after an acute excitotoxic brain injury. In order to study its biological function, we used rCD300f-Fc, a fusion protein that interrupts the endogen interaction between CD300f receptor-ligands, and CD300f KO animals, both in vitro as well as in vivo. In vitro, in co-cultures of hippocampal neurons and mixed glia, we observed that the fusion protein induced a dose-dependent neuronal death. This neuronal death was dependent on glia, because no cell death was detected in enriched hippocampal neuronal cultures treated with CD300f-Fc. Moreover, we observed that conditioned medium of co-cultures of hippocampal neurons and mixed glia treated whit rCD300f-Fc induced neuronal death in enriched neuronal cultures, however conditioned medium by mixed glia treated whit rCD300f-Fc did not. In accordance with the in vitro results, in vivo studies, performed by injecting rCD300f-Fc into rat or mouse neocortex, showed an increased lesioned areaas observed by Nissl stain or an increased neuronal loss as observed by direct counting of YFP+ neurons in Thy1-YFP-H mice. Many of the ligands of CD300f, such as phosphatidylserine, sphingomyelin or lipoproteins, are shared with TREM2 immune receptor. To address the question of whether the effects of CD300f-Fc could be mediated by the inhibition of TREM2, CD300f KO mice were injected intracortically with rCD300f-Fc or control IgG. As expected, no effect was observed by CD300f-Fc injection in CD300f KO mice when compared to control IgG injection, suggesting that the fusion protein is acting by inhibiting the endogenous CD300f receptor. In conclusion, taken together, these data suggests that CD300f is involved in the maintenance of CNS homeostasis after an in vivo penetrating brain injury, and that microglial CD300f inhibition may alter microglial phenotype generating a neurotoxic microenvironment.

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181. Ali, M., et al. (2012). "An unusual cause of traumatic brain injury in Khyber Pakhtunkhwa: A case report." JPMI - Journal of Postgraduate Medical Institute 26(3): 343-346.

Penetrating head injuries can be the result of numerous intentional or unintentional events, including missile wounds, stab wounds, motor vehicle and occupational accidents (nails, iron rods) or assaults (screw-drivers). Penetrating head injuries caused by screw-drivers constitute only a small part of the total number of traumatic head injuries seen in casualty. We report a case of neuro-trauma who was operated in our institution. A 25 years gentleman presented in casualty on with a screw-driver penetrating into the skull, as an unusual case of violence.

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182. Ali, Q. M., et al. (1994). "Patterns of skull base fracture: a three-dimensional computed tomographic study." Neuroradiology 36(8): 622-624.

Three-dimensional (3D) computed tomographic (CT) reconstructions were studied retrospectively in 14 patients with skull base fractures. Our aim was to assess the clarity of visualisation and pattern of these fractures. The reformations were obtained from 3 mm thick two-dimensional (2D) CT images. The 2D data stored on optical discs were retrieved and reformatted using the scanner's software. The 3D technique could demonstrate the presence of fractures as well as 2D images. It was of special value in defining the depth and extent of fractures in the floor of the cranial fossae. Undisplaced and displaced fractures could both be demonstrated. Fractures in the anterior fossa run diagonally towards the midline and then cross the cribriform plate of the ethmoid bone. Fractures of the middle fossa run obliquely anteroposterior. Fractures in the lamina papyracea and cribriform plate were difficult to reconstruct due to the thinness of these bones and threshold definitions. The volume of the 3D block determines the angles suitable for viewing the fractures. In spite of present technical difficulties, the 3D images are of greater anatomical and diagnostic value, particularly in anterior fossa fractures. There is no additional radiation risk to the patient, since reconstructions are made from routine 2D images.

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183. Alio, J. L., et al. (2013). "Autologous fibrin membrane combined with solid platelet-rich plasma in the management of perforated corneal ulcers: a pilot study." JAMA ophthalmology 131(6): 745-751.

IMPORTANCE: The combined use of autologous fibrin membrane and the eye platelet-rich plasma (E-PRP) clot could be considered as a new surgical alternative for the closure of corneal perforations., OBJECTIVE: To evaluate the use of autologous solid platelet-rich plasma in combination with an autologous fibrin membrane as a surgical alternative for wound closure in perforated corneal ulcers., DESIGN: Both the fibrin membrane and the E-PRP clot were prepared with the patient's own blood just before the operation. Nylon stitches were used to fixate the fibrin membrane to the conjunctiva and then the E-PRP clot was placed over the corneal perforation, underneath the fibrin membrane. A temporal partial tarsorrhaphy was performed at the end of the procedure. We conducted postoperative monitoring for 3 months. SETTING Vissum Corporacion Oftalmologica, Alicante, Spain., PARTICIPANTS: Eleven patients with perforated corneal ulcers., INTERVENTION: Surgical alternative for the closure of corneal perforation., MAIN OUTCOMES AND MEASURES: Corneal biomicroscopy, fluorescein test, digital tonometry., RESULTS: In all cases the corneal perforation was sealed. The fibrin membrane was present over the corneal surface for the first 3 to 5 days and then gradually disappeared. No evidence of infection or inflammation was detected. Digital tonometry confirmed acceptable levels of ocular tonus in all cases from day 2 after the operation. No patients reported pain, discomfort, or other symptoms, and no complications were observed. After 3 months' follow-up, there was no evidence of relapses or perforations. Corneal grafting was eventually performed in 7 of the 11 cases., CONCLUSIONS AND RELEVANCE: The combined use of autologous fibrin membrane and E-PRP clot is a safe and effective surgical alternative for the closure of corneal perforations. This technique can be considered as a temporary measure until the condition of the cornea permits definite intervention.

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184. Aljuboori, Z., et al. (2022). "A case series of crossbow injury to the head highlighting the importance of an interdisciplinary management approach." Surgical neurology international 13: 60.

BACKGROUND: Penetrating crossbow head injuries are rare with no clear consensus regarding the optimal management paradigm for such injuries. We present three cases of crossbow injury to the head, with emphasis on the need for a comprehensive multidisciplinary management plan., CASE DESCRIPTION: Three cases are presented of patients presenting with self-inflicted penetrating crossbow to head injuries. All three patients presented with intact neurological exam. A comprehensive multidisciplinary plan was created for all three cases with subsequent successful removal of the arrows. All three patients were discharged home with modified Rankin scale score of <2., CONCLUSION: Penetrating crossbow brain injuries are rare and require complex management. A comprehensive management strategy is necessary to manage these injuries. Moreover, careful consideration of factors such as the arrow trajectory, complexity of the injuries, and availability of the required expertise is important to increase the chances of success.

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185. Aljuboori, Z., et al. (2020). "Endovascular Treatment of a Traumatic Middle Cerebral Artery Pseudoaneurysm with the Pipeline Flex Embolization Device." World neurosurgery 133: 201-204.

OBJECTIVE: Traumatic pseudoaneurysms of the proximal middle cerebral artery (MCA) segments are challenging to treat. We describe the management of traumatic internal carotid artery and MCA pseudoaneurysms with flow diversion., CASE DESCRIPTION: A 19-year-old man had sustained a gunshot wound to the head. Delayed digital subtraction angiography showed de novo formation of the left internal carotid artery ophthalmic segment and left MCA M2 segment pseudoaneurysms. We had initially performed coil embolization of the left MCA pseudoaneurysm. However, it had recurred 2 weeks later. We treated both pseudoaneurysms with flow diversion using the Pipeline Flex embolization device. The patient has continued with dual antiplatelet therapy of aspirin and ticagrelor. Follow-up digital subtraction angiography at 6 months showed complete obliteration of both pseudoaneurysms with patent parent vessels. The patient remained neurologically intact., CONCLUSIONS: Flow diversion can be an efficacious treatment of traumatic MCA pseudoaneurysms in appropriately selected cases. The risks versus benefits of dual antiplatelet therapy must be weighed in trauma settings.

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186. Aljuboori, Z., et al. (2020). "The utility of repeat computed tomography angiogram after blunt cerebrovascular injury." Journal of neurointerventional surgery 12: A94.

Introduction Blunt cerebrovascular injury (BCVI) can lead to thromboembolic events. The necessity of short-term repeat vascular imaging after the initial diagnosis is controversial. The aim of this retrospective cohort study is to assess the utility of short-interval computed tomography angiography (CTA) after an initial diagnosis of BCVI. Methods We retrospectively reviewed consecutive patients with BCVI managed at the University of Louisville from 2016-2019 who underwent short-term (1-3 weeks) repeat CTA after initial diagnosis. The exclusion criteria were age <18 years, penetrating injury, and previous neck irradiation. We collected baseline data and performed logistic regression analysis to identify predictors of BCVI imaging outcomes. Results The study cohort comprised 38 patients (68% male) with a mean age of 45 years. Motor vehicle accident (79%) was the most common mechanism of injury, and 89% had cervical spine fractures. Unilateral VA and grade I dissection were the most common findings on initial CTA were a unilateral VA dissection (66%) that was Biffl grade I (36%). Antiplatelet therapy or anticoagulation was administered to 82% of patients after the initial diagnosis (table 1). Shift analysis showed a significant improvement in Biffl grades on repeat CTA (p=0.0001) (figure 1). Biffl grades I injuries were more likely to improve (relative risk ratio [RRR]=3.6, CI 95% (1.02-13.1),p=0.04), whereas grade IV injuries were more likely to be stable (RRR=33, CI 95% (2.9-374), p=0.005). Ten BCVIs (26%) completely resolved on repeat imaging (table 2). The rates of early (<2 weeks) and delayed (2 weeks to 3 months) ischemia were 5% and 0%, respectively. Endovascular stenting was performed in 8%. Conclusion Short-term repeat non-invasive vascular imaging can help to identify the evolution of BCVI. Repeat vascular imaging at short intervals

can help to identify patients who may require endovascular intervention, but additional studies are necessary to clarify its role in the management of BCVI. (Figure Presented).

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187. Aljuboori, Z., et al. (2020). "The Utility of Repeat Computed Tomography Angiogram After Blunt Cerebrovascular Injury." Clinical neurosurgery 67(SUPPL 1): 96-97.

INTRODUCTION: Blunt cerebrovascular injury (BCVI) can lead to thromboembolic events. The necessity of short-term repeat vascular imaging after the initial diagnosis is controversial. The aim of this retrospective cohort study is to assess the utility of short-interval computed tomography angiography (CTA) after an initial diagnosis of BCVI. METHODS: We retrospectively reviewed consecutive patients with BCVI managed at the University of Louisville from 2016-2019 who underwent short-term (1-3 weeks) repeat CTA after initial diagnosis. The exclusion criteria were age < 18 years, penetrating injury, and previous neck irradiation. We collected baseline data and performed logistic regression analysis to identify predictors of BCVI imaging outcomes. RESULTS: The study cohort comprised 38 patients (68% male) with a mean age of 45 years. Motor vehicle accident (79%) was the most common mechanism of injury, and 89% had cervical spine fractures. Unilateral VA and grade I dissection were the most common findings on initial CTA were a unilateral VA dissection (66%) that was Biffl grade I (36%). Antiplatelet therapy or anticoagulation was administered to 82% of patients after the initial diagnosis. Shift analysis showed a significant improvement in Biffl grades on repeat CTA (P = .0001). Biffl grades I injuries were more likely to improve (relative risk ratio [RRR] = 3.6, CI 95% (1.02-13.1), P = .04), whereas grade IV injuries were more likely to be stable (RRR = 33, CI 95% (2.9-374), P = .005). Ten BCVIs (26%) completely resolved on repeat imaging. The rates of early (<2 weeks) and delayed (2 weeks to 3 months) ischemia were 5% and 0%, respectively. Endovascular stenting was performed in 8%. Imaging outcomes of vascular injuries Number of patients Second CTA Third CTA Total 38 16 Normalized 9 (24%) 1 (6%) Improved 2 (5%) 6 (38%) Stable 14 (37%) 9 (56%)Worse 13 (34%) 0% Abbreviations: CTA; computed tomography angiogram. CONCLUSION: Short-term repeat non-invasive vascular imaging can help to identify the evolution of BCVI. Repeat vascular imaging at short intervals can help to identify patients who may require endovascular intervention, but additional studies are necessary to clarify its role in the management of BCVI.

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188. Alkadhimi, A., et al. (2017). "Frontal lobe abscess due to orbital roof blow out fracture." International journal of oral and maxillofacial surgery 46: 74.

Background: A medically fit and well 34-year-old female patient initially presented to the emergency department at Queens Medical Centre following an accident in which she fell from her bike and hit the left orbit with handlebar. Plain film radiographs (OM10o and 30o) showed no evidence of any facial fractures. Clinically, she had no functional problems apart from diplopia on lateral gaze associated with left eye. A two-week review was planned by ophthalmology. Objectives: Patient attended eye causality department 7 days after the initial trauma complaining of ongoing restriction of movement. Ophthalmological examination revealed restricted ocular motility and diplopia on all directions of gaze particularly downwards. Methods: Acomputed tomography (CT) scan performed to investigate the cause of restriction revealed an orbital roof fracture. Following discussion with neurosurgery a magnetic resonance imaging (MRI) was arranged to exclude abscess. Findings: CT showed blowout fracture through the superamedial left orbital cavity with displaced fragments projected 2 cminto the left frontal lobe. Subsequent MRI scan showed abscess formation around the left frontal lobe. The patient had urgent bifrontal craniotomy and drainage of the abscess. Due to risk of infection, no roof repair was performed. Conclusion: This case emphasised the importance of multidisciplinary approach in trauma cases; in this scenario the patient was managed by the maxillofacial surgical team, neurosurgery and ophthalmology. This case also highlights the need for consideration of mechanism of injury in light of clinical findings. A penetrating injury should always make the surgeon consider and exclude underlying bony injury.

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189. Alkan, A., et al. (2002). "Early MRI findings in stab wound of the cervical spine: two case reports." Neuroradiology 44(1): 64-66.

MR imaging was found to be the most sensitive modality for the detection of spinal cord abnormalities in the acutely injured spine. Although it is reported that traumatic pneumomyelogram indicates a base-of-skull or middle cranial fossa fracture and is almost certainly associated with intracranial subarachnoid air, early MR imaging may demonstrate subarachnoid air in penetrating trauma of the spinal cord without head injury. We report two cervical-spine stab-wound cases, one of which had subarachnoid air on early MR findings.

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190. Alkufri, F., et al. (2017). "Intracranial Stray Bullet: Undiagnosed for 4 Decades." World neurosurgery 100: 707.e709.

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191. Allaire, M. T. and M. H. Manhein (2008). "Suicide by blasting caps: a case study of rare cranial trauma." Journal of forensic sciences 53(6): 1313-1315.

Suicide is a deliberate act of ending one's life. Suicide by use of any explosive device, when not involved in a terrorist act, is quite rare in occurrence when compared with other methods routinely utilized. In this paper, we present to the medicolegal community a case of an adult male who committed suicide with blasting caps and the subsequent extensive damage to the cranial hard tissue. Although the cause and manner of death were relatively straightforward, consultation with forensic anthropologists was requested for an anthropological trauma assessment of the highly fragmented skull. After the skull was cleaned and reconstructed, the analysis revealed similarities between blasting cap trauma to the head and high velocity gunshot trauma to the head. Therefore, in a case where some evidence may have been removed or destroyed, forensic analysis involving trauma of this magnitude could result in a misinterpretation of the true mechanism responsible for the osseous damage. In this case, cooperation among the law enforcement agency, coroner's investigators, the forensic pathologist, and forensic anthropologists provided a comprehensive death case analysis.

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192. Allais, L., et al. (2021). "Emergent bilateral hemicraniectomy in the setting of delayed diagnosis of traumatic brain injury." Journal of neurosurgical anesthesiology 33(4): 413.

Traumatic brain injuries (TBI) cause a large burden of ED visits and deaths.1 Intracranial hypertension (ICH) is a consequence of severe TBI. When medical management of ICH fails, decompressive craniotomy becomes necessary to mitigate brain swelling and herniation.2 Unfortunately, TBIs can be difficult to detect early, leading to delayed care. Furthermore, when the brain undergoes significant trauma, a catecholamine surge can lead to cardiac collapse. We present a severe TBI masked by a Glasgow Coma Scale (GCS) of 15, requiring emergent bilateral craniectomies, complicated by intraoperative catastrophic cardiovascular events. Case Summary: Patient is a 49 year old man who arrived after witnessed gunshot wounds to the head. He was awake, able to speak coherently, moving all extremities, with a head wound thought to be a bullet “graze injury.” Head CT revealed a bullet tract from left parietal tissues to the right temporal lobe, holohemispheric bleeds, pneumocephalus and edema. His care was elevated to involve Neurosurgery and Anesthesiology. The patient became progressively hypertensive, developed rightward gaze deviation, left sided motor deficits as his neurological status quickly declined, He was intubated with the head of bed at 30°, hyperventilated, and moved to the OR. He received Mannitol, 23% saline, and Levetiracetam. The Catastrophic Brain Injury protocol was started. He remained hypertensive during the early operative course. As hemorrhages were evacuated, he required a Phenylephrine infusion and PRBCs to maintain adequate cerebral perfusion. During flap closure, the patient developed profound bradycardia and hypotension. Carotid pulse could not be identified until after receiving 0.2 mg of epinephrine. Additional vasoactive medications were given during similar episodes of abrupt profound lability during which the surgical team appreciated

continued herniation with closure. Due to complications of continued hemodynamic lability, global autonomic dysregulation, and poor neurologic exam, the decision for compassionate extubation was made POD 12. Discussion: Missed diagnosis of TBI increases morbidity and mortality. This patient's initial presentation may have led to a delay in escalation of care. In spite of initial high GCS, a witnessed firearm attack should trigger expedited management of presumed TBI. Time to craniectomy might have been shorter, improving brain preservation.3,4 High GCS on presentation can be a positive prognostic factor with timely intervention.5 Expediting tertiary care regardless of GCS may be protective. Initially hypertensive, the patient became suddenly hypotensive and bradycardic. Similar to the myocardial "stunning" in subarachnoid hemorrhages,6 this was possibly catecholamine-mediated, worsened by early brainstem herniation. His catecholamine reserves were likely exhausted after a massive surge, demonstrated by response only to exogenous catecholamines. Furthermore, the cardiomyopathy induced by adrenergic cascade can in of itself be a threat by provoking abrupt and cataclysmic arrhythmias refractory to chemical support.

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193. Allareddy, V., et al. (2014). "Emergency department visits with facial fractures among children and adolescents: an analysis of profile and predictors of causes of injuries." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons 72(9): 1756-1765.

PURPOSE: The objectives of this study were to provide nationally representative estimates of hospital-based emergency department (ED) visits for facial fractures in children and adolescents, examine the burden associated with such visits, identify common types of facial fracture, and examine the role of patient-related demographic factors on the causes of facial fractures., MATERIALS AND METHODS: The Nationwide Emergency Department Sample for 2008 to 2010 was used. All ED visits with a diagnosis of facial fractures in those no older than 21 years were selected. Demographic characteristics, types of facial fracture, causes of injuries, and hospital charges were examined., RESULTS: During the study period, 336,124 ED visits were for facial fractures in those no older than 21 years. Late adolescents (18 to 21 yr old) and middle adolescents (15 to 17 yr old) comprised 45.6% and 26.6% of all ED visits, respectively. Male patients comprised 74.7% of ED visits. The most common facial fractures were those of the nasal bones and mandible. Younger children were more likely to have falls, pedal cycle accidents, pedestrian accidents, and transport accidents, whereas older groups were more likely to have firearm injuries, motor vehicle traffic accidents, and assaults ($P < .05$). Female patients were more likely to have falls, motor vehicle traffic accidents, and transport accidents, whereas male patients were more likely to have firearm injuries, pedal cycle accidents, and assaults ($P < .05$). Those residing at low annual income household levels were at a high risk for having firearm injuries, motor vehicle traffic accidents, and transport accidents ($P < .05$)., CONCLUSIONS: Late adolescents, middle adolescents, and male patients comprise a significant proportion of these ED visits. Age, gender, and household income levels are significantly associated with the causes of facial fracture injuries.

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194. Allareddy, V., et al. (2014). "Impact of facial fractures and intracranial injuries on hospitalization outcomes following firearm injuries." JAMA otolaryngology-- head & neck surgery 140(4): 303-311.

IMPORTANCE: Firearm injuries (FAIs) play a major role in unintentional injuries, suicides, and homicides. It is important that policy makers, public health authorities, physicians, and the public are kept abreast of current trends in FAIs so that preventive programs can be tailored to the needs of cohorts that are at highest risk for such injuries., OBJECTIVES: To provide nationally representative longitudinal estimates of outcomes associated with hospitalizations attributed to FAIs in all age groups in the United States during the years 2003 to 2010; to obtain prevalence estimates of skull and/or facial fractures and intracranial injuries among those hospitalized owing to firearm injuries; and to examine the association between the occurrence of skull and/or facial fractures and/or intracranial injuries and in-

hospital mortality., DESIGN, SETTING, AND PARTICIPANTS: In this retrospective analysis of the largest all-payer hospitalization data set in the United States, we evaluate a Nationwide Inpatient Sample of patients hospitalized for FAIs during the years 2003 to 2010., EXPOSURES: Face and/or skull fracture and/or intracranial injuries due to firearm injuries., MAIN OUTCOMES AND MEASURES: The main outcome of interest was in-hospital mortality. The primary independent variables included occurrence of face and/or skull fracture and/or intracranial injuries. RESULTS During the study period, 252,181 visits were attributed to FAIs. Adolescents and young adults accounted for nearly 80% of all hospitalizations, with more than half of these in the 18- to 29-year-old, high-risk group. Male patients consistently accounted for 89% of the hospitalizations. The uninsured population accounted for nearly a third of hospitalizations. A total of 214,221 FAI hospitalizations did not involve facial and/or skull fractures or intracranial injuries; 13,090 involved a facial and/or skull fracture without a concomitant intracranial injury; 20,453 involved an intracranial injury without a concomitant facial and/or skull fracture; and 4417 involved both a facial and/or skull fracture and intracranial injury. Those with intracranial injuries without concomitant facial and/or skull fractures (odds ratio [OR], 58.40; 95% CI, 50.08-68.11) (P < .001) and those with both facial and/or skull fractures and intracranial injuries (OR, 17.45; 95% CI, 13.98-21.79) (P < .001) were associated with higher odds of in-hospital mortality than those without these injuries. Teaching hospitals were associated with higher odds of in-hospital mortality than nonteaching hospitals (OR, 1.31; 95% CI, 1.14-1.49) (P < .001). Teaching hospitals also tended to treat a higher proportion of complex cases. The uninsured had higher odds of in-hospital mortality than those with private insurance (OR, 1.55; 95% CI, 1.35-1.78)., CONCLUSIONS: AND RELEVANCE Occurrence of intracranial injuries was an independent risk factor for poor outcomes. Teaching hospitals had higher mortality rates but also treated more complex cases than nonteaching hospitals.

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195. Allareddy, V., et al. (2016). "Firearm injuries in children in the USA: A persistent, pervasive, public health issue!" Critical care medicine 44(12): 200.

Learning Objectives: Firearm injuries (FAI) play a major role in intentional as well as unintentional injuries in children and are a major cause of morbidity and mortality. Current national estimates and trends of FAI in children are unknown. We sought to characterize FAI in children requiring emergency department(ED) visit. Further, we sought to identify the predictors of mortality in this cohort. Methods: We performed a retrospective analysis of the Nationwide Emergency Department Sample (years 2008 to 2013), the largest all-payer ED database in the United States. All children aged <18years who visited the ED due to FAI were identified using the external cause of injury codes. Available modes of FAI (accidental vs non-accidental) and resulting types of injuries were assessed. Outcomes included in-hospital mortality (IHM), hospital charges (HC) and Length of stay (LOS). A multivariable logistic regression analysis adjusted for a multitude of patient and hospital level characteristics was used to identify the predictors of mortality in the ED and following hospitalization. Results: Over a 6y period, a total of 49,061 children visited the ED due to FAI in the USA. Of these 16,247(33%) were admitted to the same hospital. The mean age was 14.5y and males accounted for 85% of visits. Outcomes include: Mean ED HC ($4615), mean inpatient HC ($89,859) and mean LOS (6.2days). 1752 patients died in the ED, while 1119 died following hospitalization. Major modes of FAI included accidental (37%), assault (46%), legal intervention (1.7%) and suicide/ self-inflicted(2.6%). Predictors of increased risk of mortality (Odds ratios, 95% CI, p value) included younger(0-9y) age (1.7{1.1-2.5},0.01); uninsured(2.4{1.8-3.3},<0.01); mode of FAI-accidental (4.1{1.4-12.2},0.01), assault(5.2{1.7-16},<0.01) or self-inflicted(15.3{4.7-49.7},<0.01); and those with intracranial injuries(18.4{13.2-25.6),<0.01). Conclusions: Nearly 22 children visit ED every day due to FAI. Adolescents, males and those without insurance or from lower income group are the high risk cohorts. FAI in children are no longer rare tragedies!.

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196. Allareddy, V., et al. (2016). "Is it time for code GSW (gunshot wound)? 194 adult ED visits a day!" Critical care medicine 44(12): 203.

Learning Objectives: Firearm injuries (FAIs) play a major role in suicides, homicides and unintentional injuries. It is important that policy makers, physicians and the public are kept abreast of current trends in FAIs so that preventive programs can be tailored to the needs of cohorts that are at highest risk for such injuries. We sought to characterize FAI in adults requiring emergency department(ED) visit. Further, we sought to identify the predictors of mortality in this cohort. Methods: We performed a retrospective analysis of the NEDS (years 2008 to 2013), the largest all-payer ED database in the USA. All patients aged >18years who visited the ED due to FAI were identified. Available modes of FAI (accidental vs non-accidental) and resulting types of injuries were assessed. Outcomes included in-hospital mortality (IHM), hospital charges (HC) and Length of stay (LOS). A multivariable logistic regression analysis adjusted for a multitude of patient and hospital level characteristics was used to identify the predictors of mortality in the ED and following hospitalization. Results: Over a 6y period a total of 423,624 adults visited the ED due to FAI. Of these 154,399(36.4%) were admitted to the same hospital. Characteristics included: mean age of 32y (18-30y accounted for 57.5%), males (89%), low income (48.3%) and uninsured (44.9%). Outcomes include: Mean ED HC ($5,192), mean inpatient HC ($103,765) and meanLOS (7.2days). 22,998 patients died in the ED, while 13,363 died following hospitalization. Major modes of FAI included accidental (33.5%), assault (47.2%), legal intervention (2.6%) and suicide/self-inflicted(6.9%). Predictors of increased risk of mortality (OR's, 95% CI, p value) included the uninsured(1.9{1.7-2.1},<0.01); self-inflicted FAI (2.3{1.2-4.4},0.01); and those with intracranial injuries(15.3{13.8-16.9),<0.01), crushing/internal injury(4.1{3.6-4.6},<0.01) or open injury to head/neck/ trunk(2.2{2-2.5},<0.01). Conclusions: 194 adults visit ED every day due to FAI. 1 in 12 exposed to FAI died. Young adults, males, the uninsured, and those from lower income were the high risk cohorts. FAI are common occurrences in USA.

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197. Allen, I. V., et al. (1983). "An ultrastructural study of experimental high velocity penetrating head injury." Acta neuropathologica 59(4): 277-282.

Experimental high velocity missile brain injury in the rhesus monkey produces widespread swelling of perivascular astrocytes within 30 min of injury. Possible mechanisms for this lesion include a direct effect of force, chemical mediation secondary to the extravasation of blood, alterations in the permeability of the blood brain barrier and ischaemia. The implications of this findings for the function of the blood brain barrier, for neurotransmission and for neuronal survival are discussed.

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198. Allison, R. Z., et al. (2017). "Derivation of a Predictive Score for Hemorrhagic Progression of Cerebral Contusions in Moderate and Severe Traumatic Brain Injury." Neurocritical care 26(1): 80-86.

BACKGROUNDS: After traumatic brain injury (TBI), hemorrhagic progression of contusions (HPCs) occurs frequently. However, there is no established predictive score to identify high-risk patients for HPC., METHODS: Consecutive patients who were hospitalized (2008-2013) with non-penetrating moderate or severe TBI were studied. The primary outcome was HPC, defined by both a relative increase in contusion volume by >=30 % and an absolute increase by >=10 mL on serial imaging. Logistic regression models were created to identify independent risk factors for HPC. The HPC Score was then derived based on the final model., RESULTS: Among a total of 286 eligible patients, 61 (21 %) patients developed HPC. On univariate analyses, HPC was associated with older age, higher initial blood pressure, antiplatelet medications, anticoagulants, subarachnoid hemorrhage (SAH) subdural hematoma (SDH), skull fracture, frontal contusion, larger contusion volume, and shorter interval from injury to initial CT. In the final model, SAH (OR 6.33, 95 % CI, 1.80-22.23), SDH (OR 3.46, 95 % CI, 1.39-8.63), and skull fracture (OR 2.67, 95 % CI, 1.28-5.58) were associated with HPC. Based on these factors, the HPC Score was derived (SAH = 2 points, SDH = 1 point, and skull fracture = 1 point). This score had an area under the receiver operating curve of 0.77. Patients with a score of 0-2 had a 4.0 % incidence of HPC, while patients with a score of 3-4 had a 34.6 % incidence of HPC., CONCLUSIONS:

A simple HPC Score was developed for early risk stratification of HPC in patients with moderate or severe TBI.

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199. Allison, R. Z., et al. (2014). "Risk factors for delayed intraparenchymal hematoma enlargement after moderate and severe traumatic brain injury using multivariable regression modeling." Neurocritical care 21(1): S136.

Introduction After traumatic brain injury (TBI), delayed enlargement of intraparenchymal hematomas (IPH) has been reported in up to 40% of patients but predictive models for IPH enlargement have not been developed. Methods The trauma database from the only American College of Surgeons verified trauma center in Hawaii was queried to identify consecutive patients admitted for non-penetrating moderate and severe TBI from 2008-2013. Retrospective chart review was undertaken to collect additional variables. IPH volume was estimated using the ABC/2 method. The primary outcome was IPH enlargement by ≥10 mL on serial imaging. Chi-square and ANOVA were used to identify factors associated with IPH enlargement ($p< 0.1$) which were then included in a multivariable logistic regression model. Results 419 patients were screened, of whom 286 had repeat imaging and were included in the analyses. Mean age was 47.6±26.7 years, 70.6% were male, 38.8% were Asian, 29.7% were Native Hawaiian or Pacific Islander, and 25.2% were white. Mechanism of injury was fall in 48.3%, motor vehicle crash in 25.2%, and assault in 15.0%. In-hospital mortality was 20.6%. Sixty-one patients (21.3%) had delayed IPH enlargement, which was symptomatic in 52% of cases. On univariable analyses, IPH enlargement was associated with older age, higher initial systolic blood pressure, anti-platelet medications, anticoagulants, subarachnoid hemorrhage (SAH), subdural hematoma (SDH), skull fracture, frontal contusion, and shorter interval from injury to initial CT. Packed red blood cells (pRBC) transfusion was protective. In a stepwise logistic regression model, SAH (OR 6.33), SDH (OR 3.46), skull fracture (OR 2.67), and pRBC transfusion (OR 0.31) were independently associated with IPH enlargement ($p< 0.05$). Conclusions We identified risk factors for delayed IPH enlargement after moderate and severe non-penetrating TBI. These factors could be used to identify patients at high risk for IPH enlargement who require closer clinical and radiographic monitoring and may benefit from investigational treatments.

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200. Allon, G., et al. (2016). "The role of computed tomography in the immediate workup of open globe injury." European journal of ophthalmology 26(5): 503-504.

PURPOSE: Immediate primary closure is indicated in cases of traumatic open globe injury. Orbital computed tomography (CT) is performed prior to primary closure in order to rule out possible intraocular foreign bodies (IOFB) and/or damage to adjacent extraocular as well as intraocular structures. The aim of the present study is to evaluate the yield of orbital CT scan in immediate clinical decision-making in cases of open globe injury., METHODS: All cases of open globe injury treated in our institute during a 10-year period were reviewed. All underwent a CT scan before any surgical intervention, regardless of trauma severity. The influence of the CT scan results on decisions regarding the immediate treatment of the open globe injury was analyzed., RESULTS: A total of 125 cases of open globe injury were included in the present study. In none of these cases did the CT scan results have any influence on immediate treatment. The CT scan results did influence decisions that were made after the immediate operative stage., CONCLUSIONS: Computed tomography scan has limited value in immediate clinical decision-making in cases of open globe injury scheduled for primary closure. While not crucial prior to the initial procedure, it is of value in managing the case during the following few days as well as later on. This study suggests that a CT scan performed after the initial globe exploration and suturing procedure is a valid alternative to stalling the definite globe suturing process until a CT scan is obtained and interpreted.

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201. Allred, D., et al. (2014). "Anoxic brain injury and emerging consciousness in a lightning strike victim: A case report." Archives of physical medicine and rehabilitation 95(10): e56-e57.

Objective: N/A Design: Case Report Setting: South Texas Veterans Health Care System, San Antonio, TX. Participants: Army service member struck by lightning who sustained an anoxic brain injury, hemorrhagic contusion of left frontal lobe, burns of 14% total body surface area requiring surgical allografting and epithelial corneal defects of right eye. Acute hospital course complicated further by stress-induced cardiomyopathy, pulmonary embolism, rhabdomyolysis, AKI, SIADH, dysautonomia, pneumonia and respiratory failure with prolonged intubation and tracheostomy, and dysphagia with gastrostomy tube placement. At the onset of his rehabilitation, his Rancho Los Amigos (RANCHO) cognitive functioning level was II. Interventions: The patient was enrolled in the Veterans Health Administration emerging consciousness program (VHA-ECP) which involves a highly functional interdisciplinary rehabilitation team with treatment focus on detailed environmental regulation, direct stimulation interventions, mobility and positioning programs and management of medical comorbidities and traumatic brain injury-related sequalae. Main Outcome Measure(s): Overall improvement in alertness and cognition measured by the Rancho Los Amigos cognitive functioning scale, neuropsychiatric testing and gains achieved in activities of daily living (ADLs) measured by functional independence measure (FIM) scoring. Results: Upon completing the 90-day VHA-ECP, patient had improved his cognitive function and level of alertness to a RANCHO V and was able to be subsequently enrolled into a traditional acute inpatient rehabilitation program. Conclusions: This case report illustrates the efficacy of the VHA-ECP in an anoxic brain injury patient, which is different than the more typical traumatic brain injuries of blast or penetrating trauma.

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202. Al-Mefty, O., et al. (1986). "Value of angiography in cerebral nail-gun injuries." AJNR. American journal of neuroradiology 7(1): 164-165.

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203. Almog, D. M., et al. (2010). "Veteran's shrapnel in the maxillofacial region." The Alpha omegan 103(4): 157-159.

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204. Almogy, G., et al. (2005). "Can external signs of trauma guide management?: Lessons learned from suicide bombing attacks in Israel." Archives of surgery (Chicago, Ill. : 1960) 140(4): 390-393.

BACKGROUND: Following a suicide bombing attack, scores of victims suffering from a combination of blast injury, penetrating injury, and burns are brought to local hospitals., OBJECTIVE: To identify external signs of trauma that would assist medical crews in recognizing blast lung injury (BLI) and effectively triaging salvageable and nonsalvageable victims., DESIGN: Retrospective analysis of all 15 suicide bombing attacks that occurred in Israel from April 1994 to August 1997., SETTING: National survey., PATIENTS: One hundred fifty-three victims died and 798 were injured as a result of 15 attacks. Medical records were reviewed for external signs of trauma, such as burns and penetrating injuries, and the presence of BLI. Main Outcome Measure The odds ratio for BLI and death., RESULTS: Three settings were targeted: buses, semiconfined spaces, and open spaces. Sixty survivors (7.5%) suffered from BLI, which was more common in buses (37 of 260) than semiconfined spaces (14 of 279) and open spaces (9 of 259) (P<.001). Victims with BLI were more likely to suffer from penetrating injury to the head or torso, burns covering more than 10% of the body surface area, and skull fractures (odds ratios, 4, 11.6, and 55.8, respectively; P<.001). Victims who died at the scene were more likely to suffer from burns, open fractures, and amputations in comparison with survivors (odds ratios, 6.5, 18.6, and 50.1, respectively; P<.001)., CONCLUSIONS: Following a suicide bombing attack, external signs of trauma should be used to triage victims to the appropriate level of care both at the scene and in the hospital. Triage of salvageable and nonsalvageable victims should take into account the presence of amputations, burns, and open fractures.

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205. Almogy, G., et al. (2006). "Suicide bombing attacks: Can external signs predict internal injuries?" Annals of surgery 243(4): 541-546.

OBJECTIVE: To report the distribution and types of injuries in victims of suicide bombing attacks and to identify external signs that would guide triage and initial management., SUMMARY BACKGROUND DATA: There is a need for information on the degree to which external injuries indicate internal injuries requiring emergency triage., METHODS: The medical charts and the trauma registry database of all patients who were admitted to the Hadassah Hospital in Jerusalem from August 2001 to August 2004 following a suicide bombing attack were reviewed and analyzed for injury characteristics, number of body areas injured, presence of blast lung injury (BLI), and need for therapeutic laparotomy. Logistic analysis was performed to identify predictors of BLI and intra-abdominal injury., RESULTS: The study population consisted of 154 patients who were injured as a result of 17 attacks. Twenty-eight patients suffered from BLI (18.2%) and 13 patients (8.4%) underwent therapeutic laparotomy. Patients with penetrating head injury and those with > or =4 body areas injured were significantly more likely to suffer from BLI (odds ratio, 3.47 and 4.12, respectively, $P < 0.05$). Patients with penetrating torso injury and those with > or =4 body areas injured were significantly more likely to suffer from intra-abdominal injury (odds ratio, 22.27 and 4.89, respectively, $P < 0.05$)., CONCLUSION: Easily recognizable external signs of trauma can be used to predict the occurrence of BLI and intra-abdominal injury. The importance of these signs needs to be incorporated into triage protocols and used to direct victims to the appropriate level of care both from the scene and in the hospital.

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206. Almojuela, A., et al. (2022). "Vasospasm following low-velocity penetrating pediatric intracranial trauma." Journal of medical case reports 16(1): 48.

BACKGROUND: BB guns or non-powder guns created in the modern era are able to reach exceedingly fast velocities as a result of advances in compressed-gas technology. While missile penetrating trauma has been well documented in neurosurgical literature, penetrating intracranial injury secondary to non-powder guns, along with their associated complications and treatments, is not well described, and even less so in the pediatric population., CASE PRESENTATION: Here, we describe an unusual case of a 6-year-old Indigenous child who was accidentally shot with a BB gun to the head. He subsequently developed delayed acute right-sided weakness due to symptomatic vasospasm. His symptoms resolved following hypertensive therapy, balloon angioplasty intervention, and intra-arterial milrinone therapy., CONCLUSIONS: This case highlights the unique complication of delayed symptomatic vasospasm in a child following a non-missile intracranial penetrating injury. Intracranial vasospasm needs to be considered in the presence of delayed neurological deficit given its potential reversibility. This case also emphasizes the importance of gun safety and education when handling and storing these potential weapons around children.

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207. Almuqamam, M., et al. (2022). "Therapeutic intensity and treatment of hyperthermia in severe traumatic brain injury." Critical care medicine 50(1 SUPPL): 791.

INTRODUCTION: Severe acute traumatic brain injury (sTBI) is a leading cause of pediatric morbidity and mortality. There are no known effective primary therapies for sTBI and management thus centers on the prevention of secondary brain injury. Fever is both a well-established complication of sTBI and known to potentiate secondary injury. We aimed to describe the incidence, duration, severity, and management of fever in children with sTBI. METHODS: This is a retrospective observational study performed at a level one pediatric trauma center. We reviewed relevant data over the first 72 hours of PICU admission in all sTBI patients (presenting GCS ≤8). Collected data included demographic information, timing of the first temperature ≥38.0°C, total duration of temperature ≥38.0°C, maximum temperature, and the timing of all therapies aimed at either fever prevention or reduction. Data are presented using descriptive statistics. RESULTS: Thirty-five patients with sTBI were included (71%

male; median age 4, IQR 0.88-11.0 years). The etiologies of TBI included motor vehicle accident (13/35, 37%), nonaccidental head trauma (11/35, 31%), fall (6/35, 17%), and gunshot wounds (5/35, 14%). 62% of patients developed fever in the first 72 hours of hospitalization with a median time of 5.78 (IQR 3.19 - 13.09) hours to the first fever following PICU admission and a duration of the first fever of 120 (IQR 60 - 285) minutes. The median total duration of hyperthermia ≥38.0°C in the first 72 hours of PICU admission was 256 (IQR 76 - 495) minutes. Tylenol was prescribed to 66% of patients with a fever, a cooling blanket to 11%, and any other therapy aimed at temperature regulation to 3%. The median time from the first fever to the prescription of the first therapy aimed at prevention or management of hyperthermia was 1.22 (IQR -0.27 - 6.39) hours and was started after the first fever in 68% of patients. CONCLUSIONS: Despite the well-described implications of fever in sTBI, it occurs with a high frequency in the clinical management of sTBI. Therapies aimed at prevention or treatment of fever commonly occurs after the start of the first fever and is a potentially modifiable risk factor for worse patient outcomes.

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208. Alnaousf, E., et al. (2010). "Penetrating cranio-cerebral injury - An unusual assault with a long iron bar." Kuwait Medical Journal 42(4): 304-306.

Violent penetrating head injury is rare but it is a significant cause of morbidity in children. We report a case of a 12-year-old boy who sustained a penetrating skull injury at the right parietal bone following an assault with a long curved iron bar.

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209. Al-Omaishi, L., et al. (2013). "Difficulties with recruitment of traumatically brain injured patients for a prospective post-traumatic epilepsy study." Epilepsy Currents 13: 182-183.

Rationale: Traumatic Brain Injury (TBI) is a well-known risk factor for post-traumatic epilepsy (PTE), especially among survivors of penetrating head injuries such as gun shot wounds (GSW), assaults, and blast injuries. We sought to enroll new civilian TBI patients into a prospective study designed to predict the onset of PTE through computerized analysis of electroenchalography (EEG) and microRNA biomarkers with a target enrollment of 90 patients. One critical component of a prospective study such as this is a reasonable expectation of enrollment and an understanding as to why a majority of TBI patients are poor study subjects. Methods: This is an ongoing study. We screened all new TBI patients upon admission as a Level 1 trauma to St. Joseph's Hospital and Medical Center (SJHMC) beginning October 16, 2011. Criteria for enrollment included moderate to severe penetrating or closed head injuries (initial Glasgow Coma Score (GCS) <13), with no previous diagnosis of epilepsy, and not participating in another clinical trial. If the patient was unable to sign for him or herself, families were approached with information about the study and the legally authorized representative was asked to sign for consent. Results: To date (6/15/12) 111 patients who came through SJHMC as a Level 1 trauma patient who had sustained moderate to severe TBI (mean age: 38, GCS at admission: 7.1, mean lowest GCS: 5.7) have been screened for enrollment. Of these, 85 patients were ineligible for study for a variety of reasons; 33 died from their injuries (mean time from injury to death = 6.4 days), 13 lived far from the Phoenix Metropolis and would be unable to return, 10 were not interested, 8 were chronic alcoholics, 7 had a history of seizure disorders, 4 were polysubstance abuse users with suicidal ideologies, and 12 were rejected for other reasons. Of the 26 enrolled, 3 died from their injuries, 5 suffered acute traumatic seizures (but have not yet developed PTE) and 5 were withdrawn. This means only 12.6% of all moderate to severe Level 1 TBI patients are active study participants. Mechanisms of injury were as follow: motor vehicle collision (30), auto vs. pedestrian (20), GSW (14), motorcycle crash (14), assault (11), fall (10), ATV accident (8), and other (4). Alcohol was a factor in 60% of all injuries; 36% of patients were positive for other substances including but not limited to cocaine, marijuana, and opiates, and amphetamines. Conclusions: Prospective clinical studies of PTE after TBI which require long-term follow-up are difficult. Our experience has been that only 1 of 8 such patients (12.6%) could be enrolled and continuously followed over six or more months. This experience should be considered when

planning a long term follow-up study of moderate to severe TBI patients with either penetrating or closed head injuries.

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210. Alonso, N., et al. (2016). "Pseudoaneurysm of the internal maxillary artery: A case report of facial trauma and recurrent bleeding." International journal of surgery case reports 21: 63-66.

Introduction Pseudoaneurysms occur when there is a partial disruption in the wall of a blood vessel, causing a hematoma that is either contained by the vessel adventitia or the perivascular soft tissue. Presentation of case A 32-year-old male presented to the emergency department presented with comminuted fractures in the left zygoma, ethmoids, and the right ramus of the mandible following a gunshot wound. The patient underwent open reduction of his fractures and the patient was discharged on the eighth day after the trauma. Thirteen days after the discharge and 21 days after the gunshot wound, the patient returned to the ER due to heavy nasopharyngeal bleeding that compromised the patency of the patient's airways and caused hemodynamic instability. Arteriography of the facial blood vessels revealed a pseudoaneurysm of the maxillary artery. Endovascular embolization with a synthetic embolic agent resulted in adequate hemostasis, and nine days after embolization the patient was discharged. Discussion The diagnosis of pseudoaneurysm is suggested by history and physical examination, and confirmed by one of several imaging methods, such as CT scan with contrast. Progressive enlargement of the lesion may lead to several complications, including rupture of the aneurysm and hemorrhage, compression of adjacent nerves, or release of embolic thrombi. Conclusion This case reports the long-term follow up and natural history of a patient with a post-traumatic pseudoaneurysm of the internal maxillary artery and the successful use of endovascular embolization to treat the lesion.

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211. Alonso-Garcia, G., et al. (2006). "[Non-specific consciousness during the last six months]." Trastornos inespecificos del nivel de conciencia de seis meses de evolucion. 206(10): 517-518.

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212. Alper, M., et al. (1998). "Gunshot wounds of the face in attempted suicide patients." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons 56(8): 930-934.

PURPOSE: The purpose of this retrospective study was to evaluate the functional and cosmetic results of the treatment of gunshot wounds associated with attempted suicide that resulted in facial injury., PATIENTS AND METHODS: The records of 12 patients with facial injury resulting from gunshot wounds with a suicidal origin, who were hospitalized and treated at Ege University Hospital, Department of Plastic and Reconstructive Surgery, were reviewed., RESULTS: All injuries were limited to the head and neck region; in only one patient did intracranial penetration occur. Mandibular fractures were detected in all cases. Fractures of the maxilla were present in 11 patients. Eight patients suffered from zygomatic fractures. Perforating ocular trauma was present in two cases. Soft tissue repair was performed by primary closure, local flaps, or skin grafts, and rigid fixation was used for fractures. Procedures such as distant flaps or bone grafting were left for delayed reconstruction., CONCLUSION: Only 3 of 12 patients returned for follow-up and reconstruction. It was therefore concluded that relatives of these patients believe that the repair of such deformities, even if it is a functional deformity, is not necessary. Thus, in such cases, one should do as much reconstruction as possible at the primary surgical intervention.

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213. Alqadri, S. L., et al. (2016). "Vasopressin bolus protocol compared to desmopressin (DDAVP) for managing acute, post-operative central diabetes insipidus." Neurocritical care 25(1): S275.

Introduction: Management of post-operative central diabetes insipidus (DI) is focused on replacing urine output with free water. This may not always be sufficient, and desmopressin (DDAVP) is needed. The use of DDAVP, however, is known to cause profound changes in sodium particularly if

the triphasic response post-pituitary surgery is occurring. Herein, we report a case using a dilute vasopressin bolus protocol in managing hypovolemia in acute, post-operative, central DI. Methods: Case report comparing two protocols for DI management. Statistical analysis was performed on serum sodium, urine specific gravity, and urine output using student t-test. P<0.05 was considered significant. Results: Patient is a 16-year-old male admitted to the neurosciences intensive care unit (NSICU) after bifrontal decompressive craniotomy for severe traumatic brain injury from self-inflicted gunshot wound. Immediately post-operatively, he developed increased urine output. He arrived to NSICU hypovolemic (3.4 liters negative in three hours) and hypernatremic (148meq/L). He was resuscitated with intravenous fluids including a dilute vasopressin bolus protocol. This protocol consisted of 1 unit of vasopressin in 1 liter of 0.45% normal saline. This was given in boluses based on the formula: urine output minus one hundred. At the start of this protocol, the serum sodium was 148 and one-hour urine output was 1 liter. This protocol was continued for 48 hours. Endocrinology was consulted and recommended changing to DDAVP. Serum sodium was 149[NP1] and one-hour urine output 320 cc prior to first dose of DDAVP. Comparing the bolus protocol to the DDAVP protocol, the average sodium was 143.8+3.2 and 149.6+3.2 meq/L (p=0.0001), average urine output was 433.2+354.4 and 422.3+276.0 cc/hr (p=0.90), and average specific gravity was 1.019+0.009 and 1.016+0.01, respectively (p=0.42). Conclusions: A protocol using dilute vasopressin bolus is an alternative for managing acute, central DI post-operatively, particularly with acute hypovolemia. Additional studies are needed to address its efficacy in a larger sample.

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214. Alrajhi, K., et al. (2010). "MINOR and minimal head injuries in patients on warfarin." Canadian Journal of Emergency Medicine 12(3): 253-254.

Introduction: There is currendy very little evidence to guide physicians on how to manage emergency patients who sustain a minor or minimal head injury (HI) while on warfarin. The objective of this study was to determine the incidence of intracranial bleeding (ICB) in andcoagulated patients with minor (initial GCS of 13-15 with witnessed loss of consciousness [LOC]/confusion or amnesia) and minimal (no LOC/amnesia/confusion) His and the association of ICB to clinical features, and international normalized ratio (INR) level. Methods: Historical cohort study of all adult patients who presented to 2 tertiary care EDs over 2 years with minor or minimal His, identified through the National Ambulatory Care Reporting System database, while on warfarin with INRs of 1.5 or greater. Exclusions included penetrating injuries, new focal neurologic deficits and previous brain surgery. Our structured data collection tool included 25 variables from history, physical exam, CT, surgical interventions, return visits and death. Our outcome, ICB, included any type of bleed within the cranium, and was determined by either 1) CT during initial ED visit, or 2) CT during a subsequent ED visit at any of the 4 regional hospitals within 2 weeks of the initial visit. Results: We identified 176 patients, of which 60.2% were female, mean age was 79.0 (range 25-100) years and mean EMR was 2.5 (range 1.5- 8.2). A total of 157 patients (89.2%) had CT scans and 28 (15.9%) had ICB. Comparing the group with ICB to the group with no ICB there was no significant difference in INR levels (mean 2.53 v. 2.45, p = 0.5), respectively, while LOC correlated with higher incidence of ICB (28.6% v. 10.8%, p < 0.05), respectively. Incidence of ICB was 21.9% in the minor HI group versus 4.8% in the minimal group. Conclusion: The incidence of ICB in patients on warfarin is considerable. LOC was associated with higher rates of ICB. This study supports a low threshold for ordering a CT scan for patients with minor or minimal head injuries who are on warfarin.

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215. Alrajhi, K. N., et al. (2015). "Intracranial bleeds after minor and minimal head injury in patients on warfarin." The Journal of emergency medicine 48(2): 137-142.

BACKGROUND: There is little evidence to guide physicians on management of patients who sustain head injuries while on warfarin., OBJECTIVES: Our objective was to determine the rate of intracranial bleeding in anticoagulated patients with minor and minimal head injuries and the association with clinical features and international normalized ratio (INR)., METHODS: We conducted a historical

cohort study of adult patients, taking warfarin, at two tertiary care emergency departments over 2 years with minor (Glasgow Coma Score 13-15, with loss of consciousness, amnesia, or confusion) or minimal (Glasgow Coma Score 15 without loss of consciousness, amnesia, or confusion) head injuries. Patients with penetrating injuries, INR < 1.5, or a new focal neurological deficit were excluded. Our outcome, intracranial bleeding, was determined by the radiologist's final computed tomography (CT) report for imaging performed within 2 weeks., RESULTS: There were 176 patients enrolled, of which 157 (89.2%) had CT and 28 (15.9%) had intracranial bleeding. Comparing patients with and without intracranial bleeding found no significant differences in INR, and loss of consciousness was associated with higher rate of intracranial bleeding. The rate of intracranial bleeding in the minor and minimal head injury groups was 21.9% and 4.8%, respectively., CONCLUSIONS: The rate of intracranial bleeding in patients on warfarin is considerable. Loss of consciousness is associated with high rates of intracranial bleeding. This study supports a low threshold for ordering CT scans for anticoagulated patients with head injuries.

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216. Alsberge, J. B., et al. (2018). "Intraorbital Bullet." JAMA ophthalmology 136(3): 295-296.

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217. Al-Schameri, A. R., et al. (2016). "Middle cerebral artery aneurysm surgery after stent misplacement: A case report." Interventional neuroradiology : journal of peritherapeutic neuroradiology, surgical procedures and related neurosciences 22(1): 49-52.

Stent misplacement during endovascular treatment of middle cerebral artery (MCA) aneurysms can cause challenges and be problematic, if clipping becomes necessary. This article reports on a 56-year-old woman with an unruptured, multi-lobulated MCA aneurysm, whom primarily refused surgery; therefore, she was scheduled for stent-assisted coiling. After successful deployment of the stent, it unfortunately then became snagged by the microcatheter and was pulled backwards. The subsequent surgical procedure (i.e. clipping of the MCA aneurysm) was challenging, due to the position of the dislodged stent. Such as misplacement of the stent is rarely documented: It resulted in the difficult handling of a MCA aneurysm. Aneurysms of the MCA should primarily be considered for surgical clipping. In conclusion, an increased risk for eventual surgery should be considered, in cases where endovascular treatments with stents are performed.

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218. Alt, K. W. (2016). "The grimace of battle-a mass grave from the thirty years' war: Dental, forensic and social aspects in the lives of soldiers." Acta Stomatologica Croatica 50(2): 188.

The Thirty Years' War (1618-1648) was one of the most destructive conflicts in the European history. Violence, famine and diseases significantly decreased the European population. In November 1632 a small town in today's Central Germany, was the setting of one of the greatest and bloodiest combats: the great Battle of Lützen. General Wallenstein and the Swedish King Gustav II Adolf were the most prominent actors on the battlefield, the latter was mortally wounded. More than 6.000 soldiers lost their lives, and-after looting-the dead bodies were buried in numerous mass graves. In summer 2011 archaeologists discovered one of these mass graves at the edge of Lützen. The complete grave was recovered en bloc and the skeletons were detailed analyzed in situ, accompanied by methods such as isotopic analyses (C/N, Sr/O), medical imaging techniques (Xray, CT, DVT) and histology. The grave contained the skeletal remains of 47 men with an age at death range from about 15 to 45 years; most of the men were 20-30 years old. One major intention was the reconstruction of the nature of violence in which these men died on the battlefield. Among numerous perimortem injuries a high number of cranial gunshot wounds were found. This kind of death and the caliber of the lead bullets helped to reconstruct the course of the combat, particularly in the area the soldiers died. Healed injuries, such as fractures of the upper and lower limbs or blunt and sharp force trauma to the cranium, provide information about healing conditions and insufficient medical treatment. Poor hygiene and long lasting deprivations have left osteological traces as well and reflects the adverse living conditions during wartime.

219. Al-Thobity, A. M., et al. (2014). "Zygomatic implants as a rehabilitation approach for a severely deficient maxilla." The International journal of oral & maxillofacial implants 29(6): e283-289.

A gunshot injury is one of the main trauma injuries that affect the head and neck region. Severe esthetic, functional, and psychologic deficiencies are consequences of gunshot injuries. The use of implants anchored in the zygomatic bone has been advocated as an approach to the prosthetic rehabilitation of a severely deficient maxilla. This approach provides the patient with an immediate, high-quality, esthetic, and functional complete fixed prosthesis and eliminates the need for bone grafting. In this case report, a patient with a severely deficient maxilla caused by a gunshot injury was rehabilitated by placement of four zygomatic and two pterygomaxillary implants, which were immediately loaded with a complete fixed all-acrylic resin interim prosthesis. The definitive CM Prosthesis (CM Prosthetics) was constructed using computer-aided design/computer-assisted manufacture (CAD/CAM) technology.

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220. Althoff, H. (1975). "Unusual perforating stab wounds of the skull caused by scissors." Kriminalistik 29(4): 157-160.

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221. Altintas, M., et al. (1998). "Eye socket reconstruction with the prefabricated temporal island flap." Plastic and reconstructive surgery 102(4): 980-987.

Insufficiency of tissues and progressive contraction usually restrict the application of prosthetic devices in anophthalmic eye sockets. To achieve a successful reconstruction, the plastic surgeon has to form a socket that has proper dimensions and is completely covered by a well vascularized epithelial surface. Eye socket reconstruction with free skin, mucous membrane, or dermis-fat grafts usually remains unsatisfactory in severe cases. We have used a prefabricated temporal island flap to solve this difficult problem since 1983. In this method, a full-thickness skin graft is applied over the temporal fascia to create a prefabricated island flap based on the superficial temporal vessels. This flap is transposed into the eye socket 3 weeks later. Some modifications in flap design have been done to get better fitting of the prosthesis since that time. Thirty-three patients with constricted eye sockets that could not use prosthetic devices were treated with prefabricated temporal island flaps since 1983. The follow-up period was between 1 and 13 years. Eye sockets with adequate size and volume were created in all patients, and the results were successful. This method prevented secondary graft shrinkage, and the prefabricated island flaps preserved their dome shape during the follow-up period. We believe this method is a useful one in the treatment of the contracted socket.

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222. Alvarez, J. A., et al. (1999). "Delayed rupture of traumatic intracranial pseudoaneurysm in a child following gunshot wound to the head." The Journal of cranio-maxillofacial trauma 5(4): 39-44.

BACKGROUND AND OBJECTIVES: Traumatic intracranial aneurysms (TICAs) are highly unstable lesions that may rupture within minutes after formation or remain quiescent for several weeks and manifest with delayed hemorrhage and neurologic deterioration. Mortality following a rupture may be 30% to 40%. Among all cerebral aneurysms, the incidence of TICAs is less than 1%; 20% to 30% of TICAs occur in children., METHODS AND MATERIALS: A child with a low-caliber craniocerebral gunshot wound deteriorated neurologically 12 days after the initial injury and emergency evacuation of an intracranial hematoma. A new massive left frontal hematoma was discovered, caused by the rupture of an unsuspected left pericallosal artery pseudoaneurysm. The new hematoma was evacuated, and the aneurysm was trapped using microsurgical techniques., RESULTS AND/OR CONCLUSIONS: A high index of suspicion should be maintained for delayed pseudoaneurysm genesis and rupture. A cerebral arteriogram should be obtained when significant subarachnoid hemorrhage or intraparenchymal

hematomas are present, when missiles traverse major arteries, or when the pterional or cranioorbitofacial regions are violated. Treatment should be prompt.

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223. Alvarez, M. N., et al. (2013). "Flow diverting stents as exclusive treatment of a traumatic carotid cavernous fistula complicated by a wide-neck fusiform aneurysm." Journal of Vascular and Interventional Radiology 24(1): 145.e149-145e110.

Purpose: High flow direct carotid cavernous fistulas (CCF) are an infrequent complication from blunt or penetrating trauma to the basilar skull, which are now treated endovascularly with the objective of eliminating the fistula while preserving patency of the internal carotid artery (ICA). To our knowledge the use of a flow diverting stent as sole therapy for a CCF has been described only once in the literature. We present a traumatic high flow direct CCF complicated by a wide-neck dissecting distal ICA aneurysm treated exclusively with flow diverting stents. Materials and Methods: 21 year-old female was the driver in a high speed motor vehicle rollover, suffering multiple facial bone, sphenoid and basilar skull fractures. Initial angiography revealed a small dissection of the cavernous segment of the left ICA and a direct CCF with early and abnormal drainage into the ipsalateral cavernous sinus, superior and inferior ophthalmic veins and petrosal sinuses. The patient returned to the angio suite fourteen days later for anticipated endovascular repair with detachable coils. The diagnostic angiogram demonstrated a 1.5 x 1.2 x 1.0 cm lobulated and fusiform aneurysm arising from the dissected segment of the cavernous segment of the distal left ICA with a neck of approximately 11 mm as well as continued filling of the cavernous andpetrosal sinuses and ophthalmic veins. The patient was treated five days later by telescoping two Pipeline embolization devices (PED) within the cavernous segment of distal ICA. Post stent deployment angio- gram demonstrated stagnant flow within the aneurysm and cessation of the flow within the cavernous sinus and petrosal sinuses. Results: Approximately ten months after intervention the patient returned for a follow-up diagnostic angiogram. Cerebral injection of the left ICA demonstrated normal contour of the reconstructed cavernous segment of the ICA and normal antegrade flow into the ipsilateral anterior and middle cerebral arteries. There was no evidence of residual aneurysm and no abnormal filling of the ophthalmic veins and cavernous and petrosal sinuses. Conclusion: We present a unique case of a CCF complicated by a dissecting, wide- neck fusiform aneurysm. While there are several recent reports in the literature reporting the successful treatment of these types of aneurysms with flow diverting stents, there has only been one published case of a CCF treated solely with a flow diverting stent. The PED allowed reconstruction of the distal ICA and the telescoping of two devices supplemented coverage across the vascular defect eliminating the fistula and diminishing intra-aneurysmal flow. Followup angiogram performed ten months later demonstrated normal flow dynamics, a completely thrombosed aneurysm and resolution of the fistula. Thus, flow diverting stents may provide a safe, durable and effective alternative to the treatment of complicated CCFs.

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224. Alves, A. M. and C. Black (1972). "Posttraumatic extracranial aneurysm of the vertebral artery." International surgery 57(5): 422-424.

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225. Alves, J. L., et al. (2012). "Temporal gunshot injuries - about 3 different cases and review of the literature." Sinapse 12(1): 45-51.

Background: Although rare, penetrating temporal bone trauma by gunshot injury has a tremendous potential impact in terms of mortality and morbidity. As one of the most complex anatomical regions in the cranium and intracranial compartments, multiple clinical and radiological presentations should be expected, implying different management strategies, by specialized teams, and expecting several possible outcomes. Methods and results The authors report on three Traumatic Brain Injury patients with this particular sub-type of injury, different particularities and management, followed by a brief review on the subject. The preferred surgical and medical strategies are presented and

balanced against the relevant literature. Conclusion A crucial and necessary interdisciplinary approach is clearly the only valid option for an optimal treatment and followup of this type of patients suffering this complex traumatic injury.

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226. Alves, O. L., et al. (2003). "Evaluation of topiramate neuroprotective effect in severe TBI using microdialysis." Annals of the New York Academy of Sciences 993: 25-53.

Despite recent advances in our understanding of human traumatic brain injury (TBI) pathophysiology, we still need effective neuroprotective agents. The lack of rigorous drug pharmacokinetic studies in the "living" brain is an important cause of neuroprotection trials failure in human TBI research. In the past, several drugs have been labeled as inefficient, and even withdrawn from expensive trials, without knowing their actual penetration in the traumatized human brain. The injured brain is characterized by an increased diffusion distance, due to edema, and reduced blood flow that modulates drug transport across the blood-brain barrier (BBB). In the study reported in this paper, we used cerebral microdialysis to provide a safe and efficient tool for continuous in vivo evaluation of bioavailability and pharmacologic efficacy of topiramate, a glutamate release inhibitor. Topiramate crossed the BBB in neuroprotective concentrations, and showed a lowering effect on glutamate levels, thereby modifying the natural history of glutamate release after TBI. The use of cerebral microdialysis in phase II drug studies will allow the detection of the appropriate therapeutic window and dosage for the neuroprotective agent. This strategy represents a clear improvement compared to traditional clinical trial design, and will reduce the trial costs.

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227. Alvis-Miranda, H. R., et al. (2015). "Management of Craniocerebral Gunshot Injuries: A Review." Korean journal of neurotrauma 11(2): 35-43.

Craniocerebral gunshot injuries (CGI) are increasingly encountered by neurosurgeons in civilian and urban settings. Unfortunately this is a prevalent condition in developing countries, with major armed conflicts which is not very likely to achieve a high rate of prevention. Management goals should focus on early aggressive, vigorous resuscitation and correction of coagulopathy; those with stable vital signs undergo brain computed tomography scan. Neuroimaging is vital for surgical purposes, especially for determine type surgery, size and location of the approach, route of extraction of the foreign body; however not always surgical management is indicated, there is also the not uncommon decision to choose non-surgical management. The treatment consist of immediate life salvage, through control of persistent bleeding and cerebral decompression; prevention of infection, through extensive debridement of all contaminated, macerated or ischemic tissues; preservation of nervous tissue, through preventing meningocerebral scars; and restoration of anatomic structures through the hermetic seal of dura and scalp. There have been few recent studies involving penetrating craniocerebral injuries, and most studies have been restricted to small numbers of patients; classic studies in military and civil environment have identified that this is a highly lethal or devastating violent condition, able to leave marked consequences for the affected individual, the family and the health system itself. Various measures have been aimed to lower the incidence of CGI, especially in civilians. It is necessarily urgent to promote research in a neurocritical topic such as CGI, looking impact positively the quality of life for those who survive.

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228. Alvis-Miranda, H. R., et al. (2016). "Craniocerebral Gunshot Injuries; A Review of the Current Literature." Bulletin of emergency and trauma 4(2): 65-74.

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229. Amadasi, A., et al. (2015). "Assets and pitfalls of chemical and microscopic analyses on gunshot residues in skeletonized bodies: a report of five cases." International journal of legal medicine 129(4): 819-824.

In case of gunshot wounds, forensic anthropologists and pathologists have many tools at hand, and the assistance that chemical and microscopic investigations can provide in such scenarios is often valuable and crucial. However, the results of such analyses in the search of gunshot residues (GSR) ought not to be acritically considered. We report five cases where chemical (sodium rhodizonate) and microscopic (scanning electron microscopy-energy dispersive X-ray spectroscopy (SEM-EDX)) analyses were performed for the search of GSR. Four cases concerned the forensic field and analyses on buried, charred, or submerged remains, whereas one case concerned the historical remains of a soldier of the First World War. In every case, the search for GSR with these techniques showed their persistence even after long periods and preservation in peculiar environments. However, chemical analyses provided their contribution, but in two cases, anthropological analyses provided crucial and solving results. The five cases show the indisputable usefulness of chemical and microscopic analyses in the search of GSR in gunshot wounds and especially how such residues may survive in time and in adverse environmental conditions. However, experts should always be dubious about some pitfalls (such as contamination) one can frequently find in these scenarios.

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230. Amaefule, K. E., et al. (2019). "Trauma intensive care in a terror-ravaged, resource-constrained setting: Are we prepared for the emerging challenge?" African Journal of Emergency Medicine 9: S32-S37.

Introduction: Trauma in developing countries has been on the increase, a situation perpetuated by rising road traffic collisions, terrorism and firearms proliferation. Some of the victims of trauma are left with life threatening conditions requiring urgent surgical intervention and/or intensive care. The objectives of this study were to determine the pattern of major trauma needing intensive care in the region, and to determine the outcome of major trauma admitted to intensive care unit. Methods: A six-year retrospective cohort study of trauma patients needing intensive care, set in the Intensive Care Unit of Ahmadu Bello University Teaching Hospital, Zaria, North-West Nigeria. Subjects were major trauma patients admitted into the intensive care unit of the institution, identified via an admission register kept in the unit. The main outcomes measured were length of stay and mortality. Results: Trauma admissions represented 25.1% of the all intensive care admissions. Severe traumatic brain injury accounted for 32.1% of the trauma admissions, while burns accounted for 23.2%. Of the injuries, 15.5% were sustained in bomb blasts, and 8.3% were firearm injuries. The majority of the patients stayed for no more than seven days from admission. Burns patients had the worst outcomes, with 82.1% mortality. Conclusion: Major trauma contributes significantly to local intensive care admissions, with terrorism-related trauma now an emerging challenging cause of major trauma in our region. The observed poor outcomes in this study are a reflection of the quality of available intensive care, and lends credence to the concept of appropriately resourced, specialised intensive care units for optimisation of care.

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231. Amano, K. and S. Kamano (1982). "Cerebellar abscess due to penetrating orbital wound." Journal of computer assisted tomography 6(6): 1163-1166.

A cerebellar abscess developed in a child with a penetrating transorbital wound extending deep into the cerebellum. The computed tomographic (CT) scans at first demonstrated the image of the residual foreign body as a sharp, low density track. This changed to high density with suggestion of granulation along the lesion. The cerebellar abscess developed at the tip of the track with CT ring enhancement. Antibiotic treatment reduced the size and density of the abscess.

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232. Amano, Y., et al. (2022). "Multiple Brain Metastases in a Patient with ROS1 Fusion-Positive Lung Adenocarcinoma as a Disease Flare due to Crizotinib Cessation Caused by Disseminated Aseptic Inflammation from Crizotinib-Associated Renal Cysts: A Case Report." Case Reports in Oncology 15(1): 338-344.

Rapid tumor growth after cessation of molecularly targeted drugs, called "disease flare,"may occur and affect the prognosis of lung cancer. However, this phenomenon has never been reported in ROS proto-oncogene 1 (ROS1) fusion-positive lung adenocarcinoma. Herein, we report a disease flare in a patient with ROS1 fusion-positive lung adenocarcinoma. A 60-year-old female was diagnosed with stage IVA ROS1 fusion-positive lung adenocarcinoma via bronchoscopy. Although crizotinib, an ROS1 tyrosine kinase inhibitor, achieved a partial response, a mass lesion appeared in the patient's right kidney 12 months after starting crizotinib, which was diagnosed pathologically as crizotinib-associated renal cysts (CARCs). Given that readministration of crizotinib repeatedly induced CARC-like aseptic inflammation that appeared to be disseminated around surgical site, crizotinib treatment had to be abandoned. Around 25 days after crizotinib cessation, she was referred to the emergency department with a convulsive seizure and hemiparesis due to new, rapidly growing brain metastases. Whole-brain irradiation and administration of another ROS1 tyrosine kinase inhibitor, entrectinib, markedly ameliorated the metastases and improved hemiparesis. This has been the first report of a disease flare after crizotinib cessation due to CARCs in a patient with ROS1 fusion-positive lung adenocarcinoma. Attention should be paid to disease flare, especially in the brain, when molecularly targeted medication is stopped due to adverse events in ROS1 fusion-positive lung adenocarcinoma. Switching to drugs that penetrate the blood-brain barrier could overcome disease flare in the brain.

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233. Amaolo, M., et al. (2002). "Cranial gunshot: Revised concepts on bullets, therapeutic management and revision of literature." Prensa Medica Argentina 89(10): 860-872.

The gunshot wounds constitute the majority of penetrating injuries to the head. In patients under 45 years old they are a cause of brain death in 35% of cases, and 65% die in the place that the event takes place before receiving any medical attention. Nowadays, these lesions are arising in frequency because of maybe the facility to obtain firearms in the civil ambit and to the continuous armored events all around the world. That demands interests in order to improve the ballistics knowledge and apply it to surgical techniques in the gunshot wounds to the head.

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234. Amaral, M. B. F., et al. (2017). "Facial fractures caused by less-lethal rubber bullet weapons: case series report and literature review." Oral and maxillofacial surgery 21(3): 357-361.

PURPOSE: The present study aims to describe three cases of patients inflicted by rubber bullets with severe facial fractures., METHODS: In addition, a review of English-language literature involving facial fractures by rubber bullets from 1975 to 2016 was performed., RESULTS: This current study demonstrated that the use of the LLRBW is unsafety even when applied by police enforcements exclusively., CONCLUSIONS: Management of facial fractures caused by LLRBW is done in a usual manner with closed or open reduction associated with bone mini-plates or reconstruction plates when indicated. Special initial wound care should be done to avoid secondary infection and additional procedures.

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235. Amat, J. A., et al. (1996). "Phenotypic diversity and kinetics of proliferating microglia and astrocytes following cortical stab wounds." Glia 16(4): 368-382.

Brain injury induces reactive gliosis, characterized by increased expression of glial fibrillary acidic protein (GFAP), astrocyte hypertrophy, and hyperplasia of astrocytes and microglia. One hypothesis tested in this study was whether ganglioside GD3+ glial precursor cells would contribute to macroglial proliferation following injury. Adult rats received a cortical stab wound. Proliferating cells were identified by immunostaining for proliferating cell nuclear antigen (PCNA) and by [3H]-thymidine autoradiography, and cell phenotypes by immunocytochemical staining for GD3, GFAP, ED1 (for reactive microglia) and for Bandeiraea Simplicifolia isolectin-B4 binding (all microglia). Animals were labeled with thymidine at 1,2,3, and 4 days postlesion (dpl) and sacrificed at various times thereafter. Proliferating cells of each phenotype were quantified. A dramatic upregulation of GD3 on ramified

microglia was seen in the ipsilateral hemisphere by 2 dpl. Proliferating cells consisted of microglia and fewer astrocytes. Microglia proliferated maximally at 2-3 dpl and one third to one half were GD3+. Astrocytes proliferated maximally at 3-4 dpl, and some were also GD3+. Both ramified and ameboid forms of microglia proliferated and by 4 dpl all GD3+ microglia were ED1+ and vice versa. In the contralateral cortex microglia expressed neither GD3 nor ED1. Thus they acquired these antigens when activated. Neither microglia nor astrocytes that were thymidine-labeled at 2, 3, or 4 dpl changed in number in subsequent days. Most thymidine+ astrocytes were large GFAP+ reactive cells that clearly arose from pre-existing astrocytes, not from GD3+ glial precursors. In this model of injury microglia proliferate earlier and to a much greater extent than astrocytes, they can divide when in ramified form, and GD3 is up-regulated in most reactive microglia and in a subset of reactive astrocytes. We also conclude that microglial proliferation precedes proliferation of invading blood-borne macrophages.

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236. Amato, A., et al. (2011). "Isoelectic electroencephalogram (eeg) with bithalamic injury and hyperdynamic cerebral blood flow: A case study." Neurocritical care 15(1): S260.

Introduction Electroencephalography (EEG) is a non-invasive neurophysiological test used to evaluate the electrical activity of the cerebral cortex. In the ICU, it is widely used to evaluate for subclinical seizure activity and as an adjunct to verify the diagnosis of brain death. We present the case of a patient with severe, penetrating traumatic brain injury who had clinical and sonographic evidence of cerebral blood flow while showing no evidence of electrical activity. Methods A 17 year old male was admitted to our NeuroICU after sustaining a gunshot wound to the head. At presentation, the patient had a Glasgow Coma Scale (GCS) of 4 (E1M2V1) with bilateral fixed pupils and bilateral extensor posturing. Head CT imaging showed a large right temporal lobe contusion and 9mm of right-to-left subfalcine herniation prompting an emergent decompressive hemicraniectomy. Results Post-operatively, the patient remained comatose (GCS 4) with extensor posturing. Continuous EEG was performed that showed severe diffuse slowing. However, shortly after recording had begun, spontaneous electrical activity was no longer present. Transcranial doppler ultrasound performed simultaneously showed global hyperdynamic cerebral blood flow. Follow-up imaging revealed extensive hypodensities in the frontal lobes and thalami. Over the next 4 days, the patient's condition worsened and he progressed to clinical brain death. Conclusions We present this unique case of an isoelectric EEG in the absence of clinical signs of brain death. We believe the patient's bithalamic injury contributed to the lack of spontaneous electrical activity through the loss of thalamocortical inputs in the setting of severe bilateral hemispheric injury. We also present this case to highlight the limitations of EEG as a confirmatory test for brain death in the ICU.

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237. Ambrosi, P. B., et al. (2012). "Prognostic factors in civilian gunshot wounds to the head: a series of 110 surgical patients and brief literature review." Neurosurgical review 35(3): 429-426.

This study was carried out to evaluate the early results and the prognostic factors affecting the outcome during the in-hospital stay of 110 patients with civilian gunshot wounds to the head admitted at the Hospital of Restauracao, Recife, Brazil. Penetrating injury (66%) was the most prevalent type of wound encountered in the present series. Twelve of the 110 (10.9%) patients presented a unilateral dilated pupil at the admission. Motor impairment was present in 24/110 (21.8%) patients. Intracerebral hematoma was present in 36/110 (32.7%) and there were 15/110 (13%) patients with cerebrospinal fluid fistula. Eleven of 110 patients developed meningitis and in 9/110 intracranial abscesses occurred. Nine of 110 patients developed deep venous thrombosis, 11/110 had urinary infection, and coagulopathy was detected in 8/110. Following the surgical procedure, 27/110 (24.5%) patients died during their hospital stay. When the two groups, survivors and non-survivors, were compared, there were significant statistical differences and the univariate analysis identified five preoperative predictors of a poor outcome following surgery: age over 40 years (odds ratios (OR) 5.4, 95% CI 1.73-16.82); presence of unilateral pupil dilatation (OR 5.5, 95% CI 1.641-18.13); low (<=8) Glasgow coma score on admission (OR 6.50, 95% CI 2.27-18.60), presence of intracranial hematoma (OR 3.0, 95% CI 1.21-7.34), and

respiratory infection (OR 4.8, 95% CI 1.75-13.47). Thus, (a) age of the patient (juvenile/young age), (b) high preoperative Glasgow coma score, (c) lack of pupil abnormalities, and (d) absence of intracerebral hematoma are predictors of a good prognosis.

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238. Ameen, A. A. (1984). "The management of acute craniocerebral injuries caused by missiles: analysis of 110 consecutive penetrating wounds of the brain from Basrah." Injury 16(2): 88-90.

Penetrating missile injuries of the head comprised 3.4 per cent of the missile injuries admitted to our hospital directly or transferred from nearby hospitals. Those who died accounted for approximately 70 per cent of the total deaths in hospital from missiles. The immediate treatment is presented and the results are evaluated in 110 consecutive cases. The points emphasized are, first, that less than rapid evacuation selects those patients who are probably going to survive anyway; second, that bullet wounds of the head are nearly always fatal, especially if inflicted by high-velocity weapons; and, third, that the operation should include wide exposure of the injured site with thorough excision of the wound track and watertight closure of the dura.

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239. Ameen, A. A. (1986). "Five years experience with penetrating missile head injuries." Journal of Neurological and Orthopaedic Medicine and Surgery 7(2): 175-177.

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240. Ameen, A. A. (1987). "Penetrating craniocerebral injuries: observations in the Iraqi Iranian War." Military medicine 152(2): 76-79.

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241. Ameen, A. A. (1990). "Relationship of suturing of the dura to cerebrospinal fluid fistulas." Neurosurgery 27(2): 334.

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242. Amelot, A., et al. (2013). "Penetrating craniocerebral injury caused by a rubber bullet questions the relative harmlessness of these weapons." The American journal of emergency medicine 31(3): 636.e635-637.

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243. Amene, C., et al. (2013). "Outcomes of middle fossa skull base defects repaired using a novel combination of materials." Journal of Neurological Surgery, Part B: Skull Base 74.

Introduction: Defects in the middle cranial fossa result in cerebrospinal fluid (CSF) leaks that can present a daunting challenge to skull base surgeons, both in diagnosis and treatment. Defects may arise spontaneously or may be acquired after trauma or surgical manipulations. Persistent leaks require surgical intervention to avoid possibly fatal complications including meningitis and brain herniation. Secondary to the variability in techniques and materials used for repair, outcome analysis has yielded mixed results in the literature. The objective of this study was to evaluate the safety and durability of the authors' repair technique using a combination of three synthetic materials. Methods: We performed a retrospective case review of patients treated for CSF leaks between January 2009 and September 2012. Inclusion criteria for the study were: neuroimaging-documented temporal bone defect, gross CSF otorrhea, and symptoms consistent with CSF leak. Ten patients were found to have been treated surgically for middle fossa CSF leaks. Hydroxyapatite cement, collagen-based dural substitute matrix, and polyethylene glycol hydrogel sealant were used in all patients for the repair. Results: Of the 10 cases that met the inclusion criteria, four were spontaneous defects and six were acquired (one penetrating traumatic brain injury, five with previous surgical procedures). CSF otorrhea was present in nine patients (90%), and hearing loss was present in five (50%). One patient presented with rhinorrhea. Nine cases were repaired via the middle fossa approach, and one case was repaired through a combined

middle fossa/transmastoid approach. In all patients, the CSF leaks were successfully repaired using all three synthetic agents with an inlay/onlay technique. The repair was supplemented by autologous graft (temporalis muscle, fascia, or pericranium) in seven cases. Mean follow-up duration was 59.1 weeks (range, 1-180 weeks). In one patient, an epidural hematoma developed at the operative site on postoperative day 7, and in another patient a superficial wound dehiscence occurred on postoperative day 48. There was no evidence of wound infections, neurovascular damage, or CSF leakage requiring reoperation during the follow-up period. Conclusions: The middle fossa approach using a combination of hydroxyapatite cement, collagen-based dural substitute matrix, and polyethylene glycol hydrogel sealant is a safe, effective method for repairing middle fossa CSF leaks. A multilayered closure remains an important aspect to these closures.

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244. Amer, H., et al. (2018). "Mayo Clinic's first face transplant: 17 months on." American Journal of Transplantation 18: 761.

Mayo Clinic established a reconstructive transplant program as an extension of clinical practice in 2010. A 31-year-old Caucasian male had significant functional limitations and disfigurement despite multiple conventional reconstructive procedures following a self-infl icted gunshot to the face. These limited his social interactions and potential for career advancement due to inability to pass fitting of required safety equipment. He was referred for transplant 7 years after his injury and was listed for transplant after 2 1/2 years of evaluation, education, psychosocial assessment and follow-up. The surgical team rehearsed the planned surgery over 50 Saturdays in the anatomy lab. Guides developed by Medical Modeling using 3D CT reconstruction aided bone cuts. The patient received a blood group compatible, negative flow cross match, no DSA transplant. Donor and recipient were EBV negative but CMV mismatched (D+/R-). The graft consisted of all facial tissues from below the eyelids including maxilla, mandible and upper and lower teeth. Immunosuppression consisted of anti-thymocyte globulin (ATG) induction and a triple immunosuppressive regimen consisting of tacrolimus, mycophenolate mofetil, and corticosteroids. The patient recovered well from surgery. The aesthetic result was deemed good by the patient “better than I expected”. He regained his sense of smell, the ability to chew food (prior to the transplant he had only two molar teeth with significant microstomia). Gradually nerve regeneration progressed with the ability to smile and coapt his lips. Nasal breathing was also possible. One VCA Banff grade two rejection occurred on day 57-post transplant. This was successfully treated with a course of pulse corticosteroids. Seven months after transplant asymptomatic primary CMV infection was detected on surveillance. A short course of valganciclovir controlled the infection. One year after transplant two-point discrimination was 5 mm. Surveillance biopsy showed no inflammation and no donor specific antibodies were detected. Seventeen months from transplant renal function remains preserved and functional recovery continues with the patient progressing in his chosen career and social integration.

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245. Amer, H., et al. (2018). "Mayo clinic's first face transplant: One year outcome." Transplantation 102(7): S433.

In June 2016, we performed the first face transplant at Mayo Clinic. Mayo Clinic established a reconstructive transplant program as an extension of clinical practice in 2010. A 31-year-old Caucasian male had significant functional limitations and disfigurement despite multiple conventional reconstructive procedures following a self-inflicted gunshot to the face. These limited his social interactions and potential for career advancement. He was referred for transplant 7 years after his injury. He was listed for transplant after 2 1/2 years of evaluation, education, psychosocial assessment and follow-up. The surgical team rehearsed the planned surgery over 50 Saturdays in the cadaver lab. Guides developed by Medical Modeling using 3D CT reconstruction aided bone cuts. He received a blood group compatible, negative flow crossmatch, no DSA transplant. Donor and recipient were EBV negative. Donor was CMV positive and the recipient negative. The graft consisted of all facial tissues from below the eyelids including maxilla, mandible and teeth. Immunosuppression consisted of anti-thymocyte

globulin (ATG) induction and a triple immunosuppressive regimen consisting of tacrolimus, mycophenolate mofetil, and corticosteroids. The patient recovered well from surgery. The aesthetic result was deemed excellent by the patient better than I expected. He regained his sense of smell, the ability to chew food (prior to the transplant he had only two molar teeth with significant microstomia. Gradually nerve regeneration progressed with the ability to smile and coapt his lips. Nasal breathing was also possible. One VCA Banff grade two rejection occurred on day 57-post transplant. This was successfully treated with a course of pulse corticosteroids. Seven months after transplant valganciclovir prophylaxis was discontinued due to leucopenia. Asymptomatic primary CMV infection was detected on surveillance. A combination of viral markers and virus specific immune monitoring was used to tailor therapy. A short course of valganciclovir controlled the infection and the patient developed humoral and cellular virus specific monitoring. One year after transplant two-point discrimination was 5 mm. Renal function was preserved and functional recovery continues.

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246. Amin, D., et al. (2021). "Incidence of Gunshot Wounds to Head and Neck Increased during COVID-19 Pandemic." Journal of oral and maxillofacial surgery 79(10): e15.

Purpose: COVID-19 was declared a pandemic by the World Health Organization on March 2020. Since then, there was an increase in the number of firearm purchases. The purpose of this study was to investigate whether the incidence of gunshot wounds (GSWs) to the head and neck increased during the COVID-19 pandemic. Materials and methods: This cross-sectional study reviewed patients in the Trauma Registry at Grady Memorial Hospital (GMH) in Atlanta, GA. Patients were included if they: 1) sustained GSW to head and neck, 2) activated the Trauma Registry, and 3) were treated at GMH. Patients were stratified according to date of injury into 1 distinct time period: 1) March 13 to August 13, 2019 (i.e., before the COVID-19 pandemic, BC19) or 2) March 13 to August 13, 2020 (i.e., during initial 6 months of the COVID-19 pandemic, C19) (Figure 1). March 13 was chosen because COVID-19 was announced as a national emergency on that date. The research team collected patient demographics, distressed communities index (DCI), social history, and etiology of GSW. Details regarding extent of GSW injury (i.e., isolated soft tissue, bony, other locations of injuries) were recorded. Injury severity was described using the following variables: status of patient and Glasgow Coma scale (GCS) on arrival to GMH, cardiopulmonary resuscitation (CPR) in Emergency Department (ED), diagnosis of shock on admission, disposition from ED, ICU length of stay (LOS), total days on mechanical ventilator (MV), hospital LOS, and hospital discharge status. Descriptive statistics were performed. Univariate and bivariate analysis were performed. The Chi-squared test was used for categorical variables. Statistical significance was P <.05. Results: During the study period, 948 patients sustained GSW. Of them, 215 patients had GSWs to head and neck. The BC19 group had 96 patients (78 males) with a mean age of 31.5 years old (range 7-82). The C19 group had 119 patients (101 males) with an average age 32.7 years (range 14-82). Overall, there was a 10.4% increase in incidence of GSW to head and neck during C-19 (Figure 2). The data showed that alcohol abuse was associated with an increase in GSW to the head and neck (P <.0001). The mean DCI for C19 group was lower than BC19 by 8%, meaning that the distress to the population was decreased. GSW to base of skull occurred 34.5% more often during C19 (P =.002), and intracranial injuries occurred 26% more often during BC19 (P =.03). In the BC19 group, 85.4% of the patients arrived alive to GMH, compared to 16% in C19 group. Patients had shock on admission (BC-19; n = 22, 22.9 %, C-19; n = 24, 20.2%). Researchers found that the status on arrival to ED (i.e., alive) was statistically significant (P <.0001). Outcomes data: Researchers found a 10.4% increase in the incidence of GSWs to the head and neck during C-19. Specifically, the peak incidence occurred during May, June, and July, with 25 cases per month (Figure 2). The peak in incidence was parallel with the shelter-in-place order in the state of GA that was issued on April 3, 2020. The finding is consistent with previous studies that showed an increase in gun violence during the COVID-19 pandemic. Conclusion: In conclusion, understanding the underlying causes for the increase in GSW to the head and neck during the COVID-19 pandemic is imperative for implementing gun violence prevention programs. Health system leaders should develop partnerships that embrace medical professional organization support to proactively reduce firearm-related injury during periods of social isolation.

247. Amin, D., et al. (2021). "Frequency of Firearm Injuries to Head and Neck Increased During Covid-19 Pandemic." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons 79(11): 2299-2305.

PURPOSE: During coronavirus disease-19 (COVID-19) pandemic, hospitals faced challenges which were different than previous years. The purpose this study was to report frequency of firearm injuries (FI) to head and neck during the COVID-19 pandemic., MATERIALS AND METHODS: This cross-sectional study reviewed patients in the Trauma Registry at Grady Memorial Hospital (GMH) in Atlanta, GA. Patients were included if they sustained FI to head and neck, were listed in TR, and were treated at GMH. Patients were stratified according to date of injury into 1) before COVID-19 pandemic, (BC19) or 2) during initial 5 months of COVID-19 pandemic, (C19). Variables were patient demographics, illegal substance use, etiology, place of injury, distressed communities index, location of injury, Glasgow Coma scale on arrival, cardiopulmonary resuscitation in Emergency Department (ED), shock on admission, disposition from ED, length of stay, days on mechanical ventilation and discharge status. Descriptive, univariate, and bivariate analysis were completed. Chi square test was used for categorical variables. Statistical significance was $P < .05$., RESULTS: There were 215 patients who met inclusion criteria. There were 96 patients (78 males) with a mean age of 31.5 years old during BC19. There were 119 patients (101 males) with a mean age 32.7 years old during C19. There was a 10.4% increase in FI to head and neck during COVID-19. Our data showed that alcohol use was associated with FI during C19 ($P<= .0001$). FI to base of skull occurred 34.5% more often during C19 ($P = .002$). Cranial injuries occurred 26% more often during BC19 ($P = .03$). During BC19, 85.4% of the patients arrived alive to GMH, but only 16% arrived alive during C19 ($P <= .0001$)., CONCLUSIONS: There were more FI to head and neck during COVID-10 pandemic than during the previous time period.

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248. Amini, A., et al. (2006). "Remote cerebellar hemorrhage." AJNR. American journal of neuroradiology 27(2): 387-390.

Remote cerebellar hemorrhage (RCH) is a rare but benign, self-limited complication of supratentorial craniotomies that, to the best of our knowledge, has not been described in the imaging literature. RCH can be an unexpected finding on routine postoperative imaging studies and should not be mistaken for more ominous causes of bleeding such as coagulopathy, hemorrhagic infarction, or cortical vein occlusion. Cerebellar hemorrhage in the typical setting can be identified as RCH and does not require more extensive or invasive evaluation.

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249. Amirjamshidi, A., et al. (2000). "Traumatic aneurysms and arteriovenous fistulas of the extracranial vessels in war injuries." Surgical neurology 53(2): 136-145.

BACKGROUND: Extracranial vessel injuries are potentially devastating complications of penetrating head and neck wounds associated with war conflicts. These vasculopathies may be occlusive or they may lead to formation of traumatic aneurysms (TA) and arteriovenous fistulae (AVF). Even though these penetrating injuries are usually clinically silent and often appear only as small superficial wounds, they may lead to catastrophic hemorrhage or vascular insult. In this study, we attempted to elucidate signs, symptoms and circumstances present in these victims who are at risk of harboring an occult vasculopathy, excluding the occlusive ones and concentrating primarily on TAs and AVFs., MATERIALS AND METHODS: In a prospective study conducted during 8 years of war between Iran and Iraq, we encountered 13 cases of traumatic vasculopathies of the extracranial carotid and vertebral arteries. The type and number of injuries were: carotid-jugular fistula (CJF) 3, carotid trunk or branch aneurysm (CA) 2, superficial temporal artery aneurysm (STA) 3, vertebral artery aneurysm (VA) 2, vertebral arteriovenous fistula (VAVF) 1, ophthalmic artery aneurysm (Oph. An.) 1, and lingual artery

aneurysm (Lin. An.) 1. Angiography was performed between the 5th and 30th day after the injury and surgical intervention was performed in all cases., RESULTS: The Glasgow outcome scale (GOS) score was 13-15 in all victims at the time of discharge from the base hospital without any additional neurological deficit. The follow-up period varied from 5 to 8 years in all cases in whom no further morbidity or mortality occurred. Single photon emission computed tomography was the noninvasive tool used for measurement of cerebral blood flow in the cases in which a major vessel ligation was performed; no remarkable change in cerebral blood flow was noted., CONCLUSION: Early recognition of stigmas suggesting possible formation of extracranial traumatic vasculopathies such as TAs or AVFs in the difficult situation of war frontier hospitals should be highlighted for attending physicians or younger neurosurgeons. Performing angiography promptly in suspected cases can pick up such traumatic vascular lesions earlier. Using simpler surgical techniques in situations in which more sophisticated endovascular equipment is unavailable can be life-saving for these usually young victims.

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250. Amirjamshidi, A., et al. (2003). "Minimal debridement or simple wound closure as the only surgical treatment in war victims with low-velocity penetrating head injuries. Indications and management protocol based upon more than 8 years follow-up of 99 cases from Iran-Iraq conflict." Surgical neurology 60(2): 105-101.

BACKGROUND: During military conflicts, surviving victims traditionally underwent large enough craniectomy or craniotomy to achieve extensive debridement of the in-driven bone, shell fragments, and debris. Meanwhile, the completely as well as the partially devitalized adjacent brain tissue would also be debrided. This might have led to additional neurologic deficit or lesser degree of recovery of functions., METHOD: We studied the efficacy and safety of much more limited or even absence of surgical intervention in a selected group of wartime head-wounded patients. Among 1,150 war victims with penetrating head wounds referred to two major centers affiliated with Tehran University of Medical Sciences during the 8-year period spanning the Iran-Iraq conflict, there were 191 head-wounded patients who underwent either no surgical intervention or a very limited debridement. We have attempted to follow up as closely as possible for more than 8 years. Ninety-nine of them fulfilled the criteria to be included in this series. Close follow-up for development of cerebral infections, functional recovery, or development of new neurologic deficits and epilepsy were performed. At least 3 contrast-enhanced CT scans were taken for each patient. All patients were victims of the battle-field areas with low- to moderate-velocity missile or shell fragment injury. The Glasgow Coma Scale (GCS) scores of the patients were between 8-14 when visited by the first attending neurosurgery staff. The factors considered to be effective in the outcome analysis were the entry point, the number of the in-driven bone fragments, the retained shell fragments, the brain compartments affected, and the paranasal sinus or skull base involvement with or without cerebrospinal fluid (CSF) fistula., RESULTS: There were 13 unilobar, 44 bilobar, 4 trilobar, 38 transventricular, and 3 skull base lesions. The number of retained metal fragments varied between 1 to 6. The number of retained bone fragments varied between 1 to 5 in 73 victims and more than five chips in other cases. The outcome was good (back to work) in 90 patients and poor (severely disabled) in 4. Five patients died because of severity of brain damage and meningitis. The effect of the different enumerated variables upon the outcome was measured using chi(2) and Fisher exact test, which was nonsignificant for all of the variables except for the orbitofacial entry point of injury ($p = 0.00006$)., CONCLUSION: This study seems to indicate that not only is reoperation for retained bone or shell fragments unnecessary, but surgeons having modern neuroradiological instruments available to detect the proper explanation for changes in GCS of the patients may decide not to proceed with any surgical intervention in a good number of patients. As a result of the "no surgical treatment protocol," one can preserve cerebral tissue without exposing the patient to undue risk of seizures, infection, or death by leaving behind some or all the in-driven bone and shell fragments.

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251. Amirjamshidi, A., et al. (1997). "Air-gun pellet injuries to the head and neck." Surgical neurology 47(4): 331-338.

BACKGROUND: Air-gun pellet injuries (AgPI) of the central nervous system (CNS) are rare but catastrophic events. They occur mostly in children and young adults. The entrance is usually either through the orbit or through the neck and the entry wound is so small that it may be disregarded on physical examination in the emergency room. Early recognition and correct management of the possible complications of AgPIs is important and may prevent a poor outcome. METHODS We intend to present our experience with 16 cases of AgPIs of the head and neck referred to the department of neurosurgery during the last 15 years. The characteristic findings on physical examination of the cases and the imaging studies performed are described. Special management undertaken for the rare complications are mentioned and a short literature review is performed on each entity. RESULTS All our cases happened in the first and second decades of life and only in boys playing with toy guns. There were 12 head and face and four neck wounds. Damaged globe that had to be exenterated was the earliest complication, handled by ophthalmologists (four cases). Cerebrospinal fluid (CSF) leakage, meningitis, brain abscess formation, development of traumatic aneurysm (TA), carotid-cavernous sinus fistula (CCF), wandering intracerebral and intraventricular pellet, and splitting of the pellet after striking hard bone were the complications noted. In addition to plain X-ray films, computed tomography (CT) scanning and angiography were diagnostic procedures of choice. CONCLUSIONS The present series of patients is the largest collection of AgPIs to the head and neck reported in the literature in which nearly all the possible complications of such injuries have been reviewed. Early recognition and awareness of the possible cumbersome complications of such a minor penetrating wound can prevent major catastrophies in this young group of victims.

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252. Amirjamshidi, A., et al. (2009). "Attempting homicide by inserting sewing needle into the brain Report of 6 cases and review of literature." Surgical neurology 72(6): 635-641.

BACKGROUND AND OBJECTIVES: Child abuse with sewing needle is a rare but well-known homicide attempt threatening the life of victims. Information about diagnosis and treatment of such cases either in the acute or chronic phases is lacking and ambiguous in the literature. This study intends to report the experience of 6 victims of homicide attempt who presented to the authors in different decades of life and were managed in different ways. This may deliver some evidences to the literature regarding management of further cases encountered by neurosurgeons., MATERIAL AND METHODS: The authors had the chance of managing 6 patients referred to their trauma center harboring one or more sewing needles within their cranium. There were 3 male and 3 female patients, with 2 patients in their first decade of life, and the others, each in either decade of life. The youngest was 6, and the eldest 51 year old. The elder patients were having vague headaches, for which a plain skull x-ray or CT of the brain lead to the diagnosis of persisting intracranial foreign bodies. Chronic headache was the main complaint of the patients. Four patients underwent surgical removal of the sewing needle, and 2 are being followed., RESULTS: Among the 4 patients who underwent surgery, 1 died after a short period of 'akinetic mutism.' Headache and limb paresthesia improved 6 months after the operation in 2 cases, and the other 1 remained unchanged. The cases under observation have been doing well. Biochemical analysis of the rusted needle showed a composite of oxidant form of some of the elements of needle such as Fe, Mn, and Cr., CONCLUSION: In spite of standard algorithms proposed for management of penetrating head wounds, selection of the best treatment in the victims harboring sewing needles in their brain needs close cooperation between neurosurgeons, pediatricians, psychiatrists, and social workers. Furthermore, there is no absolute indication for removing sewing intracranial needles detected in the later decades of life.

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253. Amirjamshidi, A., et al. (1996). "Traumatic aneurysms and arteriovenous fistulas of intracranial vessels associated with penetrating head injuries occurring during war: principles and pitfalls in

diagnosis and management. A survey of 31 cases and review of the literature." Journal of neurosurgery 84(5): 769-780.

In the early days of the war between Iran and Iraq, reports of the sudden deaths of soldiers who previously had survived a penetrating head injury suggested the possibility that a late complication, traumatic aneurysm (TA), could be the cause of this catastrophe. In response, the authors planned a prospective study to perform cerebral angiography in victims with penetrating head traumas, especially in those who had artillery shells or bone fragments passing through areas of dense vasculature. Thirty-one TAs and arteriovenous fistulas were documented. Not all of the lesions, however, were deemed appropriate for surgical intervention. Six aneurysms (19.4%) healed spontaneously and shrank or disappeared on repeated serial angiograms. The authors present their cases and discuss the incidence of TAs, their natural course and behavior, and the special problems encountered in managing these interesting and potentially fatal complications of penetrating head injuries.

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254. Ammar, M. A. and N. S. Hussein (2018). "Using propranolol in traumatic brain injury to reduce sympathetic storm phenomenon: A prospective randomized clinical trial." Saudi Journal of Anaesthesia 12(4): 521-528.

Background: Traumatic brain injury (TBI) correlated with increased sympathetic activity on the expense of parasympathetic system due to loss of cortical control after brain injury. Manifestations of sympathetic storm include tachycardia, hypertension, tachypnea, and hyperthermia. The neuroprotective effects via reducing cerebral metabolism and lowering O2 and glucose consumption are the targets early after trauma. Beta-blockers reduce sympathetic activity. Objectives: We suppose that using propranolol blunts the sympathetic storming phenomenon as it is a nonselective β inhibitor and has a lipophilic property to steadily penetrate blood-brain barrier. Patients and Methods: Sixty patients allocated randomly into two groups, each consisting of 30 patients. Group A started propranolol and Group B received placebo within first 24 h. Primary outcome was catecholamine levels on day 7, and the secondary outcomes were physiological measures (heart rate [HR], respiratory rate [RR], mean arterial blood pressure [MABP], temperature, random blood sugar, and follow-up Glasgow coma score [GCS] and sedation score). Results: Analysis of outcomes demonstrated that Group A tended to have lower catecholamine levels in comparison to Group B in day 7 (norepinephrine 206.87 ± 44.44 vs. 529.33 ± 42.99 pg/ml, P = <0.001), epinephrine level (69.00 ± 8.66 vs. 190.73 ± 16.48 pg/ml, P < 0.001), and dopamine level (32.90 ± 4.57 vs. 78.00 ± 3.48 pg/ml P < 0.001). GCS of the patients in Group A improved and was statistically significant compared to Group B in day 7 (13 vs. 10, P = 0.006), with percent change interquartile range (20.0 vs. 8.33, P = 0.006). Regarding hemodynamic parameters between the two groups MABP, HR, RR, and temperature, there was no statistically significant difference on day 1, while on day 7, there is high statistical significance and significant percent change (P < 0.001). Conclusion: Early usage of propranolol after TBI controls hemodynamics and blood sugar with decreased catecholamine levels correlated with the improvement of GCS.

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255. Ammaturo, C., et al. (2001). "[Non-surgical treatment of liver trauma]." Il trattamento non operatorio dei traumi epatici. 53(2): 181-187.

The aim of the study was to assess the role of non-operative treatment in haemodynamically stable patients with liver trauma. Over the period from 1996 to July 2000, out of a total of 2,048 patients with abdominal trauma, 124 open and 1,924 closed, we observed 77 hepatic lesions, consisting of 55 closed traumas and 22 penetrating traumas. Non-operative treatment was implemented in 18 patients (32.7%) with closed liver traumas. In addition to serial clinical examinations of the abdomen, the patients receiving non-operative treatment were submitted to thorough haemodynamic monitoring and complete blood counts in the intensive care unit. After an abdominal CT scan at entry, patients were submitted to abdominal ultrasonography 6, 12 and 24 hours after admission. Only two patients required transfusions, one presenting a pelvic fracture and the other a triple fracture of the femur, tibia and fibula. There was no mortality. A biloma was present in one case, successfully treated by means of a US-guided

drainage puncture. It is patients with major cranial traumas that pose most problems for conservative treatment. Fifty percent of non-therapeutic laparotomies in our series were performed in patients with severe cranial traumas. It is precisely in these patients that an improvement in diagnostic capability is most desirable.

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256. Amole, O., et al. (2017). "A 14-Year Review of Craniomaxillofacial Gunshot Wounds in a Resource-Limited Setting." Craniomaxillofacial Trauma and Reconstruction 10(2): 130-137.

This study analyzed the prevalence, clinical characteristics, and management of civilian-type craniomaxillofacial gunshot wounds (CGSWs) seen over a 14-year period in a Northern Nigerian teaching hospital. A retrospective study of all hospital records relating to CGSWs from January 2000 to December 2013 was conducted to determine the prevalence of CGSWs. Information retrieved included site of injury, type of projectile, management protocol, as well as duration of hospitalization. A total of 46 admissions for CGSWs were recorded during the period under review from a total of 2,228 maxillofacial admissions. This gave a prevalence of 2.1% for CGSWs (95% confidence interval = 1.56-2.81). Sex distribution was 14.3:1 (M:F) with overall mean age of 32.9 ± 8.4 years. Average length of hospitalization was 17.7 (±15.56) days. Management of CGSWs consisted of emergency care, preliminary intervention, definitive reconstruction, revisions, and rehabilitation. Conclusively, analysis of the yearly incidence of CGSWs showed that the incidence and severity increased within the past 2 years under review (18 cases, 39.13%; χ 2 trend = 7.7, p = 0.006). This period was noted to correspond with heightened violence within the region mostly due to the acts of unknown gunmen and insurgents.

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257. Ampanozi, G., et al. (2010). "Virtopsy: CT and MR imaging of a fatal head injury caused by a hatchet: A case report." Legal medicine (Tokyo, Japan) 12(5): 238-241.

Hatchet blows to the human skull often cause fatal injuries. We present a case of homicide by hatchet blow that underwent CT, MRI, and autopsy examination. Skull fragmentation, fracture lines, and brain injuries were demonstrated prior to autopsy. Many of the hatchet-specific characteristics (flaking, crushing, shattering, and fracture lines) described in literature were observed in the post-mortem imaging of this case.

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258. Anderova, M., et al. (2004). "Voltage-dependent potassium currents in hypertrophied rat astrocytes after a cortical stab wound." Glia 48(4): 311-326.

Changes in the membrane properties of reactive astrocytes in gliotic cortex induced by a stab wound were studied in brain slices of 21-28-day-old rats, using the patch-clamp technique and were correlated with changes in resting extracellular K+ concentration ([K+]e) measured in vivo using K+-selective microelectrodes. Based on K+ current expression, three types of astrocytes were identified in gliotic cortex: A1 astrocytes expressing a time- and voltage-independent K+ current component and additional inwardly rectifying K+ currents (K(IR)); A2 astrocytes expressing a time- and voltage-independent K+ current component and additional delayed outwardly rectifying K+ currents (K(DR)); and complex astrocytes expressing K(DR), K(IR), and A-type K+ (K(A)) currents and Na+ currents (I(Na)). Nestin/bromodeoxyuridine (BrdU)-negative A1 astrocytes were found further than approximately 100 microm from the stab wound and showed an upregulation of K(IR) currents within the first day post-injury (PI), correlating with an increased resting [K+]e. Their number declined from 62% of total astrocytes in control rats to 41% in rats at 7 days PI. Nestin/BrdU-positive A2 astrocytes were found only within a distance of approximately 100 microm from the stab wound and, in comparison to those in control rats, showed an upregulation of K(DR) currents. Their number increased from 8% of the total number of astrocytes in control rats to 39% 7 days PI. Both A1 and A2 astrocytes showed hypertrophied processes and increased GFAP staining, but an examination of cell morphology revealed greater changes in the surface/volume ratio in A2 astrocytes than in A1 astrocytes. Complex astrocytes did not display a hypertophied morphology; K(IR) currents in these cells were upregulated

within 1 day PI, while the K(DR), K(A), and I(Na) currents were increased only 6 h PI. We conclude that two electrophysiologically, immunohistochemically, and morphologically distinct types of hypertrophied astrocytes are present at the site of a stab wound, depending on the distance from the lesion, and may have different functions in ionic homeostasis and/or regeneration. Copyright copyright 2004 Wiley-Liss, Inc.

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259. Anderson, I. (1986). "Surgeons want the organs of babies 'born brainless'." New scientist (1971) 112(1533): 20.

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260. Anderson, R. and J. Montero (2014). "Utilization of seizure prophylaxis in traumatic brain injury (TBI) patients." Critical care medicine 42(12): A1626.

Learning Objectives: There is a high risk in development of seizures after a traumatic brain injury (TBI). Seizures are classified as early, within seven days of injury, or late, more than seven days. Incidence of early and late seizures ranges from 4-25% and 9-42%, respectively. Risk factors for seizures include subdural, epidural or intracerebral hematoma, depressed skull fracture, cortical contusion, penetrating head wound, initial Glasgow Coma Score <10, or occurrence of seizure within 24h. Seizures in acute period can be detrimental due to elevations in intracranial pressure, blood pressure changes, alterations in oxygen delivery, and excessive neurotransmitter release. Prophylaxis is recommended seven days post injury to decrease early seizures and is not recommended for preventing late seizures. This evaluation assesses the utilization of seizure prophylaxis after a TBI at a Level II Trauma Center. Methods: Patients admitted to the trauma service with an acute TBI between January 2012 and June 2014 and started on an anticonvulsant for seizure prophylaxis within 24 hours of admission were identified. Demographic data, including type of TBI, hospital length of stay, and disposition were evaluated. Descriptive data was used to evaluate the anticonvulsant agent utilized, the duration of therapy, and if therapy was continued upon discharge. Results: Preliminary results include 28 patients receiving seizure prophylaxis after TBI. Majority were male (89%) with median age of 45 (18-84). Levetiracetam was most commonly used (79%), with the remaining receiving phenytoin. Levetiracetam was frequently dosed 500mg q12h with no loading dose. Median duration of prophylaxis was 7 (3-30) days. Five patients were discharged home on prophylaxis; two were appropriate to complete a total of 7 days. One person on levetiracetam developed seizures and switched to phenytoin. Conclusions: Preliminary results suggest that levetiracetam is commonly utilized for seizure prophylaxis in TBI patients. Duration of prophylaxis appears to be appropriate at our institution. Further evaluation into appropriate initiation is needed.

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261. Anderson, S. A. and P. G. Story (1996). "Case study of an orbital screwdriver injury." Journal of ophthalmic nursing & technology 15(3): 103-104.

1. A man struck himself in the right eye with a screwdriver. The initial diagnosis was probable medial wall fracture with medial rectus entrapment, but a forced auction test result was negative and the initial x-ray study of the orbit and sinuses was within normal limits. The patient was treated with topical antibiotics and observed closely. Subsequent exams revealed a complete, isolated right gaze palsy. 2. An axial computed tomography scan of the orbit revealed an area of a probable hematoma overlying the lateral rectus muscle. There was also a fracture of the greater wing of the spheroid. 3. One month after the injury, the patient had complete, spontaneous clearing of the diplopia and lateral gaze palsy. The patient has had no residual effects 3 years later. This care reinforces the idea that injuries such as this should be treated symptomatically and observed.

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262. Ando, T., et al. (2011). "Comparison of therapeutic effects between pulsed and continuous wave 810-nm wavelength laser irradiation for traumatic brain injury in mice." PloS one 6(10): e26212.

BACKGROUND AND OBJECTIVE: Transcranial low-level laser therapy (LLLT) using near-infrared light can efficiently penetrate through the scalp and skull and could allow non-invasive treatment for traumatic brain injury (TBI). In the present study, we compared the therapeutic effect using 810-nm wavelength laser light in continuous and pulsed wave modes in a mouse model of TBI., STUDY DESIGN/MATERIALS AND METHODS: TBI was induced by a controlled cortical-impact device and 4-hours post-TBI 1-group received a sham treatment and 3-groups received a single exposure to transcranial LLLT, either continuous wave or pulsed at 10-Hz or 100-Hz with a 50% duty cycle. An 810-nm Ga-Al-As diode laser delivered a spot with diameter of 1-cm onto the injured head with a power density of 50-mW/cm(2) for 12-minutes giving a fluence of 36-J/cm(2). Neurological severity score (NSS) and body weight were measured up to 4 weeks. Mice were sacrificed at 2, 15 and 28 days post-TBI and the lesion size was histologically analyzed. The quantity of ATP production in the brain tissue was determined immediately after laser irradiation. We examined the role of LLLT on the psychological state of the mice at 1 day and 4 weeks after TBI using tail suspension test and forced swim test., RESULTS: The 810-nm laser pulsed at 10-Hz was the most effective judged by improvement in NSS and body weight although the other laser regimens were also effective. The brain lesion volume of mice treated with 10-Hz pulsed-laser irradiation was significantly lower than control group at 15-days and 4-weeks post-TBI. Moreover, we found an antidepressant effect of LLLT at 4-weeks as shown by forced swim and tail suspension tests., CONCLUSION: The therapeutic effect of LLLT for TBI with an 810-nm laser was more effective at 10-Hz pulse frequency than at CW and 100-Hz. This finding may provide a new insight into biological mechanisms of LLLT.

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263. Andrade, G. C. d., et al. (2004). "[Penetrating brain injury due to a large asbestos fragment treated by decompressive craniectomy: case report]." Lesao cerebral penetrante por grande fragmento de fibra de amianto tratada por craniectomia descompressiva: relato de caso. 62(4): 1104-1107.

We report the case of a 22-year-old man victim of penetrating brain injury due to a 15 x 12 asbestos fragment and a successfully treatment via decompressive craniectomy. Unlike gunshot wounds to the head, penetrating brain injury from low energy objects are unusual. Most cases reported involve cranio-orbitary injuries as well as self inflicted lesions in mentally ill patients. The reported case is noteworthy due to the large dimensions of the foreign body, the treatment via decompressive craniectomy and the good patient functional outcome.

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264. Andrade, J. G., et al. (2010). "Images in cardiology. Intracardiac pneumatic nails." The Canadian journal of cardiology 26(9): e344-345.

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265. Andreu, M., et al. (2022). "Assessing fetal human neural stem cells tumorigenicity potential in athymic rats with penetrating traumatic brain injury (pTBI)." Brain research 1791: 148002.

Traumatic brain injuries (TBI) often produce disability in survivors due to unresolved inflammation and progressive neurodegeneration. The central nervous system in mammals is incapable of self-repair. Two decades of preclinical studies and clinical trials have provided insights into TBI pathophysiology that could be utilized to develop clinically relevant therapy. Our laboratory recently reported efficacy of clinical trial grade fetal human neural stem cells (hNSCs) in immunosuppressed rats with penetrating traumatic brain injury (pTBI). Next, in compliance with the United States Food and Drug Administration (USFDA) guidance, this study explores safety by assessing the tumorigenicity potential of intracranial hNSC transplants in athymic rats with pTBI. First, the maximum tolerated dose (MTD) was determined. Then, forty athymic pTBI rats were randomized to either: Group A. pTBI + vehicle or Group B. pTBI + hNSCs at MTD one week after injury with 6-months survival, sufficient time to uncover transplant associated tumorigenicity. A board-certified Pathologist examined hematoxylin-eosin (H&E), Ki67 immunostained brain and spinal cord, serial sections along with several abnormal peripheral masses for evidence of lesion, transplant, and oncogenesis. There was no evidence

of transplant derived tumors or oncogenic tissue necrosis. Consistent with athymic literature, the lesion remained unchanged even after robust hNSC engraftment. This safety study supports the conclusion that hNSCs are safe for transplantation in pTBI. The differences in lesion expansion between immunosuppressed and athymic rats in the presence of hNSCs suggests an unexpected role for thymus derived cells in resolution of trauma induced inflammation.

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266. Andrews, B. T. (1989). "Treatment of acute traumatic internal carotid artery occlusion with extracranial-to-intracranial arterial bypass: case report." Neurosurgery 25(1): 90-92.

Ligation of the cervical internal carotid artery resulted in an acute neurological deficit in the dominant hemisphere of a 35-year-old man who suffered a penetrating injury to the neck. Regional cerebral hypoperfusion was suspected because the ischemic symptoms occurred while the patient was fully heparinized. Immediate institution of a barbiturate coma, volume expansion, and placement of a high-flow extracranial-intracranial arterial bypass graft led to rapid recovery of hemispheric function. High-flow extracranial-intracranial bypass grafts appear to be indicated for the treatment of symptomatic cerebral ischemia in selected cases of acute ligation or occlusion of the extracranial carotid artery.

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267. Andrews, B. T., et al. (2016). "Orbit fractures: Identifying patient factors indicating high risk for ocular and periocular injury." The Laryngoscope 126 Suppl 4: S5-11.

OBJECTIVES/HYPOTHESIS: Maxillofacial trauma frequently involves the bony orbit that surrounds the ocular globe. Concomitant globe injury is a concern whenever orbit trauma occurs and in severe cases can occasionally result in vision loss. The mechanism of injury, physical exam findings, and radiographic imaging can provide useful information concerning the severity of the injury and concerns for vision loss. Using these three tools, it is hypothesized that the patient's history, physical exam, and radiographic findings can identify high-risk maxillofacial trauma patients with concomitant ocular injury. Identification of high risk patients who require comprehensive ophthalmologic evaluation may alter management and possibly preserve or restore vision., STUDY DESIGN: A retrospective clinical chart review was performed at a tertiary academic medical center., METHODS: Subjects were identified using the institutional trauma registry. Data collected included subject demographics, patient medical records and notes, ophthalmologic testing, and radiographic imaging. The incidence of orbit fracture and concomitant ocular injury associated with the mechanism of injury, physical exam findings, and radiographic imaging was determined. Statistical analysis was performed using a chi-square and Fisher exact test., RESULTS: In this study, 279 subjects with orbit fractures were identified and the incidence of concomitant ocular injury was 27.6% (77 of 279). Mechanism of injury was statistically associated with an increased risk of ocular injury (P = 0.0340), with penetrating trauma being the most likely etiology. The physical exam findings of visual acuity and an afferent pupillary defect were statistically associated with ocular injury (P = 0.0029 and 0.0001, respectively). Depth of orbit fracture on radiographic imaging was statistically associated with ocular injury (P = 0.0024), with fractures extending to the posterior third of the orbit being most likely to have associated ocular injury., CONCLUSION: Maxillofacial trauma patients with orbit fractures and concomitant ocular injury occur in more than one in four patients. Comprehensive ophthalmologic evaluation is recommended for all patients who sustain an orbit fracture. Subjects with a penetrating trauma mechanism of injury, physical exam findings of visual acuity deficits and an afferent pupillary defect, and radiographic imaging demonstrating fracture depth involvement of the posterior orbit are at highest risk for vision loss and warrant specific concern for ocular injury assessment., LEVEL OF EVIDENCE: IV.

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268. Andrews, M., et al. (2021). "Sleep and Tau Pathology in Vietnam War Veterans with Preclinical and Prodromal Alzheimer's Disease." Journal of Alzheimer's Disease Reports 5(1): 41-48.

Background: The increasing prevalence of Alzheimer's disease (AD) and lack of effective medications has led to a need to identify modifiable risk factors as targets for interventions. Objective: In this cross-sectional study, we sought to determine whether worse sleep quality is associated with increased pathological tau, and whether this relationship is affected by amyloid pathology. Methods: 66 male participants underwent Florbetapir (AV45) positron emission tomography (PET) and Flortaucipir (FTP) PET and completed the Pittsburgh Sleep Quality Index questionnaire (PSQI) as part of the Department of Defense Alzheimer's Disease Neuroimaging Initiative, a multicenter study collecting data from Vietnam War veterans, some of whom have a history of post-traumatic stress disorder, or non-penetrating traumatic brain injury. AV45 PET was used to determine the presence of significant amyloid pathology. We used regression models to determine the effects of amyloid pathology and PSQI on tau deposition in brain regions associated with Braak stages. Results: Among the 66 participants, 14 individuals were amyloid positive (21%) and 52 were amyloid negative (79%). In regions associated with Braak stages III-IV, there was a significant interaction of amyloid status on PSQI (β=0.04, p=0.003) with higher PSQI correlating with higher FTP SUVr in amyloid-positive individuals only (β=0.031, p=0.005). Conclusion: Our study found that an AD profile of tau deposition was associated with an interaction between self-reported sleep quality and amyloid pathology such that worse self-reported sleep was related to higher tau in regions usually associated with AD progression, but only in individuals with high cerebral amyloid deposition.

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269. Ang, B. T., et al. (2009). "Drosophila parkin mutants exhibit increased neuronal cell death following traumatic brain injury." Journal of neurotrauma 26(8): A8.

Parkin, a Parkinson's disease (PD)-linked gene product, is widely expressed throughout the brain and is commonly regarded to be a broad-spectrum neuro-protectant. De-regulation of parkin expression has thus also been implicated in stroke-induced neuronal death. Parkin apparently protects neurons against oxidative stress-mediated death by preserving proteasome and mitochondrial functions. Given this, it is tempting to propose that parkin may have a role in trauma-induced central nervous system injury. To address this, we utilized a model of penetrating traumatic brain injury (TBI) in Drosophila where age-matched control flies or flies either over-expressing parkin or ablated of endogenous parkin expression were subjected to a cranial puncture wound. Whilst Parkin-overexpressing flies did not show increased survival over control flies, parkin null flies exhibited significantly increased mortality, especially during the first two hours following the injury. Immunohistochemistry analysis upon injured wild-type flies and flies specifically designed to eludcidate regions of neuronal apoptosis, revealed marked neuronal death in the injured fly brains, which takes place at the injury site and also at distant locations. Our preliminary results therefore suggest a role for parkin in TBI and also outline the utility of drosophila for TBI studies. Experiments are currently underway to determine if heightened oxidative stress contributed by the loss of parkin function underlies the enhanced sensitivity of parkin null flies towards TBI-induced death.

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270. Angel, M. F., et al. (1992). "The serratus anterior free tissue transfer for craniofacial reconstruction." The Journal of craniofacial surgery 3(4): 207-212.

The serratus anterior muscle was used as a free tissue transfer to reconstruct complex craniofacial defects in 5 patients. Serratus anterior muscle alone and serratus anterior muscle with rib were the transfers made. All flaps survived and scapular winging did not occur. The serratus anterior muscle has several advantages for the reconstruction of medium-sized craniofacial defects. Because of its position, a two-team approach is possible. It has a consistent pedicle anatomy and low donor site morbidity. It has a large caliber vessel and a long pedicle. When compared with the commonly employed rectus abdominis flap for moderate-sized defects, the serratus muscle offers greater versatility in design and has the option of incorporating bone and innervated muscle without increasing significant donor site morbidity.

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271. Anglin, D., et al. (1998). "Intracranial hemorrhage associated with tangential gunshot wounds to the head." Academic emergency medicine : official journal of the Society for Academic Emergency Medicine 5(7): 672-678.

UNLABELLED: Tangential gunshot wounds (TGSWs) to the head are gunshot wounds in which the bullet or bullet fragments do not penetrate the inner table of the skull., OBJECTIVES: To determine the occurrence of intracranial hemorrhage (ICH) associated with TGSW to the head and to assess the ability of selected clinical criteria to predict ICH in this patient population., METHODS: A retrospective chart review of patients diagnosed as having TGSWs to the head presenting to the ED of Los Angeles County + University of Southern California Medical Center from October 1, 1993, to May 31, 1996., RESULTS: Four hundred twenty patients with gunshot wounds to the head presented to the ED. CT confirmed the diagnosis of TGSWs in 154 patients (36.7%). Head CT of patients with TGSWs revealed 25 (16.2%) skull fractures and 37 (24.0%) ICHs. Fourteen (56.0%) skull fractures were depressed. Of patients with a CT-documented TGSW to the head, 23 (16.1%) had a history of a loss of consciousness (LOC), 129 (84.3%) had a normal neurologic examination in the ED, 17 (11.1%) had a Glasgow Coma Scale score (GCS) < 15, and 75 (48.7%) had retained extracranial bullets or bullet fragments. Of all patients with TGSWs to the head, 113 had a GCS of 15 with no LOC and a normal neurologic examination, with 17 of these 113 patients (15.0%) having ICH. One patient died while hospitalized. Fifty-six (36.6%) patients were released home directly from the ED. Five clinical criteria (history of LOC, GCS < 15 on ED presentation, skull fracture, location of TGSW on the skull, and presence of extracranial bullet fragments) were examined to determine their ability to predict ICH. None of these criteria either alone or in combination were adequately predictive of ICH., CONCLUSION: In this series, 1 in 4 patients with a TGSW to the head had an ICH. All patients with TGSWs to the head should undergo head CT to rule out depressed skull fractures and ICH.

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272. Ankichetty, S. P., et al. (2011). "Occult chiari malformation: A rare presentation." Canadian Journal of Anesthesia 58: S80.

Purpose: To present a case of occult Chiari type I malformation after subarachnoid block in a patient who underwent total knee replacement. Clinical Features: Patient was consented. A 60 year old ASA III female was scheduled for left total knee replacement. Her past history was significant for morbid obesity, asthma and hypertension. Subarachnoid block using 27G Whitacre spinal needle was performed. She had an uneventful surgery. In the PACU, she was drowsy but arousable with stable hemodynamics. However, two hours later, she had intermittent apnoeic episodes and desaturation to 90% with 60% oxygen. Blood gas analysis showed respiratory acidosis. She was intubated and lungs were ventilated and transferred to ICU and weaned in ICU over next 36 hours. Post extubation , she had difficulty of swallowing, visual disturbance of left eye and syncope while coughing. Ophthalmologist, neurologist and otolaryngologist opinion was seaked and could not find the exact cause. MRI showed Chiari I malformation with 17mm cerebellar tonsillar herniation below the foramen magnum and compression of medulla without hydrocephalus. Her symptoms resolved over a week by conservative management and advised surgery. She had an uneventful posterior fossa decompression for Chiari I malformation after 6 months subsequently. Chiari I malformation is a maldevelopment of the hindbrain characterised by cerebellar tonsillar herniation of atleast 3 to 5 mm below foramen magnum. These patients are usually symptomatic when herniation > 5mm and definitely >12 mm. There are case reports of successful epidural labour analgesia in patients with chiari malformation. There is also a report of occult chiari malformation presented as quadriplegia in a patient who had dural tear secondary to gun shot wound. Lumbar puncture and external lumbar drainage, lumbo-peritoneal shunts have precipitated tonsillar herniation and death in patients with known chiari malformation. Our patient presented late with symptoms of difficulty of swallowing despite herniation of 17mm probably due to slow leak of CSF through puncture site and subsequent changes in cranio-caudal CSF flow dynamics. Conclusion: This is the only report of occult chiari malformation with dysphagia, visual disturbance and syncope in the post operative period after spinal anesthesia. (Figure Presented).

273. Ankrah, N.-K., et al. (2020). "Effect of Chronic Alcoholism on Traumatic Intracranial Hemorrhage." World neurosurgery 144: e421-e427.

BACKGROUND: Traumatic intracranial hemorrhage (TICH) is one of the commonest indications for neurosurgical consultation after trauma. Worsening neurologic examination results, size of initial TICH, presence of displaced skull fracture, and concomitant anticoagulant use at the time of injury drive the recommendations for repeat computed tomography of head (RCTH), to assess for stability of intracranial hemorrhage. Chronic alcohol use is not generally considered an indication for repeat head computed tomography (CT)., METHODS: A retrospective study of 423 patients with TICH with normal admission platelet (PLT) counts was reviewed for this study, taken as a subset of 1330 patients with TICH admitted to Lahey Hospital and Medical Center over a 3-year period. Of these 423 patients, 330 were classified as nonalcoholics and 93 were classified as alcoholics, based on whether alcohol use disorder was documented in the patient's medical record, present before injury. The normal PLT level was defined as >=100,000 mu/L. Patients were excluded from review if they had comorbid conditions that could cause PLT dysfunction or coagulopathy. Continuous and categorical variables were compared using independent t test and chi2, respectively. Binary logistic regression was used to predict outcome: stable versus worsening of TICH on RCTH. Statistical analysis was conducted using SPSS version 25., RESULTS: The mean age of the nonalcoholic and alcoholic cohorts were 71.9 years and 54.8 years, respectively. A significantly higher percentage of alcoholics were male. There was a statistically significant difference (chi2 = 8.14; P < 0.004) in radiologic progression of TICH between the 2 groups, with the alcoholics having a worsening RCTH 16.1% of the time compared with only 6.7% in nonalcoholics. Chronic alcohol use was an independent predictor of radiologic progression in patients with normal PLT level (odds ratio, 2.69; confidence interval, 1.34-5.43; P < 0.006)., CONCLUSIONS: Chronic alcohol use was an independent predictor of radiologic progression of TICH in the setting of normal PLT level. Modification of this risk of progression with transfusion of fresh PLTs in chronic alcoholic patients with TICH needs to be investigated in a prospective trial.

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274. Anonymous (1971). "Clinical pathological conference. Violence and brain disease." JAMA 216(6): 1025-1034.

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275. Anonymous (1972). "Secondary treatment of perforating injuries and surgical treatment of other injuries to the eye." Advances in ophthalmology = Fortschritte der Augenheilkunde = Progres en ophtalmologie 27: 131-164.

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276. Anonymous (1979). "Brain death and organ transplantation." Lancet (London, England) 2(8155): 1311.

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277. Anonymous (1981). "Case records of the Massachusetts General Hospital. Weekly clinicopathological exercises. Case 2-1981." The New England journal of medicine 304(2): 100-107.

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278. Anonymous (1990). "For your information: head injury." Missouri medicine 87(10): 741-742.

Head injury causes more deaths and disabilities than any other neurologic cause in individuals under age 50. Skull fractures can tear the arteries and veins that supply the meninges (the protective membrane covering the brain), causing hemorrhage or intracranial pressure from the rapidly expanding mass of clotted blood. Meningitis-causing bacteria can be introduced via the small openings caused by

skull fracture. Even closed head injuries (head injuries that do not result in displaced skull fractures) can cause bruising and tearing of brain tissue. In the medical management of patients with head injuries, family and friends can play a key role in post-treatment observation.

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279. Anonymous (1998). "Practice parameter: antiepileptic drug treatment of posttraumatic seizures. Brain Injury Special Interest Group of the American Academy of Physical Medicine and Rehabilitation." Archives of physical medicine and rehabilitation 79(5): 594-597.

The practice of antiepileptic drug (AED) prophylaxis for posttraumatic seizures (PTS) is common, although results of clinical trials raise questions regarding the benefits of such treatment. A subcommittee of the Brain Injury Special Interest Group of the American Academy of Physical Medicine and Rehabilitation was impaneled to review published literature regarding AED prophylaxis of PTS and formulate recommendations in the form of a practice parameter. The subcommittee presents the following recommendations: (1) Treatment standard: Prophylactic use of phenytoin (PHT), carbamazepine (CBZ), sodium valproate (VPA), or phenobarbital (PB) is not recommended for preventing late PTS, defined as seizures that occur after 1 week of injury, in the patient in whom there has been no history of seizures following a nonpenetrating traumatic brain injury (TBI). (2) It is recommended as a treatment option that PHT, PB, and CBZ may be used to prevent early PTS in patients at high risk for seizures following TBI. (3) Prophylactic use of PHT, CBZ, VPA, or PB is not recommended for preventing late PTS following penetrating TBI.

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280. Anonymous (2001). "Antibiotic prophylaxis for penetrating brain injury." The Journal of trauma 51(2 Suppl): S34-40.

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281. Anonymous (2001). "Fluid Resuscitation in Pre-Hospital Trauma Care: a consensus view." Journal of the Royal Army Medical Corps 147(2): 147-152.

Fluid administration for trauma in the pre-hospital environment is a challenging and controversial area. There is not yet any equivocal answer which can be supported by clear unanswerable evidence. Nevertheless, a careful reading of what evidence is available does allow some provisional conclusions to be drawn. We believe that the following represent the best possible current expert consensus on pre-hospital fluids in trauma. As future evidence brings clarity to this area, these guidelines can be modified, and further consensus statements will be issued taking into account such information. When treating trauma victims in the pre-hospital arena: Cannulation should take place en route where possible Only two attempts at cannulation should be made Transfer should not be delayed by attempts to obtain intravenous access Entrapped patients require cannulation at the scene Normal saline is recommended as a suitable fluid for administration to trauma patients Boluses of 250 ml fluid may be titrated against the presence or absence of a radial pulse (caveats; penetrating torso injury, head injury, infants).

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282. Anonymous (2001). "Management of cerebrospinal fluid leaks." The Journal of trauma 51(2 Suppl): S29-33.

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283. Anonymous (2001). "Neuroimaging in the management of penetrating brain injury." The Journal of trauma 51(2 Suppl): S7-11.

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284. Anonymous (2001). "Part 1: Guidelines for the management of penetrating brain injury. Introduction and methodology." The Journal of trauma 51(2 Suppl): S3-6.

285. Anonymous (2001). "Part 2: Prognosis in penetrating brain injury." The Journal of trauma 51(2 Suppl): S44-86.

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286. Anonymous (2001). "Trauma program bolsters case for better equipment with benchmarking study." Healthcare benchmarks 8(2): 13-16.

Gregory Jurkovich, MD, FACS, head of trauma at Harborview Medical Center in Seattle, contended that patients with severe head injuries did better when they had intercranial pressure monitors. But it is an expensive proposition that some might question. So it was nice to get support from national benchmarking data that the best trauma programs did just what his physicians did at Harborview.

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287. Anonymous (2011). "[Forensic medical assessment of injuries to the human body and clothes caused by a crossbow arrow]." Sudebno-meditsinskaia ekspertiza 54(3): 32-35.

Analysis of the data published in the special literature revealed the lack of information for the objective comprehensive forensic medical evaluation of injuries to the human body and clothes caused by the arrows from different models of crossbows. Morphological characteristics of injuries were shown to strongly depend on the design features of the arrows. This fact can be used to differentiate between injuries inflicted by crossbow arrows and other types of missile weapons.

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288. Anonymous (2014). "Before and after surgery in WW1." British dental journal 217(10): 556.

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289. Anonymous (2019). "Infection after penetrating brain injury-An Eastern Association for the Surgery of Trauma multicenter study oral presentation at the 32nd annual meeting of the Eastern Association for the Surgery of Trauma, January 15-19, 2019, in Austin, Texas: Erratum." The journal of trauma and acute care surgery 87(3): 744.

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290. Ansari, S. A. and A. M. Panezai (1998). "Penetrating craniocerebral injuries: an escalating problem in Pakistan." British journal of neurosurgery 12(4): 340-343.

We carried out a prospective study on patients admitted to busy neurosurgical units in Karachi and Quetta with penetrating craniocerebral injuries. Of the 100 patients, 52 died and 48 survived in spite of aggressive surgical management. Maximum mortality was in patients with Glasgow Coma Score (GCS) below 5. A delay of 6 h, delay in interhospital transfers, and limited post operative aggressive management led to further secondary insults to the brain contributing to a poorer outcome. A review of current literature on pathophysiology and management is included and the importance of prehospital optimum care, and early transfer to the neurosurgical centre are emphasized. Since only two of the 35 patients with a GCS of less than five survived, with severe disabilities, utilizing resources in third world countries on the management of craniocerebral penetrating injuries in patients with a GCS less than 5 is questioned especially when organ donation is not possible.

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291. Anthony, J. P., et al. (1997). "The free fibula bone graft for salvaging failed mandibular reconstructions." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons 55(12): 1417-1412.

PURPOSE: The purpose of this study was to determine the efficacy of vascularized free fibula bone grafts for mandibular salvage reconstruction., PATIENTS AND METHODS: Seven patients had

fibula grafts after failed attempts at mandibular reconstruction. The prior attempts involved 20 operative procedures. Four of the seven patients (57%) had a history of radiation to the affected mandible. Bony defects averaged 10.2 cm (range, 4.5 to 24 cm), and the associated soft tissue defects averaged 6 x 12 cm. Average follow-up was 16 months. Cosmetic (facial symmetry) and functional (speech quality, oral continence, deglutition, donor site morbidity, dental rehabilitation) results were evaluated by questionnaire and clinical examinations., RESULTS: Soft tissue coverage and mandibular restoration were successful in all patients, and flap survival was 100%. Five of the seven patients (70%) achieved good or excellent functional results, and five of seven (70%) achieved good or excellent esthetic results. Complications were minimal, and the average hospital stay was 14 days., CONCLUSIONS: When the initial attempt at mandibular reconstruction is unsuccessful, mandibular function and esthetics can be salvaged with reliable vascularized soft tissue and bone flaps. As long as appropriate flap options are considered and the patient is medically stable, successful mandibular reconstruction should be achievable despite the number or cause of prior failed attempts.

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292. Antic, B., et al. (1999). "[Secondary neurosurgical management of craniocerebral war injuries]." Sekundarno neurohirursko zbrinjavanje ratnih kraniocerebralnih povreda. 56(1): 9-13.

In Belgrade Military Medical Academy 88 males and 1 female (aged 13-55, average 28.6 years) with war craniocerebral injuries (CCI) were secondarily neurosurgically treated from October 1991 trough December 1992. Primary neurosurgical management of these patients was performed in war hospitals in former Yugoslavia. Out of 89 patients, 78 had penetrating, and 11 closed CCI. Out of 55 patients with penetrating CCI who underwent surgery, intracranial debridement was performed in 34 patients. All patients with severe CCI (GCS = 3-8) were severely by disabled or died, and in the majority of patients with minor CCI (GCS = 13-15) the outcome was good ($p < 0.01$). Statistical analysis showed no significant correlation between the extent of cerebral lesion and the outcome of penetrating CCI ($p > 0.05$). Eight (10.3%) patients with penetrating CCI died. The outcome of war CCI mostly depended on the severity of injury.

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293. Antonyshyn, O. M., et al. (1993). "Reconstruction of composite facial defects: the combined application of multiple reconstructive modalities." Canadian journal of surgery. Journal canadien de chirurgie 36(5): 441-452.

OBJECTIVE: To describe the combined use of craniofacial skeletal reconstruction, tissue expansion and microvascular free tissue transfer in the repair of major composite facial defects., DESIGN: Case series with an integrated team approach., SETTING: Craniofacial unit, university teaching hospital., PATIENTS: Three cases were selected to best illustrate the combined use of the three modalities in reconstruction of acute traumatic, congenital and post-traumatic facial defects. A 15-year-old boy had a shotgun wound to the face; a 23-year-old man had Treacher Collins syndrome; and a 55-year-old woman had a post-traumatic composite defect of the central midface., INTERVENTIONS: Preoperatively, complete neurologic, ophthalmologic and dental examinations, anthropometric analysis, prosthodontic assessment, computed tomography and computer graphics. Operatively, craniofacial exposure followed established surgical principles. Skeletal reconstruction was performed to provide accurate positioning of bony segments and three-dimensional stability. Bone grafting was used when necessary to restore bony continuity and increase stability. Tissue expansion was used to provide more locally available tissue for wound closure and resurfacing composite defects. Microsurgical free tissue transfer was used to provide functional replacement of deficient tissues., RESULTS: The results of the modalities used for reconstruction of these composite facial defects are illustrated for each case described., CONCLUSIONS: The use of multiple modalities, including craniofacial skeletal reconstruction, tissue expansion and free tissue transfer, allow the surgeon to address the specific functional and anatomical requirements associated with composite facial defects that are characterized by a combined deficiency of multiple tissues in the craniofacial region.

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294. Anwar, D. R., et al. (2015). "Mode of injury and mortality following traumatic paediatric head injury in a single centre series of 309 patients." European Journal of Paediatric Neurology 19: S70-S71.

Objective: Paediatric traumatic brain injury (TBI) remains the leading cause of death in children aged >1 year. In the USA Trauma Bank, Haider found similar mortality for pedestrians and motor vehicle crashes (MVC), higher than falls, but four times the mortality for gunshot wounds. However, there are few European studies, data on outcome in survivors is limited and any relationship between mode of injury and CT findings has received little attention. Methods: This was a retrospective review of all severe TBI admitted to a single European centre over 14 years. Demographics, mechanism of injury, and CT data were collected. Outcome was scored using the King's Outcome Scale for Children with Head Injury (KOSCHI)and logistic regression analysis with death as the outcome was conducted in 309 consecutive children <18 years. Results: 10 children were non-accidentally injured (NAI), 107 had fallen, 83 were pedestrians, 43 were in a MVC, 33 were riding a bike and 17 were struck by an object. CT scan was more likely to be normal after a fall (41%) compared with 29% of pedestrians, 26% of MVC victims and 8% of cyclists. Twentyone (7%) died; mortality was lower (3%) in those who had fallen compared with rates for MVC (7%), pedestrians (10%) and cyclists (10%) and NAI (20%). Acute subdural haemorrage on initial CT was the most common finding associated with death (14%). Outcome in survivors was also related to mode of injury ($p<0.001$), with children who fell more likely to be discharged with no or minimal sequelae (KOSCHI grade 5a or b). Conclusion: Despite differences in aetiology of TBI between Europe and the US, with no gunshot wounds in our series, we also found that mortality is higher in pedestrians and cyclists and in NAI than following falls. Neuroimaging was often normal and outcome good after falls.

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295. Aouinti, I., et al. (2014). "Vancomycin therapeutic drug monitoring in cerebrospinal fluid." Therapie 69(6): 529-530.

Vancomycin penetrates poorly through the blood-brain barrier. Determination of vancomycin concentration in plasma is recommended. In contrast, its determination in cerebrospinal fluid (CSF) is rarely performed. We report the case of a 74-year-old man with post traumatic meningitis with vancomycin concentration measured in CSF.

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296. Aoun, S. G., et al. (2018). "Osteodiskitis of Lumbar Spine Due to Migrated Fractured Inferior Vena Cava Filter." World neurosurgery 113: 298-303.

BACKGROUND: Venous thromboembolism can be a significant cause of morbidity in the trauma population. Medical and surgical specialties have been pushing the indication for prophylactic filter placement., CASE DESCRIPTION: A 36-year-old man presented with axial lower back pain with a radicular right L2 component after lifting a heavy object. He had a history of penetrating brain trauma 3 years prior, with placement of a prophylactic inferior vena cava filter. His radiograph, computed tomography, and magnetic resonance imaging of the lumbar spine showed fracture of his filter, with migration of the fractured fragment through the inferior vena cava and into the L2-L3 disk space, and surrounding bony lysis and severe osteodiskitis. He was treated medically with intravenous and then oral antibiotics and improved clinically and radiographically., CONCLUSIONS: Conservative use of filter devices and early retrieval once their indication expires are paramount to avoid unnecessary complications.

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297. Apaydin, A., et al. (2015). "Management of self-inflicted gunshot (pellet) wounds of the jaws with Le fort I osteotomy followed by implant insertion and prosthetic rehabilitation." International journal of oral and maxillofacial surgery 44: e188.

Background: Gunshot injuries to maxillofacial complex can result from suicide, rarely patients can survive. Those wounds can result in devastating functional and aesthetic consequences because of the missing hard and soft tissues. Objective: We would like to present the treatment of a case who had self-inflicted injury with severe tissue loss.A43-year-old man was sent to our clinic from the Plastic Surgery Department 4 months after his initial admission with several scar formations in soft tissues, a missing left eye and a smashed mandible which had been reconstructed. Half of the tongue, floor of the mouth and most of the maxilla were destroyed on the left side. The fractures of the right maxilla had healed in a retruded position; the vertical height of the face was shortened, resulting in a cross bite, causing a deviation to right. We advanced the maxilla with Le fort I osteotomy to establish the vertical dimension with the aid of the upper and lower molars. Dental and orthodontic implants, an obturator prosthesis to the maxilla and an implant-supported prosthesis to the mandible were applied. We achieved the restoration of function and emotional comfort to the patient. Findings and conclusions: Management of gunshot wounds of the maxillofacial region represents formidable challenge to the surgeon. The type and severity of the injury and success of the treatment depend on the gun type, projectile velocity and tissue resistance. The most difficult problems are secondary infection, severe deformity and tissue volume loss.

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298. Apostolides, P. J., et al. (1996). "Gunshot wounds to the head in civilian practice." Neurosurgery 39(1): 210-211.

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299. Appelbaum, R. D., et al. (2022). "Penetrating brain injury with hypopituitarism." Trauma case reports 38: 100628.

A 34-year-old healthy male presented as a trauma activation after sustaining a gunshot wound to his face. CT head imaging was suggestive of a ballistic fragment adjacent to a posterior wall sphenoid sinus fracture with likely a small volume of adjacent blood products. He was ultimately diagnosed with hypopituitarism which included central diabetes insipidus, central hypothyroid, and adrenocorticotropic hormone deficiency secondary to cortisol deficiency. This case illustrates the spectrum of endocrine dysfunction that can occur with skull base injuries, and the appropriate pituitary-function screening and treatment that should be performed if there is clinical concern. Early recognition and prompt treatment of pituitary insufficiency can facilitate overall rehabilitation after TBI.

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300. Appleby, J., et al. (2015). "Perimortem trauma in King Richard III: a skeletal analysis." Lancet (London, England) 385(9964): 253-259.

BACKGROUND: Richard III was the last king of England to die in battle, but how he died is unknown. On Sept 4, 2012, a skeleton was excavated in Leicester that was identified as Richard. We investigated the trauma to the skeleton with modern forensic techniques, such as conventional CT and micro-CT scanning, to characterise the injuries and establish the probable cause of death., METHODS: We assessed age and sex through direct analysis of the skeleton and from CT images. All bones were examined under direct light and multi-spectral illumination. We then scanned the skeleton with whole-body post-mortem CT. We subsequently examined bones with identified injuries with micro-CT. We deemed that trauma was perimortem when we recorded no evidence of healing and when breakage characteristics were typical of fresh bone. We used previous data to identify the weapons responsible for the recorded injuries., FINDINGS: The skeleton was that of an adult man with a gracile build and severe scoliosis of the thoracic spine. Standard anthropological age estimation techniques based on dry bone analysis gave an age range between 20s and 30s. Standard post-mortem CT methods were used to assess rib end morphology, auricular surfaces, pubic symphyseal face, and cranial sutures, to produce a multifactorial narrower age range estimation of 30-34 years. We identified nine perimortem injuries to the skull and two to the postcranial skeleton. We identified no healed injuries. The injuries were consistent with those created by weapons from the later medieval period. We could not identify the

specific order of the injuries, because they were all distinct, with no overlapping wounds. Three of the injuries-two to the inferior cranium and one to the pelvis-could have been fatal., INTERPRETATION: The wounds to the skull suggest that Richard was not wearing a helmet, although the absence of defensive wounds on his arms and hands suggests he was still otherwise armoured. Therefore, the potentially fatal pelvis injury was probably received post mortem, meaning that the most likely injuries to have caused his death are the two to the inferior cranium., FUNDING: The University of Leicester.

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301. Applegate, L. J., et al. (1990). "Traumatic pseudoaneurysm of the cervical carotid artery: the value of arteriography." Neurosurgery 26(2): 312-315.

A patient who sustained a gunshot wound to the neck and subsequent blunt trauma is presented. No angiogram was performed after the initial injury. Subsequently, the patient developed a cerebral embolus from a thrombus dislodged from a pseudoaneurysm of the cervical carotid artery, resulting in complete occlusion of the distal internal carotid artery. After antiplatelet therapy, the distal internal carotid artery recanalized, and the pseudoaneurysm occluded spontaneously. We stress the need for the use of arteriography in the initial evaluation of penetrating injuries to the neck and the utility of repeated arteriograms for further treatment planning as these traumatic lesions can change with time.

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302. Apriawan, T., et al. (2021). "Three-dimensional (3D)-printed model reconstruction in pre-operative planning for wooden penetrating brain injury." Bioprinting 24.

Objective: The advancements in technology have made the use of three-dimensional printed model reconstruction in neurosurgery receive special attention due to its role in the process of decision-making and pre-operative planning. Penetrating brain injuries (PBI) have a high risk of damage to the complex intracranial neurovascular structures. Due to its difficulty, 3D-printed model reconstruction could help neurosurgeons in the decision making of PBI surgery strategy. Methods: The authors reported of an 18-year-old male carpenter who was referred to the hospital due to a wooden PBI. We performed computed tomography (CT) scan, CT angiography (CTA), magnetic resonance venography (MRV) and magnetic resonance angiography (MRA). We then performed segmentations and integrations of the digital imaging and communications in medicine (DICOM) data. The digital reconstruction was then used for 3D printing, and the printed model was used for the foreign object extraction simulation for pre-operative planning. Results: There were no intra- and post-operative neurovascular complications after the craniotomy and wooden foreign body extraction procedure. Conclusion: This method was beneficial since it enhances the anatomical visualization of the location and trajectory of the foreign body. Moreover, the printed model allows for a more direct and realistic simulation for the foreign body extraction procedure.

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303. Apuzzo, M. L., et al. (1982). "Transcallosal, interfornicial approaches for lesions affecting the third ventricle: surgical considerations and consequences." Neurosurgery 10(5): 547-554.

A group of 11 patients with a variety of lesions affecting the 3rd ventricle have been treated using a direct transcallosal interfornicial approach to the region. In 3 patients, no attendant hydrocephalus was present. In an effort to minimize potential cortical injury related to the approach, we studied the venous anatomy in the region of the coronal suture. Based on this study, appropriate flap placement and interhemispheric entry points were defined. Although no lasting, clinically apparent morbidity was observed in any of the 11 cases, we performed more sophisticated studies of the interhemispheric transfer of somesthetic and perceptual motor tasks, as well as psychometric testing related to parameters of intelligence and memory, 3 to 8 months postoperatively in 6 cases. The results and clinical material indicate that this surgical technique is a safe, feasible alternative in the management of a wide spectrum of pathological lesions within this region. A transcallosal, interfornicial approach offers excellent visualization of the entire 3rd ventricle without the dependence on hydrocephalus or an

extensive extra-axial mass to enhance the exposure. With proper planning and technique, it may be accomplished with a minimum of physiological consequence.

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304. Aras, M., et al. (2014). "Being a neighbor to Syria: a retrospective analysis of patients brought to our clinic for cranial gunshot wounds in the Syrian civil war." Clinical neurology and neurosurgery 125: 222-228.

OBJECTIVE: Toward the end of 2010, the Arab spring, the waves of revolutionary demonstrations and protests influenced also Syria, where violent clashes turned into a civil war. Hundreds of thousands of people became refugees. The use of excessive force unfortunately culminated in numerous deaths and injuries in many cities. Being the closest city to Aleppo, Damascus and Homs, the biggest cities of Syria, Antioch/Hatay has been the city where initial emergency treatments were performed. For this reason, we examined and retrospectively analyzed the medical records of the patients treated in the clinics of our hospital due to cranial gunshot wounds during the war., MATERIAL AND METHODS: The medical records of 186 patients who were injured in the Syrian War and brought to, followed up and treated in the Neurosurgery Clinic of Mustafa Kemal University, Faculty of Medicine in Hatay, a Turkish city on the Syrian border, between April 2011 and June 2013., RESULTS: A total of 186 patients were evaluated in a period of more than 2 years. Of all 91.4% of the patients were adults (male/female: 152/18) and 8.6% of them were pediatric patients (male/female: 14/2). The average age of the patients was 31 years, with an age range of between 2 months and 67 years. According to Glasgow coma score (GCS) of the patients at the time of admission, GCS was 3 in 32 patients (17.2%), between 4 and 7 in 70 patients (37.6%), and between 8 and 15 in 84 patients (45.1%). We observed that the patients with GCS of 4-7 had a significantly lower mortality among the 56 patients treated surgically compared with the 14 patients treated medically., DISCUSSION: Cranial gunshot wounds are responsible for high mortality and morbidity. A multiplicity of factors plays a role on morbidity and mortality. These are the duration of transport, the injury pattern, the velocities of the weapons used, and the Glasgow Coma Scales of the patients at the time of admission., CONCLUSION: The authors recommend that the patients with cranial gunshot wounds who has GCS of 4-7 should be aggressively treated including surgery as well. We do not recommend surgical treatment for patients with GCS of 3. All our experiences show that treatment of gunshot wounds will continue to be a matter of debate, about which there is more to learn. The data presented in this study will once again demonstrate the seriousness of the event, and will, perhaps, contribute to the peace negotiations to end the war.

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305. Aravapalli, A., et al. (2009). "Cerebral fat embolism and the "starfield" pattern: A case report." Cases journal 2(11).

Nearly all long-bone fractures are accompanied by some form of fat embolism. The rare complication of clinically significant fat embolism syndrome, however, occurs in only 0.9-2.2% of cases. The clinical triad of fat embolism syndrome consists of respiratory distress, altered mental status, and petechial rash. Cerebral fat embolism causes the neurologic involvement seen in fat embolism syndrome. A 19-year-old African-American male was admitted with gunshot wounds to his right hand and right knee. He had diffuse hyperactive deep tendon reflexes, bilateral ankle clonus and decerebrate posturing with a Glasgow Coma Scale (GCS) score of 4T. Subsequent MRI of the brain showed innumerable punctate areas of restricted diffusion consistent with "starfield" pattern. On a 10-week follow up he has a normal neurological examination and he is discharged home. Despite the severity of the neurologic insult upon initial presentation, the majority of case reports on cerebral fat embolism illustrate that cerebral dysfunction associated with cerebral fat embolism is reversible. When neurologic deterioration occurs in the non-head trauma patient, then a systemic cause such as fat emboli should be considered. We describe a patient with non-head trauma who demonstrated the classic "starfield" pattern on diffusion-weighted MRI imaging.

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306. Arbour, R. B. (2013). "Early metabolic/cellular-level resuscitation following terminal brain stem herniation: implications for organ transplantation." AACN advanced critical care 24(1): 59-78.

Patients with terminal brain stem herniation experience global physiological consequences and represent a challenging population in critical care practice as a result of multiple factors. The first factor is severe depression of consciousness, with resulting compromise in airway stability and lung ventilation. Second, with increasing severity of brain trauma, progressive brain edema, mass effect, herniation syndromes, and subsequent distortion/displacement of the brain stem follow. Third, with progression of intracranial pathophysiology to terminal brain stem herniation, multisystem consequences occur, including dysfunction of the hypothalamic-pituitary axis, depletion of stress hormones, and decreased thyroid hormone bioavailability as well as biphasic cardiovascular state. Cardiovascular dysfunction in phase 1 is a hyperdynamic and hypertensive state characterized by elevated systemic vascular resistance and cardiac contractility. Cardiovascular dysfunction in phase 2 is a hypotensive state characterized by decreased systemic vascular resistance and tissue perfusion. Rapid changes along the continuum of hyperperfusion versus hypoperfusion increase risk of end-organ damage, specifically pulmonary dysfunction from hemodynamic stress and high-flow states as well as ischemic changes consequent to low-flow states. A pronounced inflammatory state occurs, affecting pulmonary function and gas exchange and contributing to hemodynamic instability as a result of additional vasodilatation. Coagulopathy also occurs as a result of consumption of clotting factors as well as dilution of clotting factors and platelets consequent to aggressive crystalloid administration. Each consequence of terminal brain stem injury complicates clinical management within this patient demographic. In general, these multisystem consequences are managed with mechanism-based interventions within the context of caring for the donor's organs (liver, kidneys, heart, etc.) after death by neurological criteria. These processes begin far earlier in the continuum of injury, at the moment of terminal brain stem herniation. As such, aggressive, mechanism-based care, including hormonal replacement therapy, becomes clinically appropriate before formal brain death declaration to support cardiopulmonary stability following terminal brain stem herniation.

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307. Arbour, R. B. (2013). "Traumatic brain injury: pathophysiology, monitoring, and mechanism-based care." Critical care nursing clinics of North America 25(2): 297-319.

Traumatic brain injury, which may be blunt or penetrating, begins altering intracranial physiology at the moment of impact as primary brain trauma. This article differentiates blunt versus penetrating brain trauma, primary versus secondary brain injury, and subsequent intracranial pathophysiology. Discussion and case study correlate intracranial pathophysiology and multisystem influences on evolving brain injury with mechanism-based interventions to modulate brain components (brain, blood, and cerebrospinal fluid volumes). The discussion also explores the effects of controlled ventilation, cardiopulmonary physiology, and global physiologic state on secondary injury, control of intracranial pressure, and recovery.

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308. Arciniegas, D. B., et al. (2011). "Mini-mental state exam and frontal assessment battery scores predict inpatient rehabilitation outcomes after traumatic brain injury." Journal of Neuropsychiatry and Clinical Neurosciences 23(2): 1.

Background: Physicians are often called upon to opine on the relationship between early posttraumatic cognitive impairments and inpatient rehabilitation outcomes. The value of commonly used bedside cognitive assessments, including the Mini-Mental State Exam (MMSE) and Frontal Assessment Battery (FAB), for this purpose remains under-explored in this population. Objective: To evaluate the MMSE and FAB, independently and combined, as predictors of: 1) rehabilitation length of stay (RLOS); 2) Functional Independence Measure (FIM) score proximate to neuropsychiatric consultation; and 3) discharge FIM score. Methods: Medical records of 83 inpatients consecutively evaluated on a brain injury rehabilitation unit were retrospectively reviewed. Inclusion criteria were: TBI (non-penetrating)

by American Congress of Rehabilitation Medicine criteria; age 20-89 years; primary language English; non-aphasic; neuroimaging demonstrating intracranial abnormality consistent with TBI. Data extracted from records of eligible subjects included: demographic information; TBI mechanism; MMSE, FAB, and FIM scores; and RLOS. Multiple regression modeling was used to investigate the proportion of variance in FIM scores and RLOS accounted for by MMSE and/or FAB Z-scores. Results: Fifty-five subjects were included. MMSE and FAB Z-scores independently predict RLOS and FIM at consultation and discharge. The combination of these measures accounted for a greater proportion of variance in all models than did either measure alone. Conclusions: Normatively interpreted MMSE and/or FAB scores inform usefully on duration of inpatient rehabilitation hospitalization as well as functional status proximate to consultation and inpatient rehabilitation discharge. Prospective study of these measures as predictors of short- and long-term rehabilitation outcomes in this population is warranted.

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309. Arciniegas, D. B., et al. (2012). "Norm-adjusted mini-mental state examination and frontal assessment battery scores predict inpatient rehabilitation outcomes after traumatic brain injury." Brain injury 26(4-5): 709-710.

Objectives: Physicians and psychologists are often called upon to evaluate persons with early posttraumatic cognitive impairments and to predict inpatient rehabilitation outcomes. The value of 'bedside' cognitive assessments that are commonly used for similar purposes by these clinicians in other contexts, including the Mini-Mental State Examination (MMSE) and Frontal Assessment Battery (FAB), remains underexplored in this population. This study sought to evaluate MMSE and FAB performance among persons receiving inpatient rehabilitation after TBI, and to test the hypotheses that MMSE and FAB Z-scores, independently and in combination, predict: 1) rehabilitation length of stay (RLOS); 2) total Functional Independence Measure (FIM) score proximate to neuropsychiatric consultation; and 3) discharge FIM score. Methods: Medical records of 83 English-speaking, non-aphasic, adults with non-penetrating TBI and abnormal intracranial neuroimaging consecutively admitted to an inpatient rehabilitation unit were reviewed. Demographic information, TBI characteristics, MMSE, FAB, and FIM scores, and RLOS were extracted from the medical record. Multiple regression modeling was used to estimate the proportion of variance in FIM scores and RLOS accounted for by MMSE and/or FAB Z-scores. Results: Fifty-five subjects (42 men, 13 women), age 46.5±17.4 years with 13.5±2.3 years of education and admitted to inpatient rehabilitation 21.7±19.9 days post-TBI, met study eligibility criteria. The MMSE and FAB were administered approximately six days after inpatient rehabilitation admission. Total FIM scores at admission, consultation, and rehabilitation discharge were 54.5±18.2, 69.2±24.0, and 102.2±17.6, respectively. Raw MMSE and FAB scores were Z-transformed (to adjust for age- and education-effects) using previously published population norms for these measures. MMSE and FAB Z-scores were -2.6±2.8 and -5.6±4.1, respectively. MMSE and FAB Z-scores independently predicted RLOS (both $R^2=0.19$ and $p<0.002$) as well as total FIM score at consultation ($R^2=0.48$, $p<0.001$ and $R^2=0.28$, $p<0.001$, respectively) and rehabilitation discharge ($R^2=0.08$, $p<0.04$ and $R^2=0.09$, $p<0.03$, respectively). The combination of MMSE and FAB Z-scores accounted for a greater proportion of variance in RLOS ($R^2=0.25$, $p<.001$), total FIM score at consultation ($R^2=0.53$, $p<0.001$), and total FIM score at rehabilitation discharge ($R^2=0.12$, $p<.0.04$) than did either measure alone. Conclusions: Normatively interpreted MMSE and/or FAB scores inform on duration of inpatient rehabilitation hospitalization as well as functional status proximate to consultation and inpatient rehabilitation discharge. These findings offer preliminary support for the use of the MMSE and FAB as elements of the 'bedside' cognitive assessment of persons receiving inpatient rehabilitation following TBI. While retrospective analysis is a limitation of the present study, the derivation of these data from a typical inpatient brain injury rehabilitation clinical practice increases their translational immediacy. Prospective study is needed to investigate further the value of Z-transformed MMSE and FAB scores as predictors of rehabilitation outcomes among persons with TBI.

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310. Arciniegas, D. B., et al. (2012). "Clock drawing performance predicts inpatient rehabilitation outcomes after traumatic brain injury." Brain injury 26(4-5): 748-749.

Objectives: Clock drawing is a widely used, timeefficient, easily performed 'bedside' cognitive assessment. However, the value of clock drawing tests as assessments of cognitive impairments in the early period following traumatic brain injury (TBI) and as predictors of rehabilitation outcome is underexplored. This study addressed this issue by evaluating clock drawing performance among persons receiving inpatient rehabilitation after TBI and by testing the hypotheses that Clock Drawing Interpretation Scale scores predict: 1) total Functional Independence Measure (FIM) score proximate to neuropsychiatric consultation; 2) discharge total FIM score; 3) FIM efficiency; and 4) rehabilitation length of stay (RLOS). Methods: Medical records of 83 English-speaking, non-aphasic, adults with non-penetrating TBI and abnormal intracranial neuroimaging consecutively admitted to an inpatient rehabilitation unit were reviewed. Demographic information, TBI characteristics, clock drawings, FIM scores, and RLOS were extracted from the medical record. One investigator scored clock drawings using Mendez' (1992) 20- point Clock Drawing Interpretation Scale (CDIS); a blinded subset were rescored three years later in order to establish test-retest reliability. FIM efficiency was calculated as: ([discharge total FIM score] - [admission total FIM score]) 7 RLOS. Multiple regression modeling was used to investigate the proportion of variance in FIM scores, FIM efficiency, and RLOS accounted for by CDIS score, controlling for the effects of age. Results: Forty-five subjects (35 men, 10 women), age 47.1±17.8 years with 13.8±2.3 years of education and admitted to inpatient rehabilitation 22.2±20.4 days post-TBI, met study inclusion criteria. Testretest reliability of CDIS scores was r=0.95. CDIS scores were normally distributed (13.4±5.6, range 2-20, Kolmogorov-Smirnov d=0.19, p=NS), and were correlated with age (r=-0.41, p<0.005) but not education. After controlling for age, CDIS score predicted total FIM score at consultation (adjusted R2=0.31, p<0.001) and discharge (adjusted R2=0.19, p<0.005), as well as rehabilitation length of stay (adjusted R2=0.22, p<0.002). The combination of CDIS score and age predicted total FIM efficiency (adjusted R2=0.10, p<0.05); CDIS score contributed more strongly (β=0.30, p=0.06) than did age (β=-0.13, p=0.42). Conclusions: Clock drawing was scored easily and consistently using the CDIS, which yielded a normally distributed score set. CDIS scores predicted functional status and length of inpatient rehabilitation hospitalization and contributed to prediction of the efficiency of functional recovery. The CDIS focuses on the contribution of frontally-mediated cognition to clock drawing performance, a characteristic that appears to influence strongly its prediction of inpatient rehabilitation outcomes. The present findings suggest that standardized administration of the clock drawing test and CDIS scoring may contribute usefully to the assessment of persons receiving inpatient rehabilitation after TBI and inform rehabilitation outcome expectations. Prospective study of clock drawing using CDIS in this population is warranted.

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311. Ardebili, S. Y., et al. (2000). "Maxillofacial-transclival juxtabasilar penetrating butcher's knife injury: a case report." British journal of neurosurgery 14(3): 258-261.

A 90-year-old woman presented with an accidental maxillofacial-clival penetrating injury with a butcher's knife, with its tip reaching the immediate proximity of the basilar artery. The knife was removed at surgery, with no untoward sequelae.

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312. Ardill, W. and S. Gidado (2003). "Penetrating head wound: a remarkable case." Surgical neurology 60(2): 120-123.

BACKGROUND: The modern management of penetrating head injuries is generally considered a neurosurgical specialty that relies heavily on the use of sequential imaging techniques, an ever-changing armamentarium of sophisticated antibiotics and specific neurosurgical operative skills. Unfortunately these optimal therapeutic components are frequently not available to patients injured in underdeveloped countries., METHODS: An unusual case of a young patient suffering a penetrating brain wound and undergoing delayed treatment in an African mission hospital is reviewed., RESULTS: A functional but neurologically impaired outcome resulted from limited surgical debridement and short-

term broad-spectrum antibiotic administration., CONCLUSIONS: The multiple exigencies of surgical practice in an underdeveloped African nation do not preclude successful management of penetrating head trauma.

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313. Ardissino, M., et al. (2019). "Decompressive craniectomy in paediatric traumatic brain injury: a systematic review of current evidence." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery 35(2): 209-216.

INTRODUCTION: Paediatric traumatic brain injury (pTBI) is one of the most frequent neurological presentations encountered in emergency departments worldwide. Every year, more than 200,000 American children suffer pTBIs, many of which lead to long-term damage., OBJECTIVES: We aim to review the existing evidence on the efficacy of the decompressive craniectomy (DC) in controlling intracranial pressure (ICP) and improving long-term outcomes in children with pTBI., METHODS: A comprehensive search of the MEDLINE and EMBASE databases led to the screening of 212 studies, 12 of which satisfied inclusion criteria. Data extracted included the number and ages of patients, Glasgow Coma Scale scores at presentation, treatment protocols and short- and long-term outcomes., RESULTS: Each of the nine studies including ICP as an outcome reported that it was successfully controlled by DC. The 6-12 month outcome scores of patients undergoing DC were positive, or superior to those of medically treated groups in nine of 11 studies. Mortality was compared in only two studies, and was lower in the DC group in both.Very few studies are currently available investigating short- and long-term outcomes in children with TBI undergoing DC., CONCLUSION: The currently available evidence may support a beneficial role of DC in controlling ICP and improving long-term outcomes.

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314. Arendall, R. E. and A. M. Meirowsky (1983). "Air sinus wounds: an analysis of 163 consecutive cases incurred in the Korean War, 1950-1952." Neurosurgery 13(4): 377-380.

Review of 1105 records patients with penetrating craniocerebral injuries incurred in the Korean War revealed 163 cases with air sinus wounds, an incidence of 14.8%. The characteristics of these wounds and their surgical management have been described. Foremost among the complications of air sinus wounds are the development of a cerebrospinal fluid fistula and the occurrence of posttraumatic infection. Prompt and radical debridement with exenteration of the affected sinus and watertight closure of the dura mater represent the key to the reduction of complications when dealing with penetrating wounds involving the air sinuses.

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315. Ares, W. J., et al. (2019). "A comparison of digital subtraction angiography and computed tomography angiography for the diagnosis of penetrating cerebrovascular injury." Neurosurgical focus 47(5): E16.

OBJECTIVE: Penetrating cerebrovascular injury (PCVI) is a subset of traumatic brain injury (TBI) comprising a broad spectrum of cerebrovascular pathology, including traumatic pseudoaneurysms, direct arterial injury, venous sinus stenosis or occlusion, and traumatic dural arteriovenous fistulas. These can result in immediate or delayed vascular injury and consequent neurological morbidity. Current TBI guidelines recommend cerebrovascular imaging for detection, but there is no consensus on the optimum modality. The aim of this retrospective cohort study was to compare CT angiography (CTA) and digital subtraction angiography (DSA) for the diagnosis of PCVI., METHODS: The records of all patients presenting to two level I trauma centers in the United States between January 2010 and July 2016 with penetrating head or neck trauma were reviewed. Only those who had undergone both CTA and DSA were included. Clinical and neuroimaging data were collected, and PCVIs were stratified using a modified Biffl grading scheme. DSA and CTA results were then compared., RESULTS: Of 312 patients with penetrating trauma over the study period, 56 patients (91% male, mean age 32 years) with PCVI met inclusion criteria and constituted the study cohort. The mechanism of injury was a gunshot

wound in 86% (48/56) of patients. Twenty-four (43%) patients had sustained an angiographically confirmed arterial or venous injury. Compared with DSA as the gold standard, CTA had a sensitivity and specificity of 72% and 63%, respectively, for identifying PCVI. CTA had a positive predictive value of 61% and negative predictive value of 70%. Seven patients (13%) required immediate endovascular treatment of PCVI; in 3 (43%) of these patients, the injury was not identified on CTA. Twenty-two patients (39%) underwent delayed DSA an average of 25 days after injury; 2 (9%) of these patients were found to harbor new pathological conditions requiring treatment., CONCLUSIONS: In this retrospective analysis of PCVI at two large trauma centers, CTA demonstrated low sensitivity, specificity, and positive and negative predictive values for the diagnosis of PCVI. These findings suggest that DSA provides better accuracy than CTA in the diagnosis of both immediate and delayed PCVI and should be considered for patients experiencing penetrating head or neck trauma.

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316. Arffa, R. C., et al. (1985). "Keratometric and refractive results of pediatric epikeratophakia." Archives of ophthalmology (Chicago, Ill. : 1960) 103(11): 1656-1659.

Keratometric and refractive results of pediatric epikeratophakia showed that patients under 1 year of age had steeper corneas preoperatively and required more correction, as estimated by the Sanders-Retzlaff-Kraff regression formula. The average spherical equivalent of refractive error six months postoperatively was +6.92 +/- 4.67 diopters in patients under 1 year, and -0.72 +/- 4.22 D in patients over 1 year. Three of 14 younger patients and 35 of 54 older patients were within 3 D of emmetropia. Since March 1982, significant undercorrection has occurred only in patients 6 months old or younger. Younger children achieved an average of 46% of the predicted change in corneal curvature, while older children achieved 85%. Also, the Sanders-Retzlaff-Kraff formula may be inaccurate in estimating powers for younger children. Therefore, we recommend at this time that epikeratophakia be used as a secondary procedure in neonates with congenital cataracts.

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317. Argenta, L. C., et al. (1983). "The use of tissue expansion in head and neck reconstruction." Annals of plastic surgery 11(1): 31-37.

The use of expanding prostheses to augment local tissues in reconstruction of the head and neck has been successfully accomplished in 13 patients over the past three years. Excellent results and reliability have been demonstrated.

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318. Arham, A. and N. Zaragita (2021). "Penetrating Injury of Superior Sagittal Sinus." Asian journal of neurosurgery 16(1): 132-135.

Penetrating injury of superior sagittal sinus (SSS) is very rare yet serious which can lead to morbidity and mortality. Complications such as bleeding, thrombosis, and infection are possible and should be anticipated. We report a case of 3-year-old boy with penetrating injury caused by a nail at the middle third of SSS. The patient underwent the surgery for extraction and sinus repair and antibiotic treatment during the hospital stay. He was neurologically intact and recovered completely. Comprehensive treatment of both surgical and medical management is important in achieving the best possible outcome. Copyright: © 2021 Asian Journal of Neurosurgery.

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319. Arici, L., et al. (2012). "Penetrating head trauma with four nails: an extremely rare case." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 18(3): 265-267.

We present a rare case of self-inflicted penetrating head trauma by a 34-year-old male who hammered four nails into his own head; he had been diagnosed with schizophrenia seven years before. On the physical examination, four nails were observed in the hairy scalp that had been driven into the cranium in the right temporal and parietal areas of the head. No cerebrospinal fluid fistulas were present.

On the neurological examination, no motor or sensory deficits were present. The Glasgow Coma Scale was 15. On direct skull X-ray and cranial computerized tomography (CT), the nails were seen to be approximately 10 cm long and extending in various directions. No injury was observed in the main vasculature on CT angiography. Under general anesthesia, two nails in the right temporal area were removed by extraction, and the other two nails in the right parietal area were removed through a mini craniotomy. In areas such as the temporal area where the bone is thin, nails can be removed by extraction. However, in areas like the parietal bone where the bone is thick, removal of the nails using this method may not always be possible.

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320. Arienta, C., et al. (1997). "Management of head-injured patients in the emergency department: a practical protocol." Surgical neurology 48(3): 213-219.

BACKGROUND: The management of head-injured patients admitted to emergency departments is not standardized., METHODS: The authors performed a retrospective analysis of 10,000 head-injured patients admitted to the Emergency Department of our hospital in a 21-month period and, on the basis of a statistical correlation between each clinical parameter (symptoms and signs upon arrival at the hospital or risk factors) and the presence of intracranial lesions, they propose a practical protocol in an attempt to avoid the overuse or radiologic examinations and yet identify patients with possible life-threatening complications., RESULTS: On the basis of this correlation the patients have been divided into four groups. In the first group (called group alpha) are patients with: no history of loss of consciousness, no vomiting or amnesia, a normal neurologic examination, and minimal if any subgaleal swelling. They can be released into the care of relatives who are given a special instruction sheet (X rays unnecessary). No patient in group alpha had complications of any kind. The second group (group beta) is made up of patients with at least one of the following features: transient loss of consciousness, post-traumatic amnesia, a single episode of vomiting or significant subgaleal swelling. They undergo a computed tomography (CT) scan and if this is normal, only a short period of observation is needed. If CT scan is not available, the skull is X rayed and, if this X ray is negative, the patient is sent home with the warning sheet after an observation period. If a fracture is found, CT scan should be performed promptly. No patient in group beta with normal skull X rays developed intracranial lesions. The third group (group gamma) contains patients with at least one of the following symptoms: impaired consciousness, repeated episodes of vomiting, neurologic deficits, otorrhagia, otorrhea, rhinorrea, signs of basal skull fracture, seizures, penetrating or perforating wounds, lack of cooperation for varying reasons, patients who have undergone previous intracranial operations or been affected by coagulopathy or submitted to anticoagulant therapy, and finally, epileptic or alcoholic patients. They receive a CT scan immediately and, if necessary, again prior to discharge. Six patients in group gamma with GCS = 15 upon admission were operated on for intracranial hematoma. The fourth group (group delta) is composed of comatose patients. Immediately following resuscitation maneuvers and prior to any surgical intervention, they undergo a CT scan. A linear association between the severity groups and the presence of intracranial lesions has been demonstrated., CONCLUSIONS: The present protocol stresses the importance of the patient's clinical and anamnestic evaluation upon arrival in the Emergency Department, especially in minor head injuries.

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321. Arif, S. H., et al. (2016). "Attempted Suicide with Needle Penetration through Cranial Defect: A Rare Case Report." Indian Journal of Neurotrauma 13(2): 104-106.

Intracranial foreign bodies are usually secondary to penetrating injuries through the orbit, ear, or cranial bones. Nails, knives, screwdrivers, sewing needles, bullets, and shrapnel have been described related to penetrating brain injury (PBI). The majority of deaths from trauma reflect unintentional accidents, but a significant minority follow suicide and even a smaller proportion (less than 10%) reflect homicide. Self-inflicted injuries among psychiatric patients are not uncommon. We report a rare case of a 35-year-old woman who tried to commit suicide by inserting a needle in her brain through cranial defect. Needle was removed and patient recovered uneventfully. Awareness of the psychological

condition and suicide precautionary measures should be kept in mind in all cases of self-inflicted PBI patients.

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322. Arifin, M. Z., et al. (2012). "Penetrating skull fracture by a wooden object: Management dilemmas and literature review." Asian journal of neurosurgery 7(3): 131-134.

Most penetrating skull injuries are caused by gun shot wounds or missiles. The compound depressed skull fracture represents an acute neurosurgical emergency. Management and diagnosis of such cases have been described, but its occurence following a fall onto a piece of wood is quite unusual. A 75-year-old female fell onto a piece of wood that penetrated her skull on the left frontal region and was treated in our department. The patient had no neurological deficits during presentation. She was managed surgically and removal of the wooden object was performed to prevent early or late infection complications. Wooden foreign bodies often pose a different set of challenges as far as penetrating injuries to the brain are concerned. Radiological difficulties and increased rates of infection due to its porous nature make these types of injuries particularly interesting. Their early diagnosis and appropriate treatment can minimize the risk of complications.

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323. Arkin, M. S., et al. (1996). "Anterior chiasmal optic nerve avulsion." AJNR. American journal of neuroradiology 17(9): 1777-1781.

In a case of traumatic avulsion of the optic nerve at the anterior chiasm, MR imaging provided highly specific images of the injury site, including the absence of the optic nerve within the optic canal and the point of transection at the anterior portion of the chiasm. This was confirmed clinically and histopathologically. MR imaging should be considered in cases of suspected chiasmal injury.

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324. Arlt, N., et al. (1972). "[Skull gunshot injuries in peacetime]." Schussverletzungen des Schadels im Frieden. 111: 146-149.

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325. Armonda, R., et al. (2011). "Specific clinical applications of transcranial doppler ultrasound for patients with wartime traumatic brain injury." Journal of neurotrauma 28(6): A5.

Traumatic brain injury (TBI) is associated with the severest casualties from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF). From Oct. 1, 2008 AMEDD TBI program initiated transcranial Doppler (TCD) ultrasound service for TBI patients who were presented for care at the National Naval Medical Center and at the Walter Reed Army Medical Center. MATERIAL & METHODS: Eighty five patients (3 females) aged 18 to 40 years (mean 25.9 years) who had suffered wartime TBI injuries (with Glasgow Coma Scale scores ranging from 3 to 15) were investigated with daily TCD studies. A total of 505 TCD studies (mean 6.4 tests/patient, ranged from 1 to 30) were made after admission. There were 28 (33%) patients after explosive blast injury, 23 patients (27%) after GSW and 34 (40%) after other causes of TBI (closed, penetrating, MVA, falls, etc). Comprehensive TCD protocol and well published diagnostic criteria for vasospasm and abnormally high intracranial pressure (ICP) applied in all cases. RESULTS: The TCD signs of mild, moderate and severe vasospasm were observed in 29 (34.1%), 16 (18.8%) and 10 (11.7%) of patients, respectively. The TCD signs of intracranial hypertension were recorded in 56 (65.8%) patients. Abnormally high CBFV's without TCD signs of vasospasm and abnormally low CBFV's were recorded in 8 (9.4%) and 12 (14.1%) of all patients, respectively. Five patients (5.8%) underwent transluminal angioplasty for post-traumatic vasospasm treatment. CONCLUSION: These findings demonstrate that delayed cerebral arterial spasm is a frequent complication of combat TBI and that the severity of spasm is comparable to that seen in aneurysmal SAH. In addition, TCD provided valuable information about the presence of abnormally high ICP. Because vasospasm and intracranial hypertension represent significant events in a high

proportion of patients after wartime TBI, close daily TCD monitoring is recommended for the management of such patients.

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326. Arnold, P. G. and G. B. Irons (1981). "One-stage reconstruction of massive craniofacial defect with gastroomental free flap." Annals of plastic surgery 6(1): 26-33.

A large craniofacial defect resulting from a close-range shotgun blast is described. It involves the left hemimandible, the left maxilla, the hard palate with nasal support, the roof of the left orbit, and the left side of the oral lining. The defect was reconstructed using autogenous ribs for the facial skeleton. The remainder of the defect was repaired with a composite free tissue transfer of gastric wall and greater omentum on the right gastroepiploic vessels. The gastric wall was used to reconstruct the oral mucosa, the omentum was packed around the bone grafts for nourishment, and a split-thickness skin graft was placed on the outside surface. The technical aspects of the procedure are described and a two-year follow-up presented.

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327. Aromatario, M., et al. (2016). "Weapon identification using antemortem CT with 3D reconstruction, is it always possible?--A report in a case of facial blunt and sharp injuries using an ashtray." Legal medicine (Tokyo, Japan) 18: 1-6.

An interesting case of homicide involving the use of a heavy glass ashtray is described. The victim, a 81-years-old woman, has survived for few days and died in hospital. The external examination of the victim showed extensive blunt and sharp facial injuries and defense injuries on both the hands. The autopsy examination showed numerous tears on the face, as well as multiple fractures of the facial bones. Computer tomography scan, with 3D reconstruction, performed in hospital before death, was used to identify the weapon used for the crime. In recent years new diagnostics tools such as computer tomography has been widely used, especially in cases involving sharp and blunt forces. Computer tomography has proven to be very valuable in analyzing fractures of the cranial teca for forensic purpose, in particular antemortem computer tomography with 3D reconstruction is becoming an important tool in the process of weapon identification, thanks to the possibility to identify and make comparison between the shape of the object used to commit the crime, the injury and the objects found during the investigations. No previous reports on the use of this technique, for the weapon identification process, in cases of isolated facial fractures were described. We report a case in which, despite the correct use of this technique, it was not possible for the forensic pathologist to identify the weapon used to commit the crime. Authors wants to highlight the limits encountered in the use of computer tomography with 3D reconstruction as a tool for weapon identification when facial fractures occurred.

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328. Arora, M. M., et al. (2008). "Analysis of non enemy action deaths in counter insurgency operations through mortuary services." Medical Journal Armed Forces India 64(2): 104-107.

Background: Regional Trauma Centre in the northern India receives the mortal remains of all fallen soldiers for embalming. Non enemy action deaths during counter insurgency operations (CI Ops) were analysed for planning preventive measures. Methods: Mortal remains received for embalming from Jan 1999 to Dec 2006 were analysed with respect to mode of injury, causation, body parts involved, fatality, seasonal variation and changing trends. Result: Accidents accounted for 3.02 deaths per thousand troops and environmental factors were responsible for 1.14 deaths per thousand troops deployed. Accidental deaths peaked in 2000, declined in 2001 and then remained more or less static. Of the accidental deaths, 88 % were brought in dead and 12% died after reaching hospital. Road traffic accidents were the major killers accounting for 48.2 %, followed by accidental discharge of weapon 35.5 %. The latter is showing a rising trend from 8 % of total accidents in 2001 to 65 % in 2005 and 51 % in 2006 ($p < .01$). Most (49.7 %) of the deaths were below 25 years of age. Proportion of persons below 25 years was more in fatalities due to accidental gunshot wound. Amongst the road traffic accidents, 40%

died of head injury and 51.2 % due to multiple injuries. When deaths occurred due to accidental discharge of own weapon, 36.4 % had brain injury and 22% heart injury. Of the environmental fatalities all but one were brought in dead. Majority were due to avalanches and landslides (51.2 %), followed by earthquake (22.4 %), lightning (12.8 %), high altitude pulmonary oedema (10.4 %) and hypothermia (3.2 %). Most of the deaths due to avalanches occurred in February while all deaths due to earthquake were in October 2005. Of the deaths due to lightning, 75 % occurred in April and May. Conclusion: Prevention of death caused by road traffic accidents, accidental discharge of weapon, avalanches and lightning will conserve manpower and add to operational preparedness.

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329. Arora, M. M., et al. (2009). "Pattern of fatal injuries in counter terrorist operations: An innovative analysis through embalming services." Medical Journal Armed Forces India 65(2): 103-107.

Background: Mortal remains of the soldiers killed in counter-terrorist operations in Kashmir valley are sent to their home after undergoing mandatory embalming. Methods: Injuries on the mortal remains of the soldiers killed in counter terrorist operations between Jan 1999 to Dec 2006 were analysed with respect to the agent, mode of injury, age, rank structure, body parts involved, seasonal variations and changing trends. Fatalities consequent to enemy action across line of control and fatalities of Kargil war were also analysed for comparison. Statistical analysis was done using chi square test for difference in proportions. Result: Over the study period, terrorist induced injuries accounted for 8.16 deaths per thousand troops deployed whereas enemy action from across the line of control accounted for 0.63 deaths per thousand. Terrorist induced fatalities peaked in 2001 and thereafter revealed a declining trend ('p' < 0.001). Fatalities due to enemy action across line of control declined to zero since 25 Nov 2003 consequent to effective ceasefire. Of the total fatalities, 89.5% were killed in action (KIA) while 10.5% died of their wounds after reaching the hospital. Fatality to total injured ratio peaked to 29% in 2001 and than stabilized to about 23%. Mean KIA to total casualty ratio was 21%. The rank structure of the fatalities was officers 8.6%, JCOs 7.3%, and Other Ranks 84.1%. Most of the soldiers died young, 51% being below 25 years of age. Out of the terrorist induced fatalities, 78.2% died of gunshot wounds and 21.5% by splinters and improvised explosive devices (IED). The ratio was reversed in enemy induced fatalities and in Kargil war. Fatalities peaked during June to November and declined in winters. Body region wise, 23.4% of all deaths were due to head injury, 8.4% due to neck and maxillofacial injury, 18.4% due to injury to lungs and 11% due to heart injury. Most frequent target of the fatal bullet was brain (25.4%), closely followed by lungs (22.5%) and heart (12.3%). When soldier died of splinters/IED, multiple body parts were injured in 57.5%, brain in 17.3%, face & neck in 3.5%, heart in 6.6%, lungs in 5.3%, abdomen in 3.5% and limbs in 5.8%. Fatality due to head and heart injury peaked in 2001, while multiple injuries peaked in 2000, declined in 2001 and peaked again in 2004 and 2005 ('p' < 0.001). In fatalities of Kargil war, chest injuries were less but multiple injuries were more. Conclusion: Most of the fatalities were due to gunshot wounds selectively aimed at head, face, neck and thorax. Therefore, a lightweight flexible and effective bulletproof protection for this area will conserve manpower.

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330. Arora, R., et al. (2017). "Preliminary results from the comparison of simple limbal epithelial transplantation with conjunctival limbal autologous transplantation in severe unilateral chronic ocular burns." Indian journal of ophthalmology 65(1): 35-40.

PURPOSE: To compare the safety, efficacy, and clinical outcomes of simple limbal epithelial transplantation (SLET) with conjunctival-limbal autologous transplantation (CLAU) in severe unilateral ocular chemical burns., MATERIALS AND METHODS: Twenty patients of unilateral chronic ocular burns with more than 270degree limbal stem cell deficiency and a healthy fellow eye were divided into two groups - ten patients of Group A underwent SLET while ten patients of Group B were operated for CLAU. Patients were followed up for 6 months and assessed for a stable epithelialized ocular surface, extent of reduction in vascularization and forniceal reconstruction, improvement in corneal clarity and visual acuity., RESULTS: A stable epithelialized corneal surface was obtained in all patients, with a

significant reduction in the mean clock hours of vascularization in both the groups (P < 0.001). The mean symblepharon score showed a statistically significant reduction from 1.80 +/- 1.14 to 0.30 +/- 0.63 in Group A and 1.70 +/- 1.06 to 0.15 +/- 0.24 in Group B at 6 months. Corneal clarity, as well as best-corrected visual acuity, showed a statistically significant improvement in both the groups., CONCLUSION: Both the procedures, SLET and CLAU, were equally effective in achieving a stable ocular surface, forniceal reconstruction, and regression of corneal vascularization. The requirement of minimal donor tissue in SLET makes it a preferred option over CLAU in cases of uniocular chronic ocular burns.

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331. Arosarena, O. A., et al. (2009). "Maxillofacial injuries and violence against women." Archives of facial plastic surgery 11(1): 48-52.

OBJECTIVE: To determine if patterns of facial injuries differed between those of female assault victims with maxillofacial injuries and those of female patients with maxillofacial injuries from other causes., METHODS: We reviewed the medical and dental records of 326 adult female facial trauma patients treated by otolaryngologists and oral/maxillofacial surgeons at the University of Kentucky Medical Center. Information abstracted included date of injury, dates of presentation for medical attention, mechanism(s) of injury, diagnoses, and treatments., RESULTS: While victims of intimate partner violence were more likely to have zygomatic complex fractures, orbital blow-out fractures, and intracranial injuries than were other patients with facial trauma, women assaulted by unknown or unidentified assailants were more likely to have mandible fractures (P = .004)., CONCLUSION: These results in conjunction with other presenting circumstances, such as delay in presentation, can assist the surgeon treating patients with maxillofacial injury in recognizing interpersonal violence against women.

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332. Arosemena, M. A., et al. (2018). "Thyroid storm triggered by strangulation in a patient with underlying undiagnosed graves' disease." Endocrine Reviews 39(2).

Background: Thyroid storm is a life-threatening syndrome characterized by end-organ compromise. Presenting symptoms include tachycardia, high-output heart failure, agitation, altered mental status, fever, and respiratory distress. Thyroid storm may be precipitated by an acute event, such as thyroid surgery, infection or parturition. Blunt force, penetrating trauma, and suicide attempt by hanging have also been reported in the literature as causes of thyrotoxicosis resulting in thyroid storm. Strangulation is a not a well-known precipitant of thyroid storm. (1) Clinical Case: A 32-year-old African American female presented to the emergency department with shortness of breath after being sexually assaulted and strangulated. On arrival to the Emergency Department she was tachycardic, tachypneic and hypoxemic. On physical exam, proptosis and soft tissue swelling of the neck were noted. Chest x-ray revealed predominantly right-sided pulmonary opacities, suggestive of pulmonary edema (Figure 1). She was placed on non-invasive mechanical ventilation and later on required intubation. Her temperature reached 40.6°C and remained elevated despite acetaminophen and ice packs. Over the hospitalization she developed multi organ dysfunction and distributive shock requiring vasopressor support. Blood and tracheal aspirate cultures were sent with no evidence of microorganism growth. She remained unresponsive off sedation, so MRI brain was performed, showing no abnormalities. Thyroid function revealed fT4: 5.66 ng/dl (normal range, 0.93 - 1.70), T3: 309.9 ng/dl (80-200 ng/dL) and TSH <0.005 mcIU/mL (0.270 - 4.200 mcIU/mL) (Figure 2). A Burch- Wartofsky score was calculated: 75, highly suggestive of thyroid storm. She was started on treatment according to American Thyroid Association guidelines. Two days after treatment, thyroid hormones decreased significantly with T3 149.4 ng/dl and fT4 2.54 ng/dl. Additionally, her temperature, heart rate, pulmonary edema, and mental status gradually improved. On day ten, after five days of normal thyroid hormones, methimazole dose was decreased, hydrocortisone was discontinued, and propranolol was titrated off. She was extubated and safely left the Intensive Care Unit. Conclusion: This is the second reported case of thyroid storm secondary to manual strangulation and the first report of strangulation unmasking a previously undiagnosed Graves' disease. This case reveals how strangulation can produce severe thyroid injury and

subsequent thyroid storm and the importance of having high degree clinical suspicion for early diagnosis and decrease mortality.

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333. Arseni, C. and M. Ghitescu (1967). "Delayed post-traumatic cerebral abscesses due to retained intracerebral foreign bodies." Acta neurochirurgica 16(3): 201-217.

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334. Arslan, E. D., et al. (2015). "Assessment of traumatic deaths in a level one trauma center in Ankara, Turkey." European journal of trauma and emergency surgery : official publication of the European Trauma Society 41(3): 319-323.

Trauma management shows significant progress in last decades. Determining the time and place of deaths indicate where to focus to improve our knowledge about trauma. We conducted this retrospective study from data of trauma victims who were brought to a major tertiary hospital which is a level one trauma center in Ankara, Turkey, and died even if during transport or in the hospital between 1 March 2010 and 1 March 2013. The patients' demographic characteristics, trauma mechanisms, time frames and causes of deaths determined by physicians were recorded. Traumas were grouped as "high energy trauma" (HET) and "low energy trauma" (LET). Falls from ground level were defined as LET. 209 traumatic deaths due to trauma or trauma-related conditions were found in the study period. 161 of 209 (78 %) patients suffered from HET. Motor vehicle collisions (MVC) (56 %) were the most common mechanism of trauma followed by burns (16 %), falls (11 %), gunshots (9 %) and stabs (6 %) in this group and traumatic brain injuries (TBI) (41 %) were the most common cause of death followed by circulatory collapse (22 %) and multi-organ failure (20 %). 36 % of deaths occurred before arrival at hospital, 25 % in the first 24 h of admission, 18 % between 2nd and 7th day and 21 % after first week. Trimodal distribution of traumatic deaths was not valid for all types of injuries and the most important factor to decrease traumatic deaths is still prevention. Also we have to keep on searching to improve our knowledge about trauma management.

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335. Arslan, M., et al. (2012). "Transorbital orbitocranial penetrating injury caused by a metal bar." Journal of neurosciences in rural practice 3(2): 178-181.

Transorbital intracranial injury is uncommon, representing 0.04% of penetrating head trauma with a high mortality rate. Orbital penetrating injuries may cause severe brain injury if the cranium is entered, typically via the orbital roof, the superior orbital fissure, or the optic canal. A 13-year-old male sustained a severe brain injury due to penetration of the right orbit with an iron bar. The bar entered the inferiomedial aspect of the orbit and emerged from the left occipital bone. Neurological examination revealed deep coma (GCS: E1M2V1) with fixed, dilated, and non-reactive pupils. The bar followed an intracranial trajectory, through the third ventricle and suprasellar cistern. The patient underwent an immediate exploration with removal of the bar. Unfortunately, he died 10 days postoperatively due to severe diencephalic injury with brainstem herniation. In this case report, we discuss the radiologic diagnosis and surgical management of transorbital orbitocranial injury by foreign body penetration.

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336. Arslan, M., et al. (2012). "Spontaneous migration of a retained bullet within the brain: a case report." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 18(5): 449-452.

Gunshot injury to the head is usually mortal, and spontaneous migration of a retained bullet is rare. We report the case of a 23-year-old man with a spontaneously migrated bullet within the brain. Cranial computerized tomography (CT) indicated that the bullet was lodged deeply in the left parietal region. The patient was conscious and had right homonymous hemianopsia. The bullet was close to the vital structures and deep-seated; therefore, surgical intervention was not considered. Two months after the injury, repeat CT revealed that the bullet had migrated posteriorly and caudally due to gravitational

factors. Management of the retained bullet was controversial. Removal of a deep-seated bullet may cause additional neurological deficit, but migration of a retained bullet may cause damage to vital structures, producing significant neurological damage. We proposed that the bullet in the brain should be removed if it could be reasonably accessed without causing additional neurological damage.

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337. Arslantas, A., et al. (2001). "Inadvertent insertion of a nasogastric tube in a patient with head trauma." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery 17(1-2): 112-114.

This is a report of a 3-year-old boy with intracranial penetration of a nasogastric tube causing brain damage in the left frontal lobe. A computed tomography (CT) showed passage of the nasogastric tube via a fracture of the cribriform plate into the intracranial cavity. The tube was manually removed under antibiotic prophylaxis. The patient then underwent dural repair for rinorrhoea and was discharged in good health.

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338. Arum, A., et al. (2018). "[A foreign object in the frontal lobe]." Ugeskrift for laeger 180(23).

In this case report a 77-year-old male tumbled in his lavatory and hit his head against a toilet roll holder. The holder penetrated his eye and orbita and left a 0.5 x 1 cm cylindrical piece of plastic inside his frontal lobe. He was admitted at a neurosurgical department, where the foreign object was removed. In this report, we summarise some of the basic principles of handling patients with a penetrating brain trauma, including risk of infection, control of bleeding and technical considerations before surgically removing a foreign object.

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339. Arunkumar, M. J., et al. (1999). "Penetrating intracranial wooden object: case report and review of CT morphology, complications, and management." Surgical neurology 51(6): 617-620.

BACKGROUND: Penetrating intracranial wooden fragments after vehicular accidents are uncommon. The CT morphology, complications, and management in such cases are quite variable., CASE REPORT: A 27-year-old male was seen with a "twig" from a tree embedded firmly just below the right medial canthus after a motorcycle accident. Diagnosis of intracranial penetrating wooden object was made on CT scanning. The wooden stick, which had splintered into two, was extricated through a craniotomy in two operative sessions. However the patient succumbed to septicemia and meningitis on the twelfth day after the accident., CONCLUSIONS: The need for prompt extrication of these objects and the causes of high mortality in this condition are discussed. The importance of imaging the intracranial compartment in injuries involving the periorbital region is emphasized.

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340. Arunkumar, P., et al. (2015). "Determined to Die! Ability to Act Following Multiple Self-inflicted Gunshot Wounds to the Head. The Cook County Office of Medical Examiner Experience (2005-2012) and Review of Literature." Journal of forensic sciences 60(5): 1373-1379.

Cases of multiple (considered 2+) self-inflicted gunshot wounds are a rarity and require careful examination of the scene of occurrence; thorough consideration of the decedent's psychiatric, medical, and social histories; and accurate postmortem documentation of the gunshot wounds. We present a series of four cases of multiple self-inflicted gunshot wounds to the head from the Cook County Medical Examiner's Office between 2005 and 2012 including the first case report of suicide involving eight gunshot wounds to the head. In addition, a review of the literature concerning multiple self-inflicted gunshot wounds to the head is performed. The majority of reported cases document two gunshot entrance wound defects. Temporal regions are the most common affected regions (especially the right and left temples). Determining the capability to act following a gunshot wound to the head is necessary in crime scene reconstruction and in differentiation between homicide and suicide.

341. Arunkumar Singh, Y., et al. (2005). "A difficult airway management following gunshot injury to upper airway." JMS - Journal of Medical Society 19(2): 72-73.

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342. Aryan, H. E., et al. (2005). "Gunshot wounds to the head: gang- and non-gang-related injuries and outcomes." Brain injury 19(7): 505-510.

PRIMARY OBJECTIVE: This study examined the differences between gang and non-gang-related incidents of penetrative missile injuries in terms of demographics, motivation, intra-cranial pathology, transit time, injury time and clinical outcome., RESEARCH DESIGN: Retrospective and prospective chart review., METHODS AND PROCEDURES: Between 1985-1992, 349 patients with penetrating missile injuries to the brain presenting to LAC-USC were studied., EXPERIMENTAL INTERVENTIONS: Inclusion criteria were implemented to keep the cohort as homogenous as possible. Patients excluded were those with multiple gunshot wounds, non-penetrating gunshot wounds to the head, systemic injuries and cases in which the motivation for the incident was unknown., MAIN OUTCOMES AND RESULTS: Gang-related shooting slightly out-numbered non-gang-related incidents. Demographic analysis showed both a male and Hispanic predominance for both gang- and non-gang-related victims and significant differences in gender, race and age. Occipital entrance sites were more common in the gang-related vs temporal entrance sites in the non-gang-related. Mean transit time to the emergency department for gang-related shootings was less than non-gang-related shootings (24.4 vs 27.8 minutes). Most shooting incidents took place between 6pm and 3am. No difference between survival and outcome was noted between gang and non-gang victims., CONCLUSIONS: Significant differences were found between gang- and non-gang-related shooting victims in terms of demographics, entrance site and transit time. No difference was found between injury time, survival and outcome between gang and non-gang populations.

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343. Asahi, S. and M. Kagawa (1985). "[Penetration of cefotaxime into human cerebrospinal fluid]." The Japanese journal of antibiotics 38(6): 1680-1684.

The penetration of cefotaxime (CTX) into the cerebrospinal fluid (CSF) was monitored to evaluate the prophylactic efficacy of the drug against post-craniotomy infections. Doses ranged from 1 to 2 g were administered to patients with subarachnoid hemorrhage due to the rupture of cerebral aneurysm, traumatic cerebral contusion, or subdural edema accompanied by intracerebral hemorrhage, by intravenous drip infusion over a period of 30 or 60 minutes. CTX readily entered the CSF with concentrations exceeding MICs against the major pathogens occurring after craniotomy. CTX proved to be effective in the prevention of post-craniotomy infections in noninflammatory situations, especially after surgery in the case of cerebral traumas or subarachnoid hemorrhage.

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344. Asal, N., et al. (2019). "Olfactory Fossa and New Angle Measurements: Lateral Lamella-Cribriform Plate Angle." The Journal of craniofacial surgery 30(6): 1911-1914.

OBJECTIVES: The authors investigated the olfactory fossa (OF) in patients with unilateral nasal septal deviation (NSD) and presented the lateral lamella-cribriform plate angle (LLCPA)., METHODS: Paranasal sinus computed tomography images of 300 adult subjects with unilateral NSD (111 males, 189 females) were evaluated retrospectively. Septal deviation angle (SDA), Keros Classification, OF depth and width, LLCPA; and orbital plate and cribriform plate (OPCP) distance were measured., RESULTS: The OF depth values (ipsilateral, contralateral) were found as Keros III >Keros II >Keros I (Padjusted <0.0175). The OF width values (ipsilateral) were detected as Keros I >Keros II and Keros I >Keros III (Padjusted <0.0175). In patients with higher SDA values, ipsilateral OF depth values decreased (P <0.05). The LLCPA and OPCP values were higher in Keros I and lower in Keros III (P

<0.05)., CONCLUSION: In patients with lower LLCPA and OPCP, endoscopic sinus surgery will be more dangerous for trauma to lateral lamella and intracranial penetration.

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345. Asano, K., et al. (2018). "Prototype screwdriver stopper to avoid intracranial penetration injury." Neurosurgical review 41(3): 895-898.

Screwdriver slipping from the tapping screw head (screwdriver slip) represents a very dangerous situation that leads to the risk of entry into the intracranial operation field. We have developed a screwdriver stopper device to attach to the top of the screwdriver in order to prevent intracranial penetration injuries. We performed 48 craniotomies in our institute. The instrument is made from clear acrylic with a central hole (diameter, 3 mm). We checked the number of screwdriver slip events, as a precursor to intracranial penetration injury, in screwdrivers from five different companies, and compared the results. We used 496 tapping screws in 512 tightening procedures. Although screwdriver slip occurred at an overall rate of 17/512(3.3%), we completely avoided serious intracranial penetration injuries. No significant differences in rates of screwdriver slip were seen between the five companies (chi2 test, p = 0.997). Screwdriver slip is a precursor to intracranial penetration injury, but cannot be avoided with cross-type screwdrivers. Many neurosurgeons may be operating without knowledge of the potential risk of intracranial penetration injury. The screwdriver stopper described herein may prove extremely useful for preventing intracranial penetration injuries during neurological surgery.

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346. Asatryan, A. A., et al. (2010). "Improved method of primary cranioplasty using autologous bone crumbs." New Armenian Medical Journal 4(3): 38.

Introduction: Surgical procedures performed due to craniocerebral trauma (CCT) often result in skull defects, which afterwards cause functional-morphological changes of CNS and pose risk for unprotected brain. The advantages of primary and early cranioplasty are permanently stated in the literature. For primary plastic of skull defect the autologous bone crumbs are used in the Surb Astvatsamayr Medical Center for approximately 25 years. The objective of this study was to increase the effectiveness of the method. Material and Methods. During 2005-2009 the primary cranioplasty was performed in 126 children at the ages from 1 month to 17 years. There were 26 closed and 71 depressed skull fractures, from which 31 injuries were penetrating. Mild brain contusion was in 30 cases, moderate in 29 cases and severe in 7. In 39 cases fractures were located in two or more bones of the skull (more often temporal, parietal and occipital bones), in the rest cases injury was located in the right parietal region. Intracranial acute hemorrhages were diagnosed in 29 patients (26 epidural and 3 subdural hemorrhages). Results and discussion: Since 2005 brain computed tomography (CT) has been used as an additional diagnostic method of CCT, which allows describing precisely the nature, volume and locations of intracranial changes, thus making planning and performance of the surgical procedure more effective. Having initial information about the location of fractures and hematoma made possible to perform intracranial procedures (removal of contusion and hematoma) using bone plastic or two separate bone resection entries (windows) by leaving 1 cm width bone bridge between them. It allowed keeping natural vault of skull curvature and at the same time to overcome some small skull defects using autolplastic method. This modification was used among 9 patients in our Clinic. In all cases the complete regeneration of bone defect and better plastic results were achieved. Conclusion: Having pre-surgical CT results of brain injury gives opportunity to use improved method of cranioplasty more widely and improve treatment outcomes.

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347. Ascanio, L. C., et al. (2019). "Distal Parent Vessel Occlusion of 2 Superior Cerebellar Artery Fusiform Aneurysms: Report of 2 Cases and Literature Review." World Neurosurgery: X 3.

Background: Fusiform superior cerebellar artery (SCA) aneurysms are rare, and their management represents a technical challenge. In complex aneurysms, endovascular parent vessel occlusion of the SCA may be a treatment option. Here, we present 2 cases of fusiform SCA aneurysms,

1 ruptured and 1 unruptured, as well as our institution's management with parent vessel occlusion. We also provide a review of the literature. Cases Description: Case 1: A 42-year-old male was transferred from an outside hospital with subarachnoid hemorrhage. On admission, the patient had a Glasgow Coma Scale score of 8, a Hunt and Hess grade 4, and a Fisher grade 4. A diagnostic angiogram demonstrated a right SCA fusiform lesion with proximal and distal dilatations of 1.45 mm and 5.35 mm long, respectively, likely representing a single dissecting pseudoaneurysm. The distal dilatation was coiled, resulting in parent vessel occlusion. The patient recovered clinically and was discharged in stable condition. Case 2: A 27-year-old female was transferred from an outside hospital due to a brainstem stroke. A diagnostic angiogram revealed an S2/S3 segment left SCA fusiform lesion, likely representing a dissecting aneurysm. The patient was neurologically intact at admission and managed conservatively. At the 2-month follow-up angiogram, the dissection had extended along the length of the SCA. Consequently, the patient underwent coil embolization of the distal left SCA. At the 6-month follow-up, the vessel remained obliterated and the patient's neurologic status had improved. Conclusions: Endovascular coil embolization of fusiform SCA aneurysms offers a reasonable and safe treatment approach.

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348. Aseeva, K. S., et al. (2014). "Rare case of stroke, caused by bullet." Cerebrovascular Diseases 37: 386.

Background: Among the determined etiologies of the ischemic stroke there is quite rare cause - bullet embolism. There are a few cases with bullet embolism described, approximately 200 cases all over the world. Case description: 13 year-old patient R.A. was admitted to an accident and emergency department. His mother stated, that two days ago, her son had a pneumatic gunshot to the chest, and she took out the bullet, then her son's BP fell to the 70/40. They referred to hospital, where he was examined by a surgeon, underwent chest X-ray (NIL) and primary surgical treatment of the wound on the chest and was let home. The next day the boy experienced severe headache, weakness and absence of any active movements in left extremities, somnolency and vomit for three times. On general examination - in the heart area on the chest there was a skin defect of 0,5∗0,5 sm size. Neurological examination revealed left hemiplegia and hemihypestesia, torpor. Investigations: Routine analyses were NIL. Head CT showed ischemic area 4,7∗ 1,8∗4,7 sm on the right, 'Hyperdense right MCA' sign, foreign body of the pyramid of right temporal bone. Cranium X-ray confirmed the foreign body to be a bullet. On the ECG was sinus arrhythmia with heart rate of 72-107 per minute. Ultrasound of the head and neck vessels showed the occlusion on the internal carotid artery on the right at the siphon level, and occlusion of the right MCA on the M1 and M2 levels. CT angiography of the head showed right inner carotid artery, right MCA thrombosis. Chest CT displayed wound channel going inside of the pericardium with no signs of excess liquid, contusion of lungular segments. Conclusion: This case presentation shows that even asymptomatic gunshot may cause delayed embolism of different vessels, including cerebral arteries and may lead to serious consequences, not depending on the patient's age.

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349. Aseri, S., et al. (2016). "A rare case of low pressure headache secondary to spontaneous intracranial hypotension treated with epidural blood patch." Regional Anesthesia and Pain Medicine 41(2).

Introduction Spontaneous intracranial hypotension is a rare disorder that may have a varied presentation. This leads to a delay in the diagnosis and treatment. The recent advances in the radiological techniques have made it possible to diagnose the entity with a greater confidence. Due to the paucity of cases there is no controlled study to determine the best method of treatment. Therefore it is important that every case is reported and an inference is made regarding the presentation, diagnosis and method of treatment. We have had one such case of spontaneous intracranial hypotension. A 71 years old male patient was referred by General Practitioner to neurologist at the Walton Centre for Neurology and Neurosurgery with six weeks history of headache. He was seen by neurologist and had a CT scan and was referred to Neurosurgeon. Neurosurgeon reviewed him and an MR Scan was done and based on MR finding patient was referred to Department of Pain Medicine for intervention. Results/Case

report History: Patient was complaining of 6 weeks history of Headache, throbbing type, associated with tinnitus. It was positional headache, worse on standing and eased by sitting and lying down. Aggravating factors were coughing, sneezing and running. Associated with Nausea and dizziness. Examination: Occipital headache, no neck stiffness, no other neurological impairment. Investigations: CT SCAN: bilateral chronic subdural heamatoma, (no aneurysm or malformation seen) MR SCAN: meningeal thickening (? Subdural collection) and Slumping of midbrain and feature of chronic intracranial hypotension. e/o subdural collection (? SDH) Diagnosis: Chronic low pressure headache secondary to spontaneous intracranial hypotension Treatment: Epidural blood patch was done in theatre under complete aseptic precaution and epidurogram was done to confirm needle epidural space. 30ml of patients autologas blood was injected into epidural space. Patient had immediate relief of headache at rest and relief of Headache while sneezing & coughing after 24 hrs of blood patch. Discussion In spontaneous intracranial hypotension there is often the absence of definitive cause like history of dural puncture or penetrating trauma. The cardinal signs and symptoms are orthostatic headache which is increased in the upright position and decreases at recumbent position(1) and low CSF pressure Other atypical cases have been reported with no postural headache, normal CSF pressure (2) and normal cranial MRI(3). A German neurologist called Schaltenbrand introduced the term 'aliquorrea' to describe spontaneous intracranial hypotension in the absence of any precipitating factors like dural puncture or trauma (4). However Henry Woltman of The Mayo clinic described in 1940 that frontal or occipital headache comes on when the patient is up and leaves when the patient lies down(5). This headaches affect women more than men and typically occur in the middle age but can also affect children and the elderly(6). The incidence is roughly 5 per 100,000. Generally the spontaneous intracranial hypotension occurs due to leak from the spinal cord and there is CSF in the dural sac. There may be a weakness in the meninges that lead to a tear and CSF leak. There have also been accounts of fragile arachnoid cysts. (Figure presented).

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350. Asfar, S. N., et al. (1995). "The ICU outcome of head injury in Basrah, Iraq." Journal of Neurological and Orthopaedic Medicine and Surgery 16(4): 237-241.

A prospective study was carried out on 60 acutely head-injured patients admitted to the Intensive Care Unit at Basrah Teaching Hospital, Basrah, Iraq. The study assessed parameters that may affect the outcome of the patients, including age, sex, time and mode of injury, clinical state on admission, and management. Of the 60 patients, including age, sex, time and mode of injury, clinical state on admission, and management. Of the 60 patients, 22 died, 7 had some degree of disability, and 31 recovered fully. Significantly good results were obtained in younger age groups of either sex, in those received within the first 4 hours following injury, in those who sustained shell and gunshot wounds, and in those who experienced a fall from height, in those with Glasgow Coma Scale of 11-15, in those with depressed fracture with or without penetrating injury in comparison with basilar fracture, and in those with intracerebral hematoma in contrast with acute subdural hematoma. The most common cause of death was intracranial hematoma.

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351. Ashraf, M. F., et al. (2020). "Frequency of intracranial hemorrhages in medicolegal death cases: A cross sectional study." Pakistan Journal of Medical and Health Sciences 14(4): 949-951.

Aim: To examine the frequency of intracranial hemorrhages in medicolegal death cases. Study Design: Cross-sectional Place and duration of study: Department of Forensic Medicine & Toxicology and Department of Radiology, Khawaja Muhammad Safdar Medical College Sialkot from 1st January 2019 to 30th June 2020. Methodology: Total one hundred and ten patients were enrolled which include, dead bodies directly landing in dead house for postmortem or after death in wards for autopsy. Patient's complete demographics were recorded. Histopathology performed by tissue specimens of patients in which it is required. Blood sample was taken for alcohol and toxicological analysis. Cases were examined by using X-rays, CT Scans and MRI (where needed) complete autopsies were carried out. The decomposed bodies were excluded. Results: Mean age of patients was 33.18±16.68 with BMI

23.52±17.65. Intracranial lesions accounted for 12.68% of the total deaths. Mostly patients aged >23-35 were mainly affected by intracranial lesions. Percentage of traumatic (road traffic accidents) cases were greater than non-traumatic (cerebro-vascular accidents). Ratio of males was excess than that of females. Intracranial lesions separate were seen in 29(26.36%) patients. Subarachnoid hemorrhages were the commonest intracranial lesions. Pneumonia represents the commonest complication in delayed death. Conclusion: Intracranial cause of death was minimum in number but they showed majority of sharing injuries in other anatomical sites.

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352. Asimi, N., et al. (2013). "Penetrating vascular trauma resulting in bullet emboli: A case report, literature review, and recommendations." Chest 144(4).

INTRODUCTION: Although rare a bullet embolism following a penetrating vascular trauma requires a thorough investigation and timely diagnosis and management 1,2. Embolization of the heart is quite infrequent and usually involves the right heart and pulmonary vasculature 2. We present a unique case of a bullet migration from the carotid sinus to pulmonary vascular bed. CASE PRESENTATION: A 25 year-old male trauma patient with a gunshot wound to the left face of unknown gun at unknown range was brought in to our Trauma Center. Glasgow Coma Scale (GCS) on arrival was 3T. Computer tomography (CT) imaging was consistent with bullet fragment in the right superior aspect of the posterior fossa just under the tentorum. The patient was stabilized and right lateral ventricular external drain was placed. Follow up CT (4hours after the initial one) was significant for increased edema, phenumocephalus, and absence of previously noted bullet fragment. A new stable metallic density within the heart silhouette was noted on a portable chest x-ray (CXR) approximately 5 hours later. Follow up CT (done 3 hours later) was significant for a 5mm metallic foreign body within vascular bed of partially collapsed left lower lung field just posterior to the heart. Given the patient's critical and unstable neurological condition cardiothoracic surgery service recommended to continue broad spectrum antibiotics and to re-evaluate the bullet after patient stabilizes or in case the bullet dislodges or becomes symptomatic. Within 48 hours of admission, the patient was transferred to a highly specialized neurological center. At the time of transfer there were no complications associated with the bullet embolus. DISCUSSION: The diagnostic and therapeutic management of penetrating injuries of the great vessels, particularly involving projectile embolization, continue to be controversial 2, 3. The lack of experience and centralized body of evidence contributes to the difference in recommendation for diagnosis and management. CONCLUSIONS: Undoubtedly there is a need for evidence based guidelines to aid trauma surgeons in recognition, diagnosis and management of bullet emboli. Furthermore, establishing risk stratification and timetable of embolization would be of great value in treating penetrating vascular injuries with fragment migration.

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353. Asiminei, A. G., et al. (2010). "In vivo assessment of brain motion and deformation patterns by magnetic resonance imaging and its implication for cerebral contusion pathogenesis research." Brain injury 24(3): 253.

Objectives: Among all types of injuries worldwide, Brain Injury is the most likely to result in death or permanent disability. This indicates a critical need for more effective ways of understanding the mechanisms of TBI (traumatic Brain Injury) in order to prevent brain injuries. Previous studies indicate the relative brain-skull motion as a determinant factor in the occurrence of TBI, particularly for closed brain injuries without skull fractures. Although relative brain motion has been studied for decades, the patterns of relative brain motion with respect to the skull are not yet thoroughly understood. This study further investigates brain motion patterns in humans under quasistatic loading conditions using experimental Magnetic Resonance Imaging (MRI). Method: 15 human volunteers with different age were scanned in four different head positions (left lateral, right lateral, prone and supine) with a resolution of 1.1 pixels/mm and using a 3 Tesla MRI scanner. Image analysis and segmentation were performed using MimicsTM . Pair-wise comparison (prone vs. supine and left vs. right) of the obtained 3D models was performed for each volunteer by subjecting the skull models to a global registration

process and alignment using 3-maticTM . The whole brain motion, the regional brain motion patterns and the regions where brain deformation is dominant were analyzed using the Focus Inspection 4.8 software. Results: Head movement in the coronal plane determines a whole brain translation in the coronal plane with a slight rotation in the axial plane with maximum amplitudes between 2.01mm and 5.67mm. Head rotation in the sagittal plane leads to a whole brain rotation in the same plane with individual maximum amplitudes between 2.65mm and 12.02mm. These maximum amplitudes were seen at the inferolateral and medial cortex of the frontal and temporal lobes. For the lateral ventricles displacement, individual maximum values varied between 1.19mm and 3.44mm for lateral head movement and between 0.01mm and 6.38mm for prone-supine head movement. In general, higher displacement amplitudes were observed for the older volunteers. Beside head displacement, also brain deformation was observed, again being most pronounced for prone-supine head movement. Conclusions: The relative brain-skull movement is most pronounced at the orbital gyri, the lateral aspect of the frontal lobes and at the inferolateraland medial aspect of the temporal lobes. More important brain displacement and deformation occur in prone-supine head movement. The present study provides a possible etiology for the frontal and temporal lobes as being predilection sites for cerebral contusions. The results have also implications for the use of navigation in brain surgery, radiation therapy and for brain cine-MRI modalities.

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354. Aslan, S., et al. (2006). "Air guns: toys or weapons?" The American journal of forensic medicine and pathology 27(3): 260-262.

Air guns and blank guns may appear relatively harmless at first glance, but they are, in fact, potentially destructive, even lethal, weapons. Approximately 2 to 2.5 million nonpowder firearms are sold annually, and again approximately 12.9 per 100,000 population are treated for such injuries in hospital emergency departments each year in the United States. Unfortunately, these guns are considered to be a toy for children. Therefore, incidents of air gun injuries are gradually increasing. Although such injuries may initially be considered trivial, it may signify severe internal tissue pathologies. These apparently trivial injuries may have catastrophic consequences if unnoticed. In this study, we report 4 cases with head injury due to a shot by these guns. The cases indicate that these people had used the guns belonging to their parents for the purpose of suicide. The cases also show that these machines are not innocent.

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355. Assaf, A. A. (1985). "Traumatic retinal detachment." The Journal of trauma 25(11): 1085-1089.

Six hundred forty-three patients had retinal detachment surgery during 81/2 years; 17.6% were under the age of 30 years. Analysis of this group of patients showed that males were more commonly affected than females (68%). Trauma was the most frequent cause, reported in 40% of cases. Dialysis was the commonest retinal break, occurring in 51% of patients, and 73% of these occurred in the inferior temporal quadrant. In patients with a history of trauma, the type of the retinal break produced and operative success was related to the severity of ocular damage, with more successful outcomes in nontraumatic cases and fewer of these in cases of ocular perforation.

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356. Assiri, Z. A., et al. (2020). "Retrospective radiological evaluation to study the prevalence and pattern of maxillofacial fracture among Military personal at Prince Sultan Military Medical City [PSMMC], Riyadh: An institutional study." Saudi Dental Journal 32(5): 242-249.

Purpose: The aim of the present study was to analyze the prevalence, causes, and patterns of maxillofacial fractures retrospectively in patients who were treated at Prince Sultan Military Medical City, Riyadh, Saudi Arabia. Methods: Patients′ medical records were reviewed from 2005 to 2014. Patient′s age, gender, cause, and the pattern of maxillofacial fractures were studied. Associated body injuries were also recorded. Results: Out of 263 patients, 207 (78.7%) were male and 56 (21.3%) were female. The age range was from 3 to 67 yr with a mean age of 26.21 yr. Road traffic accidents 236

(89.8%) were the most commonly reported cause of maxillofacial fractures, followed by falls 14 (5.3%), assaults 4 (1.5%), gunshot 3 (1.1%), and sport accidents 2 (0.8%). Most of the cases of maxillary fracture were Le Fort II 27 (36.5%), followed by LeFort I 23 (31.1%), LeFort III 20 (27.0%) and palatal fractures 4 (5.4%). Of the mandibular fractures, parasymphysis fractures constituted 61 (27.4%), body 50 (22.4%), condyle 45 (20.2%), angle 40 (17.9%), symphysis 16 (7.2%), ramus 7 (3.1%) and coronoid 4 (1.8%). Zygomatic complex fractures 110 (94.8%) were the most commonly reported fractures in the mid and upper facial region. Other facial fractures included orbital floor 61 (97.0%), naso-orbito-ethmoidal 18 (19.8%), and frontal 12 (13.2%). Conclusion: Road traffic accidents were the most common cause of maxillofacial fractures. Spreading awareness among young drivers regarding road safety regulations is highly recommended.

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357. Astarci, P., et al. (2009). "Endovascular treatment of acute aortic isthmic rupture: concerning midterm results." Annals of vascular surgery 23(5): 634-638.

BACKGROUND: We evaluated midterm results of endovascular management of traumatic aortic isthmic ruptures., METHODS: Between 2001 and 2008, 10 patients (seven males, mean age 38 years) underwent endovascular treatment of an acute aortic rupture. Eight procedures were emergent, with four cases of hemodynamic instability with Glasgow scores of 3, 5, and 7. Associated traumas were severe brain, liver, and pelvic bone injuries. All procedures were performed with transoesophageal echocardiography monitoring. We used two AneuRx and nine Medtronic Talent or Valiant stent grafts., RESULTS: All patients survived their traumatic isthmic rupture. In nine patients, stent-graft deployment was successful. One patient experienced a distal migration needing a laparotomy and deployment of an additional new thoracic stent graft. The mean intensive care unit stay was 48 hr (range 24-168). The mean hospital stay was 11 days (range 8-43). All patients were controlled clinically and by contrast computed tomography (CT) according to the EUROSTAR protocol. There were no endoleaks, stent graft-related complications, or late deaths during a mean follow-up of 49 months. The control CT showed a lack of apposition of the proximal part of the stent graft at the inner curve of the aortic arch in three patients., CONCLUSION: The midterm results of endovascular treatment of acute traumatic aortic isthmic rupture are encouraging and compare favorably to the surgical approach. Late follow-up is required to exclude possible stent-graft complications, especially in young patients with angulated aortic arches.

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358. Atabey, C. and T. Ersoy (2012). "An unusual penetrating craniocerebral injury due to landmine explosion: a case report." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 18(2): 181-184.

Penetrating landmine injuries are the unavoidable consequences of military conflicts. They are potentially life-threatening. The mortality rates in the literature range from 23% to 92% and are considerably higher in patients admitted with poor neurologic state. Penetrating craniocerebral injuries require early surgical management designated to prevent infection and remove foreign objects, necrotic tissue and complicating blood clots, as well as to minimalize post-traumatic sequelae. We report herein an interesting case of penetrating intracerebral injury with giant shrapnel due to landmine in a 20-year-old young man.

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359. Atac, K., et al. (2004). "Foot drop due to cranial gunshot wound." Military medicine 169(7): 568-569.

OBJECTIVE: We present a case of foot drop from hemorrhagic contusion after cranial gunshot, which has never been reported., METHODS: A 21-year-old man was admitted with inability of dorsiflexion 1 day after a tangential gunshot wound of the scalp. The scalp skin was cut by the rifle bullet. He had foot drop and his neurological examination was normal except for weakness at dorsiflexion of the right foot. Pathological reflexes and sensation failure were not detected. T1- and T2-

weighted magnetic resonance images showed hyperintense contusion at the right superior frontal gyrus and mild subdural hemorrhage. Peripheral nervous system examination was electrophysiologically normal. Motor-evoked potentials showed the location of the lesion at the motor cortex because no electrical record was obtained from the right anterior tibial and extensor digitorum brevis muscles, and there was a normal record on the left. Six months later, the patient's neurological examination was uneventful., CONCLUSION: When a cranial gunshot wound injury victim presents with foot drop, the central causes should be included in the differential diagnosis list.

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360. Atalar, M. H., et al. (2007). "[Diffuse cerebrovascular air embolism on CT secondary to cardiopulmonary resuscitation]." Kardiyopulmoner resusitasyon sonrasi BT'de saptanan difuz serebrovaskuler hava embolizmi. 13(4): 319-321.

Air embolism is known to be a complicating factor in several clinical settings, including thoracic, cardiovascular and neurosurgical operations, central line placement, penetrating thoracic and cranial trauma and haemodialysis. Computed tomography (CT) is useful for showing cerebral air embolism. However, CT demonstration of massive air in all of the major cerebral arteries is extremely rare. In this report, we present a 45-year-old woman with cerebrovascular pneumoangiogram on postmortem CT examination after an unsuccessful posttraumatic cardiopulmonary resuscitation and discuss the possible mechanisms of pneumoangiogram.

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361. Atawneh, A. F. (1974). "Injuries of the common and internal carotid arteries." Journal of the Kuwait Medical Association 8(1): 41-48.

Indirect injuries to the carotid arteries without penetrating wounds in the neck are less well recognized than those with penetrating wounds. The vessels of the neck are vulnerable to traumatic injury because of their close proximity to the skin and lack of bony protection. The effects of carotid obstruction may be falsely attributed to direct injury to the brain. Intimal tear (leading to thrombosis) is the most frequently encountered lesion. This is due either to a direct blow to the artery or to severe stretching i.e., sudden stretching and rebound causing intimal trauma. The media also may be torn but not the adventitia. Most of these lesions are at or near the bifurcation; a striking number are between the bifurcation of the artery and the base of the skull. Half of the patients have bruises or abrasions to the skin of the neck. In the early cases the diagnosis was only made at autopsy.

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362. Atia, A., et al. (2021). "Distribution of wounding patterns in casualties from mass shooting events." Trauma (United Kingdom).

Introduction: The incidence and severity of public mass shootings, and mass casualty incidents (MCI), continues to rise. Understanding the wounding pattern and incidence of potentially preventable death after these incidents is key not only to Health System and Trauma Center emergency response planning but also to community outreach and initial emergency interventions. Methods: A retrospective study of autopsy reports after events with at least 10 fatalities exclusive of the assailants identified via the Federal Bureau of Investigation database from 1 January 1999 to 31 December 2020 was performed. Sites of injury, identification of weaponry, and identification of potentially survivable wounds were compiled. Results: Nine events including 203 victims were reviewed. Overall, 56% of gunshots were to the head/neck/face; 37% were to the chest; 43% were to the abdomen/torso/back; 31% were to the lower extremity; and 36% were to the upper extremity. On average, there were 29 fatalities per event. Conclusion: Emergency response disaster care strategy should focus on immediate point of care at the site of wounding by both the civilian population and medical personnel, as well as rapid extrication of victims for definitive medical care. Review of these autopsy results indicates exsanguination, often treatable, is the primary cause of death—supporting community education efforts in hemorrhage control. The location of the wounding patterns seen in this study warrants primary integration of

craniomaxillofacial, orthopedic trauma, neurotrauma, and surgical critical care/trauma surgical specialists into the initial response team for MCI.

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363. Atreya, A., et al. (2016). "Pressure cooker - A potential hazard in domestic setting." Kathmandu University Medical Journal 14(54): 181-183.

Pressure cooker is an integral part of Asian kitchen, and is frequently used in Nepal. Steam under pressure generated while cooking has high boiling point and great penetrating power. The use of pressure cooker in kitchen is associated with unintentional injuries that mostly include pressure cooker burns. In rare instances the pressure cooker may accidently explode and may cause serious injuries. The same mechanism is used in making explosive device for mass homicides. An unusual case of penetrating facial injury sustained in a pressure cooker explosion in a domestic setting is reported along with a brief review of literature on pressure cooker explosions.

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364. Atweh, N. A., et al. (1999). "Euthanasia in its active and passive forms has challenged our society." The Journal of trauma 46(2): 359.

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365. Atwood, R. E., et al. (2020). "Levetiracetam Is Safe and Effective for Post-Traumatic Seizure Prophylaxis for Combat-Related Traumatic Brain Injury: A Retrospective Cohort Study." Journal of the American College of Surgeons 231(4): S175.

Introduction: Post-traumatic seizure prophylaxis is recommended in patients with traumatic brain injury (TBI) at high risk for post-traumatic seizures, but there is no consensus on the optimal pharmacologic therapy. Levetiracetam is frequently used for seizure prophylaxis in combat-related TBI, but its efficacy and safety in this patient population have not yet been described. Methods: A retrospective cohort of 687 consecutive casualties (Caring for Combat Casualties Database) transferred to the continental US from October 2010 to December 2015 was analyzed; 71 patients with combat-related injuries and radiographic evidence of depressed skull fractures or intracranial hemorrhage were included. Data collection included demographics and injury characteristics including initial Glasgow Coma Score (GCS), CT findings, interventions, and 6-month Glasgow Outcome Score (GOS). Results: All patients in this cohort were male, with an average age of 25 (median 24; interquartile range [IQR] 4.5) and average Injury Severity Score (ISS) of 28 (median 27; 15). The most common mechanism of injury was explosive blasts (76%). Penetrating TBI was common (51%). Most patients (87%) received levetiracetam for seizure prophylaxis, with 2.8% receiving phenytoin. The remaining 13% were cleared by neurosurgery for no prophylaxis. Two patients developed seizures while on seizure prophylaxis (2.8%). Both of these patients suffered transcranial gunshot wounds and ultimately died. No serious adverse effects were attributed to levetiracetam. Conclusion: Levetiracetam appears to be a safe and effective medication for post-traumatic seizure prophylaxis in Caring for Combat Casualties patients. The rate of post-traumatic seizures in combat-related TBI on appropriate prophylaxis is low.

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366. Augustin, A., et al. (2021). "A case of an unusual penetrating brain injury." British Journal of Surgery 108(SUPPL 6): vi88.

Introduction: Penetrating brain injuries (PBI) are less common than closed head traumas. Interest in frontal lobe injuries dates back to 1848's famous Phineas Gage incident. Here, we report a case of a construction worker, who showed a remarkable neuropsychiatric outcome following a workplace accident. Case Presentation: 45year old gentleman came with complaint of a foreign body accidentally lodged in his forehead. He had no neurological deficits or CSF leak. X-ray revealed that a 5.5cm metallic screw was penetrating his skull, headfirst; CT revealed that approximately 3cm of the screw was in the frontal sinus. He was given antiepileptics and antibiotics prophylactically. Surgically the screw was removed by raising a bone flap and mobilizing the screw carefully by cutting the dura and

adequate irrigation, causing minimal damage to the brain parenchyma. The dural deficits were repaired and the frontal sinus was canalized, then a drain was placed, and the patient was shifted to ICU for postoperative monitoring. Discussion: It is important to prognosticate PBI as they can have neurological deficits that may be lifelong. Understanding the mechanism of injury, aggressive medical management and immediate surgical intervention may lead to improved outcomes. A foreign object of the size of 5.5cm, completely penetrating the skull would have otherwise resulted in extensive parenchymal damage. Literature suggests that no two people have an identical frontal sinus. In our patient the size the frontal sinus has served the purpose of protection against PBI and has resulted in minimal parenchymal injury (of only about 1cm).

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367. Auh, Y. H., et al. (1980). "The excessively small ventricle on cranial computed tomography: clinical correlation in 75 patients." The Journal of computed tomography 4(4): 325-329.

Excessively small ventricle (ESV) was demonstrated in 75 (8.3%) of 9,000 patients over 15 years of age examined by cranial computed tomography (CT). The patients had no other CT abnormality except for ESV. Detailed retrospective analysis of clinical records of these 75 patients revealed four major groups of patients: 1) those with seizures (24%); 2) those with headaches (24%); 3) those with acute non-penetrating head trauma (21.5%); and 4) those with benign increased intracranial pressure (8%). The remaining patients (22.5%) had a variety of cerebral derangements.

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368. Aulino, J. M., et al. (2005). "Temporal lobe intraparenchymal retained foreign body from remote orbital trauma." AJNR. American journal of neuroradiology 26(7): 1855-1857.

We present the case of a 35-year-old man with a new onset of seizure disorder who was found to harbor an intraparenchymal retained foreign body related to remote orbital trauma. Imaging revealed a rim-enhancing anterior medial temporal lobe mass. Histologic evaluation of the resected mass showed evidence of acute and chronic inflammation with associated foreign material. The patient described a "bar fight" 16 years previously in which he received a blow to the orbit with a pool cue stick. The diagnosis of a foreign body reaction should be considered when an intraparenchymal mass is identified in this location.

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369. Aurangzeb, A., et al. (2011). "Predisposing factors, clinical presentation and outcome of repeated aspiration in cerebral abscess through a drainage tube in situ." Journal of Ayub Medical College, Abbottabad : JAMC 23(4): 58-60.

BACKGROUND: Cerebral abscess is a serious and life threatening complication of several diseases. Aspiration of the abscess cavity versus excision of capsule are still in debate for the capsulated, large, superficially located abscesses especially in patients with poor surgical fitness. The objective of this study was to look for the clinical presentation and outcome of patients with repeated aspiration in cerebral abscess through a drainage tube in situ., METHODS: This prospective study was conducted in Department of Neurosurgery, Ayub Medical College, Abbottabad from Jan 2010 to Jun 2011. Twenty-three patients with age ranges 6-21 years who had large, solitary, capsulated, superficially located abscesses, were included in this study. These patients had poor American Society of Anaesthesiologists (ASA) grading (grade III and IV). After thorough clinical examination and workup, patients were subjected to operative procedure. The procedure included placement of 8 size nasogastric tube in the abscess cavity through a single burr hole. Under strict aseptic conditions, repeated aspiration of pus was done through the drain daily for 2-4 days consecutively at intervals of 24 hours. The demographic data. predisposing factors, clinical presentation, and outcome of patients with repeated aspiration through drain placed in abscess cavity were recorded. Postoperatively, gadolinium enhanced CT-scan was done twice in the first month at the span of two weeks each, later on monthly for next 3 months. The CT-scans were reviewed for recurrence or any other possible intracranial complications. Patients were followed for duration of 3 to 6 months., RESULTS: The predisposing factors found were congenital

heart disease in 7 (30.4%) patients, spread of contagious infections like mastoiditis/Chronic suppurative ottitis media in 5 (21.7%) patients, sinusitis in 2 (8.6%) patients, meningitis in 5 (21.7%) patients, septicemia in 3 (13.7%) patients, and penetrating cranial injury in 1 (4.34%) patients. In 16 (69.5%) patients presenting complaints were headache and vomiting, altered sensorium in 8 (34.7%) patients, hemiparesis in 9 (39.1) patients, aphasia in 3 (13.1%) patients, papillodema in 2 (8.7%) patients, and seizures in 1 (4.34%) patients. The abscess resolved in 19 (82%) of patients, recurrence occurred in 2 (8.7%) of patients, and death occurred in 2 (8.7%)., CONCLUSION: Cerebral abscess is a life threatening condition requiring aggressive management measures. Aspiration of cerebral abscess with repeated aspiration through a drainage tube is a life saving in patients with poor ASA grade with low recurrence of abscess formation and low mortality.

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370. Ausman, J. I. (2002). "In this issue." Surgical neurology 58(3-4): 161-162.

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371. Austin, A. E., et al. (2013). "Multiple injuries in suicide simulating homicide: report of three cases." Journal of forensic and legal medicine 20(6): 601-604.

Multiple inflicted injuries in traumatic deaths usually indicate homicide. Three cases are reported where homicide was initially suspected due to findings at the death scene and the apparent nature of the injuries however, after investigation, involvement of any other individuals in the deaths could be excluded. Case 1: A 52-year-old male was found with multiple stab wounds. At autopsy, 36 stab wounds were identified, the majority of which were superficial. Only two stab wounds had penetrated deeply. Case 2: A 19-year-old female was found with three gunshot entry wounds to the right temple and a .22 calibre automatic rifle resting across her lap. Case 3: A 47-year-old female was found with numerous haematomas and three deep head wounds in keeping with trauma from impact with a blunt object. A high level of clozapine was detected on toxicological analysis of blood and a history of schizophrenia was reported. Although multiple self-inflicted wounds are most often caused by sharp objects such as knives, on occasion multiple gunshot wounds and rarely, blunt trauma may also be encountered. Careful integration of scene and autopsy findings may be required to avoid misinterpretation of the circumstances and manner of death.

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372. Austin, A. E., et al. (2012). "Head impalement - An unusual form of suicide." Journal of forensic and legal medicine 19(5): 264-266.

An 80-year-old man with pancreatic adenocarcinoma and depression was found with his head impaled on a bolt that had been screwed into a hole that had been drilled in the floor of a shed at his home address. Once the bolt was in place the decedent had winched a heavy weight above it, using a pulley that he had attached to the metal roof frame, and the front fork of a bicycle frame. The latter had been bolted to a nearby work bench as a winching device. After the weight had been positioned, he had placed his head over the bolt and cut the rope with a kitchen knife. The impact of the falling weight had forced his head onto the bolt with penetration of the cranial cavity. The complexity of the design of the suicide apparatus is exceedingly rare in our experience and the time taken to set up the device indicated that there had been a considerable degree of premeditation. The finding of complex apparatus at a death scene may provide useful information in ascertaining the manner of death and also in providing some indication as to the decedent's level of determination to succeed.

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373. Austin, A. E., et al. (2012). "Recent firing range suicides in South Australia." Journal of forensic sciences 57(6): 1495-1496.

Two cases are reported from South Australia, where deaths occurred that were due to single self-inflicted gunshot wounds to the head in individuals who were visiting indoor firearm ranges. Case 1: A 54-year-old man visiting an indoor firing range placed a .357 magnum handgun to his head and fired one shot. Case 2: A 23-year-old woman who was being instructed in firearm usage at an indoor firing range placed a 9 mm handgun to her head and fired one shot. In both cases, deaths were due to cerebral laceration with skull fracture. Firing ranges may be utilized by individuals who are seeking weapons for suicide attempts, and suicide may be successfully undertaken at such locations even while a victim is under direct supervision. In jurisdictions, where firearm ownership is strictly legislated, it may be that clubs can inadvertently provide access to firearms for this type of activity.

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374. Autelitano, L., et al. (2008). "Ossification of vascular pedicle in fibular free flaps: a report of four cases." International journal of oral and maxillofacial surgery 37(7): 669-671.

The fibular free flap is the most widely used flap for jaw reconstruction. Flap contouring requires removal of bone excess in the proximal segment by a subperiosteal dissection, preserving vascular connections between the pedicle and the bone and leaving well vascularized periosteum attached to the vascular pedicle. Among about 100 reconstructions with fibular flaps, 4 cases were observed of abnormal ossification along the vascular pedicle. Periosteum preserves its osteogenic capability after transposition, especially in a revascularized flap; this characteristic, together with the direct contact with the bone, allows the possibility of new bone formation along the pedicle. It would appear necessary to change the technique of reducing fibular excess, with removal of periosteum together with the bone, in order to avoid the complication described.

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375. Avecillas-Chasin, J. M., et al. (2014). "Surgical management of chronic traumatic pseudomeningocele of the craniocervical junction: case report." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery 30(6): 1125-1128.

PURPOSE: Chronic traumatic pseudomeningocele (PM) is a rare complication of gunshot injuries of the craniocervical junction in pediatric patients. Impairment of the CSF dynamics may cause severe symptoms and should be treated., METHODS: We report the case of a 6-year-old girl who was accidentally shot in the neck during tribal clashes. On being admitted, she was neurologically intact with cerebrospinal fluid (CSF) leakage through the wounds. She underwent primary closure of the wounds in a rural medical facility. After two episodes of meningitis, CSF leakage resolved spontaneously. Nine months later, the patient was presented with a disfiguring mass growing in the posterior neck, severe headaches, and constitutional symptoms such as loss of appetite and a failure to thrive., RESULTS: Neurosurgical intervention was performed with the patient in the prone position. Occipital pericranium graft was used to repair the defect, and the cavity of the PM was obliterated with muscle layers. The patient's symptoms improved at 1 year follow-up without PM recurrence., CONCLUSION: This is a rare presentation of gunshot injuries in an environment with limited neurosurgical resources. Restoring the normal pattern of CSF circulation should be the aim of any neurosurgical intervention.

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376. Avery, N. C. and T. Cheak (1998). "Treatment of cranial vault fractures: recent trends toward a more conservative approach." The Journal of cranio-maxillofacial trauma 4(3): 42-48.

A number of aspects in historical teaching regarding the indications for operative treatment of fractures of the cranial vault have been recently challenged. Several contemporary studies have reported excellent results by employing a more conservative approach regarding the treatment of displaced fractures of the skull. Improvements in the diagnosis of injuries by computerized tomography (CT) scanning, antibiotic therapy, and the ability to rapidly transfer patients to neurosurgical care have allowed neurosurgeons to treat many of these injuries outside the operating room with local irrigation, debridement, and simple closure of the wound. Cosmetic deformities of the skull are one of the few

absolute indications for surgical therapy. This article reviews the recent literature regarding skull fractures of the cranial vault and discusses the indications for surgical therapy in these patients and cases where a more conservative approach may be utilized.

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377. Aveta, A. and P. Casati (2008). "Soft tissue injuries of the face: early aesthetic reconstruction in polytrauma patients." Annali italiani di chirurgia 79(6): 415-417.

Facial injuries are often accompanied by soft tissue injuries. The complexity of these injuries is represented by the potential for loss of relationships between the functional and the aesthetic subunits of the head. Most reviews of craniofacial trauma have concentrated on fractures. With this article, we want to emphasize the importance of early aesthetic reconstruction of the face in polytrauma patients. We present 13 patients with soft tissue injuries of the face, treated in our emergency department in the 'day one surgery", without "second look"procedures. The final result always restored a sense of normalcy to the face. The face is the first most visible part of the human anatomy, so, in emergency, surgeons must pay special attention also to the reconstruction of the face, in polytrauma patients.

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378. Avila, R., et al. (2017). "Acute kidney injury in critical trauma patients: Incidence and clinical outcomes." Intensive Care Medicine Experimental 5(2).

INTRODUCTION. Many factors are involved in the prognosis of trauma patients. Acute kidney injury (AKI) is one of the most threatening complications because of its high association with bad outcomes, increasing morbid mortality, length of stay in ICU (LOS) and higher treatment costs.These patients are exposed to multiple injuries such as shock, rhabdomyolysis, abdominal hypertension and administration of IV contrast, which make them vulnerable to developing AKI. In this study we describe the incidence and outcomes of patients with trauma related AKI who were managed in the Trauma Intensive Care Unit. OBJECTIVES. To identify the incidence and outcomes of patients with trauma related acute kidney injury (AKI), as defined by KDIGO criteria, at a single level I trauma center in Santa Fe, Argentina. METHODS. We performed a retrospective study of 611 trauma patients admitted to the Hospital Cullen intensive care unit from January 2014 to January 2016. The trauma unit database (Hardinero Q) was used to retrieve patient data for this analysis. We collected patient demographics: age, sex and injury severity score (ISS). We conducted multivariable logistic regression to identity independent predictors for AKI and mortality. In the mortality prediction model we evaluated the following risk factors: age, mechanism of injury (blunt vs. penetrating) or traumatic brain injury (TBI), BMI, hematocrit on admission and AKI. RESULTS. The overall incidence of AKI was 19.5% (n = 119), ICU LOS in non AKI 14 days vs 21 days in AKI. Mean ISS was 23 and mean age was 37 (SD 15.2) in the AKI group. Overall mortality in the AKI group was 71% (n = 85) but was significantly lower in the non AKI group (71% versus 27% P < 0.00001). AKI was an independent predictor of mortality (OR 11,6 95% CI 4.51-29.82). Hematocrit on admission was an independent risk factor for AKI. Forty-one patients (36%) required renal replacement therapy. CONCLUSIONS. Our findings are similar to other studies where AKI in trauma patients was an independent risk factor for mortality and LOS ICU. Renal replacement therapy treatment is high in this group and represents a significant health care cost burden.

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379. Avlonitis, V. S., et al. (2003). "Pulmonary transplantation: the role of brain death in donor lung injury." Transplantation 75(12): 1928-1933.

The paucity of suitable lung donors and the high early mortality as the result of primary graft failure remain major challenges in pulmonary transplantation. There is evidence that the lung is injured in the donor by the process of brain death and often is made unusable or fails posttransplantation after amplification of the injury by the process of ischemia-reperfusion. An understanding of the mechanism of donor lung injury could lead to the development of new treatment strategies for the donor to reduce lung injury, increase the number of donors with acceptable lungs, and improve the results of transplantation. The pathophysiology of brain death is complex and involves sympathetic,

hemodynamic, and inflammatory mechanisms that can injure the lung. The literature is reviewed, and these mechanisms are discussed together with their possible interrelations.

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380. Avrahami, E., et al. (1986). "Computerized tomographic demonstration of intraorbital bone fragments caused by penetrating trauma." Ophthalmic surgery 17(1): 41-43.

Three patients with fragments of bones lodged in the orbit from apparently non-penetrating trauma, associated with cranio-cerebral injury, are reported. In all three cases the initial symptoms and signs of intraorbital or retrobulbar injury were minimal. The bone fragments were not demonstrable on plain x-ray films of the skull but were clearly shown on computerized tomographic (CT) scans of the orbit. They could easily have been overlooked had reliance been placed on plain x-ray films alone. In patients with suspected non-penetrating orbital trauma, axial and coronal CT views of the orbit are recommended.

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381. Awad, A. H., et al. (2000). "Recognized globe perforation during strabismus surgery: incidence, risk factors, and sequelae." Journal of AAPOS : the official publication of the American Association for Pediatric Ophthalmology and Strabismus 4(3): 150-153.

BACKGROUND: Inadvertent perforation of the globe is a well-recognized complication of extraocular muscle surgery. We evaluated the incidence, risk factors, and sequelae of this complication at our institution., METHODS: Medical records of patients who underwent extraocular muscle surgery at King Khaled Eye Specialist Hospital, Saudi Arabia, between September 1983 and April 1997, were reviewed for the occurrence of globe perforation. We documented preoperative visual acuity and refraction, surgical procedure, how the perforation occurred, and immediate management, as well as the sequelae of the perforation, its management, and final outcome., RESULTS: Recognized perforations occurred in 15 of 4886 procedures, for an overall incidence rate of 3/1000. Perforations were 3 times more common in myopic eyes (>-6.00 D, P =.05) and 2 times more common in eyes with previous extraocular muscle surgery. Perforations occurred during muscle reattachment (5 cases), placement of traction sutures at the limbus (4 cases with transient hyphema), muscle disinsertion (3 cases), and placement of sutures at the muscle insertion before disinsertion (3 cases). One patient had a large scleral laceration with uveal prolapse, necessitating scleral patch graft at the time of surgery, and later had retinal detachment surgery with loss of 2 lines of visual acuity. Endophthalmitis, cataract, glaucoma, and phthisis bulbi were not encountered in our review., CONCLUSION: The current incidence of globe perforation is low and only rarely associated with serious sequelae.

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382. Awadalkreem, F., et al. (2020). "Prosthetic rehabilitation of maxillary and mandibular gunshot defects with fixed basal implant-supported prostheses: A 5-year follow-up case report." International journal of surgery case reports 68: 27-31.

Introduction: Gunshot injuries to the oral maxillofacial region have serious aesthetic and functional consequences. Presentation of case: A 32-year-old male patient presented with a marginal mandibular resection owing to a gunshot wound. A clinical examination revealed destroyed crowns in teeth 12, 11, and 21; extraction in teeth 13, 22, 24, 31, 32-45; a fracture in tooth 38; and severe pain. Further, he had multiple submental scars and a completely obliterated sulcus. Consequently, a multidisciplinary team was formed who devised the following treatment plan: stage 1, root canal treatment for the maxillary anterior teeth, followed by crown construction and transitional mandibular removable partial denture construction, and stage 2, placement of immediately loaded basal implant definitive prostheses supported by 6 corticobasal screw implants. After 5 years of use, the patient presented with excellent peri-implant soft tissue health, prosthesis stability, and great improvements in aesthetics and function. The patient was highly satisfied with the treatment and restoration of his quality of life. Discussion: Accurate treatment planning is vital for managing complicated cases, including gunshot defect cases, and should involve the selection of the most suitable reconstructive technique with

lower susceptible complication rates and high success rates. The described treatment eliminates the need for bone grafting, reduces treatment duration, and involves fixed prosthesis placement. Conclusion: To our knowledge, this is the first report on basal implant-based full-mouth rehabilitation in a gunshot mandibular defect patient. The fixed hybrid basal implant-supported prosthesis produced highly acceptable aesthetic and phonetic results and greatly improved the patient's life.

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383. Awasthi, D., et al. (1991). "Coagulation changes after an experimental missile wound to the brain in the cat." Surgical neurology 36(6): 441-446.

Platelet studies (total number and platelet aggregation) and coagulation assays (fibrinogen, factor VIII, and anti-thrombin III) were performed on systemic arterial blood of four control and four experimental adult cats that sustained a penetrating missile injury to the brain. Among the brain-wounded, a significant decrease in the total number of platelets and aggregates occurred 120 minutes after injury. Fibrinogen levels decreased significantly in the brain-wounded animals by 240 minutes after injury and continued declining until the end of the 6-hour experiment. No significant changes occurred in factor VIII and antithrombin III levels in wounded as compared with control animals. These results indicate that blood coagulation factors are altered following a missile wound to the brain. These alterations may, occasionally, lead to clinically manifested bleeding disorders, specifically disseminated intravascular coagulation. Thus, early analysis and control of the coagulation system in the brain-wounded patient should be considered to prevent and treat bleeding disorders in the setting of penetrating head injury.

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384. Awori, J., et al. (2017). "Penetrating Head Injury by a Nail Gun: Case Report, Review of the Literature, and Management Considerations." Journal of stroke and cerebrovascular diseases : the official journal of National Stroke Association 26(8): e143-e149.

Our objective is to discuss penetrating head injuries (PHIs) which, although rare, lead to considerable morbidity and mortality. One of the most significant culprits of PHI is the nail gun, which was introduced in 1959 and has gained substantial popularity. We describe our successful strategy for removing an 8-cm nail that penetrated through the orbit and middle cranial fossa, with the tip lodged within the posterior fossa. Vascular imaging and balloon test occlusion are imperative in circumstances where vessel sacrifice is necessary. In addition, positioning of balloons within large vessels that are in close proximity to the penetrating object is necessary to control bleeding that may occur during removal of the object. It is of paramount importance to have a multidisciplinary team participating in the management and eventual removal of foreign objects within the intracranial compartment. Included is a review of the literature and a discussion on management approaches to such injuries.

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385. Awwad, R. J., et al. (2006). "Endoscopic transnasal approach for retrieval of foreign bodies from the pterygomaxillary fossa." American journal of otolaryngology 27(6): 440-442.

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386. Aycart, M. A., et al. (2016). "A Retrospective Analysis of Secondary Revisions after Face Transplantation: Assessment of Outcomes, Safety, and Feasibility." Plastic and reconstructive surgery 138(4): 690e-701e.

BACKGROUND: Face transplantation has emerged as a viable option for certain patients in the treatment of devastating facial injuries. However, as with autologous free tissue transfer, the need for secondary revisions in face transplantation also exists. The authors' group has quantified the number of revision operations in their cohort and has assessed the rationale, safety, and outcomes of posttransplantation revisions., METHODS: A retrospective analysis of prospectively collected data of the authors' seven face transplants was performed from April of 2009 to July of 2015. The patients'

medical records, preoperative facial defects, and all operative reports (index and secondary revisions) were critically reviewed., RESULTS: The average number of revision procedures was 2.6 per patient (range, zero to five procedures). The median time interval from face transplantation to revision surgery was 5 months (range, 1 to 10 months). Most interventions consisted of debulking of the allograft, superficial musculoaponeurotic system plication and suspension, and local tissue rearrangement. There were no major infections, allograft skin flap loss, or necrosis. One patient suffered a postoperative complication after autologous fat grafting in the form of acute rejection that resolved with pulse steroids., CONCLUSIONS: Secondary revisions after face transplantation are necessary components of care, as they are after most conventional free tissue transfers. Secondary revisions after face transplantation at the authors' institution have addressed both aesthetic and functional reconstructive needs, and these procedures have proven to be safe in the context of maintenance immunosuppression. Patient and procedure selection along with timing are essential to ensure patient safety, optimal function, and aesthetic outcomes., CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, V.

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387. Aydin, S. (2019). "Intracranial Penetrating Trauma Caused by Fishing Sinker." World neurosurgery 129: 237-240.

BACKGROUND: Intracranial penetrating traumas (IPTs) are rarely encountered in neurosurgery practice. Here, we report the case of a patient with orbital and cranial trauma caused by an unexpected object., CASE DESCRIPTION: A 37-year-old male presenting with a right orbital penetrating injury was referred to our emergency department. Neurologic examination of the patient revealed right periorbital ecchymosis, a dilated and fixed right pupil, and right hemiparesis. Cranial computed tomography showed fractures of the right orbital medial wall and the anterior skull base, as well as bifrontal and left parietal intracerebral hemorrhage accompanied by a metallic foreign body artifact. Emergency left frontoparietal decompressive craniectomy was performed, and the foreign body, identified as a fishing sinker, was removed. No additional postoperative complications were observed, and cranioplasty was performed 6 months postoperatively., CONCLUSIONS: IPTs have high morbidity and mortality rates. Early surgical intervention is often the first treatment option. Intracranial injury caused by a fishing sinker is an extremely rare low-energy intracranial penetrating trauma, and in the literature, this is the first reported case in which the patient survived.

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388. Aydin, S., et al. (2010). "The association of mobile medical team involvement on on-scene times and mortality in trauma patients." The Journal of trauma 69(3): 589-594.

OBJECTIVES: Mobile medical teams (MMTs) provide specialized care on-scene with the purpose to improve outcome. However, this additional care could prolong the on-scene time (OST), which is related to mortality. The purpose of this study was to assess the effects of MMT involvement on the mortality rate and on the OST, in a Dutch consecutive cohort of Level I trauma patients., METHODS: All patients who required presentation in the trauma resuscitation room in an urban Level I trauma center were included in this prospective study during the period of November 2005 till November 2007. For data collection, we used both pre- and in-hospital registration systems. Outcome measures were 30-day mortality and OST., RESULTS: In total, 1,054 patients were analyzed. In 172 (16%) patients, the MMT was involved. Mortality was significantly higher in the MMT group compared with patients treated without MMT involvement; 9.9% versus 2.7%, respectively ($p < 0.001$). Significantly higher Injury Severity Scores, intervention rates, and a significantly lower Triage Revised Trauma Score were found in patients treated by MMT. After adjustment for patient and injury characteristics, no association could be found between MMT involvement and higher mortality (95% CI, 0.581-3.979; $p = 0.394$). In patients with severe traumatic brain injury (GCS score <= 8) in whom a MMT was involved, the mortality was 25.5%, compared with 32.7% in those without MMT involvement ($p = 0.442$). The mean OST was prolonged (2.7 minutes) when MMT was involved (26.1 vs. 23.4 minutes; $p = 0.003$)., CONCLUSIONS: In this study, OSTs were long compared with PHTLS

recommendations. MMT involvement slightly prolonged the OST. Trauma patients with MMT involvement had a high mortality, but after correction for patient and injury characteristics, the mortality rate did not significantly differ from patients without MMT involvement.

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389. Ayertey, H. D., et al. (2001). "[Stab injury of the orbit]." Pfahlungsverletzung der Orbita. 98(9): 906-907.

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390. Ayoub, A. F. and J. Rowson (2003). "Comparative assessment of two methods used for interdental immobilization." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery 31(3): 159-161.

AIM: This investigation was carried out to compare Dimac wires with arch bars for interdental immobilization., MATERIAL AND METHODS: The assessment was conducted on 50 patients who had mandibular fractures and in whom intermaxillary fixation was required as a part of the treatment. The time required for applying each method of fixation, the needle-stick injuries that occurred during their application, and the periodontal damage that followed interdental immobilization was investigated., RESULTS: The mean time required for the application of Dimac wires was significantly less than that required for arch bars. The needle-stick injuries were significantly less with Dimac wires. Patients reported difficulty with oral hygiene with arch bars in place. This was associated with periodontal damage following removal of fixation., CONCLUSION: Dimac wires is safer to use and less traumatic to the periodontium

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391. Azad, T. D. (2021). "Opinion & Special Articles: Shared Decision-Making During the COVID-19 Pandemic: Three Bullets in 3 Hemispheres." Neurology 96(20): e2558-e2560.

Patients with traumatic brain injury may be dependent on the decision-making of their families. Restrictive visitation policies implemented during the coronavirus disease 2019 (COVID-19) pandemic disproportionately affect these patients and their families. This narrative aims to illustrate this phenomenon and catalyze discussions regarding the need for careful evaluation of restrictive family visitation policies and exceptions that may be required for patients with brain injuries.

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392. Azarpira, N., et al. (2013). "Penetrating knife injury to the temporal lobe: A case report." Neurosurgery Quarterly 23(1): 64-65.

We present the case of a traumatic brain and artery injury with complete occlusion of this vessel in a 28-year-old man due to a penetrating stab wound to the brain. His initial Glasgow Coma Score was 14/15. The initial computed tomography scan showed that the knife had passed through the medial part of the left temporal lobe with midline shift. He was managed aggressively with surgery and made an excellent recovery. The cerebral angiography performed after 2 months revealed dissection of the internal carotid. In this report, we emphasize on performing an angiogram to exclude intracranial vascular lesion in similar situations.

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393. Azevedo, B. E. C. D., et al. (2022). "Prognosis in Traumatic Brain Injury." Brazilian Neurosurgery 41(2): E108-E136.

Objective To characterize the profile of TBI victims who required neurosurgical approach in two reference hospitals in the metropolitan area of Florianópolis, state of Santa Catarina, Brazil, and to identify the prognostic increase in the Pupil Reactivity Score when subtracted from the Glasgow Coma Score, found in the Glasgow-P. Additionally, to present demographic, etiological, clinical, and tomographic data, and associate them with the outcome of death. Methods Medical record data and

computed tomography (CT) scans of patients with TBI undergoing neurosurgical procedures from January 2014 to April 2019, at 2 reference hospitals in the metropolitan area of Florianópolis, state of Santa Catarina, Brazil - Hospital Regional de São José Dr. Homero de Miranda Gomes (HRSJ-HMG, in the Portuguese acronym) and Hospital Governador Celso Ramos (HGCR, in the Portuguese acronym). Results The results of the 318 cases studied indicated that the male gender predominated (87.7%). The most affected age group was between 35 and 65 years old (47.5%). The main cause was motorcycle accidents (26.1%), followed by a fall from a height (16.4%). Most patients required admission to the intensive care unit (ICU) (85.8%), with an average duration of 13 days. The average total hospital stay was 28 days. Most cases needed external ventricular drain (EVD) (64.8%). The predominant tomographic classification was Marshall II (43.4%), followed by Marshall IV (26.1%). Most patients presented with extra-axial hematoma (64.2%), with subdural hematoma (SDH) being the most frequent (45%). Most patients presented with sequelae at hospital discharge (43.4%). Conclusion There was no clinically relevant increase between the Glasgow and Glasgow-P scores for the tested outcomes (need for decompressive craniectomy, midline shift, presence of basal cisterns obliteration, need for ICU admission, and death).

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394. Azevedo-Filho, H., et al. (2010). "Prognostic factors in civilian gunshot wounds to the head: A serie of 110 cases." Brain injury 24(3): 280.

Objectives: Despite advances in neurosurgery, the surgical management of civilian gunshot wounds to the head (GWH) has remained a controversial issue, especially concerning the prognostic factors regarding outcome. This study was carried out to focus on the prognostic factors affecting the outcome until discharge. Method: 110 patients with GWH were studied between January 2002 and March 2005 in Recife, Brazil. Results: The most prevalent type of wound was the penetrating injury (74.5%). Twelve out 110 (10.9%) patients presented a dilated pupil. Motor impairment was present in 24/110 (21.8%) patients. Intraaxial hematoma was present in 36/110 (32.7%) patients. There were 15/110 cases (13%) of CSF fistulae. Eleven patients developed meningitis and in nine cases intracranial abscess occurred. Nine cases presented venous thrombosis, 11 urinary infection and 8 coagulopathy. Following the surgical procedure, 27/110 (24.5%) patients died during their hospital stay. Univariate analysis identified five preoperative predictors of poor outcome following GW H surgery: age over 40 years (OR 5.4, 95% CI 1.73-16.82); presence of unilateral pupil dilatation (OR 5.5, 95% CI 1.641-18.13); low (≤8) GCS on admission (OR 6.50, 95% CI 2.27-18.60) or GCS<15 (OR 10.7, 95% CI 1.70-65.76), presence of intracranial hematoma (OR 2.69, 95% CI 1.11- 6.57), and respiratory infection (OR 4.8, 95% CI 1.75-13.47). Conclusions: When the two groups - survivors and nonsurvivors - were compared, there were significant statistical differences with respect to the age of the patient, GCS on admission, pupil size, presence of intracranial hematoma, CSF fistula and respiratory distress/pneumonia.

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395. Aziz, H., et al. (2013). "Prothrombin complex concentrate effectively treats coagulopathy in patients with lethal brain injuries and increases organ donation." Journal of Surgical Research 179(2).

Introduction: Coagulopathy is a defined barrier for organ donation in patients with lethal traumatic brain injuries. There are many ways to treat coagulopathy, but the effectiveness of Prothrombin Complex Concentrate (PCC) in the reversal of coagulopathy to facilitate organ donation is not well described. The purpose of this study was to document our experience with the use of Prothrombin Complex Concentrate (PCC) to facilitate organ donation in patients with lethal traumatic brain injuries. Methods: We performed a 4 year (2008-2011) retrospective analysis of all patients with devastating gunshot wounds to the head. The data was analyzed for demographics, parameters for coagulopathy, change in International Normalized ratio (INR), and subsequent organ donation. Coagulopathy was defined as INR >1.5. Primary endpoint of the study was organ donation. Results: 88 patients with lethal traumatic brain injury were identified from the trauma registry of which13 were coagulopathic at the time of admission (Mean INR of 2.3 +0.8). Ten patients (10/13) received PCC for

reversal of coagulopathy. Mean INR before PCC administration was 2.06+0.37 and 1.36 +0.42 after administration (p-<0.006). Correction of coagulopathy was attained in 70 % (7/10) patients. Of these 7 patients; consent for donation was obtained in 6 patients and resulted in 19 solid organs being procured. The cost of PCC per patient averaged $1,022 ±$544. Conclusions: PCC effectively reveres coagulopathy associated with lethal traumatic brain injury and enabled patients to proceed to organ donation. Though various methodologies exist for the treatment of coagulopathy to facilitate organ donation; PCC provides for a cost effective therapy for reversal of coagulopathy in patients with lethal traumatic brain injuries. (Table Presented).

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396. Azzi, A. J., et al. (2019). "Transcranial Blade Injuries and Principles of Their Safe Extraction." The Journal of craniofacial surgery 30(3): e228-e231.

Retained cranial blade injuries are uncommon events lacking standardized recommendations for appropriate surgical extraction. The authors present a case of a 30-year-old male who sustained a penetrating blade injury of the left orbit with intracranial extension through the skull base into the temporal lobe. The patient walked to the emergency room and remained alert. Clinically, the patient had only a small laceration of the left upper eyelid with no gross visual impairment. The radiological investigation confirmed the presence of a knife blade in the orbit. Intraoperative management included an intracranial approach and an extracranial craniofacial dissection for blade visualization and soft tissue protection, globe protection and to avoid any major bleeding. A thorough review of the penetrating cranial injuries literature is presented and a trauma management algorithm is offered for the care of similar injuries.

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397. Baba, M., et al. (1982). "[Penetrating transorbital intracranial foreign body]." No shinkei geka. Neurological surgery 10(8): 869-874.

About a month prior to admission to our hospital, a 25-year-old man had a quarrel with his friend and was stabbed in his left eye with a cracked bottle of beer. He underwent emergency operation for the injured left eye. Subsequently he was admitted to an ophthalmological ward in our hospital for plastic surgery of an artificial eye. An intracranial foreign body was pointed out, and he was soon transferred to our neurosurgical ward. Plain x-ray films and tomograms of the skull and CT scan showed a foreign body at medial portion of the left superior orbital fissure. Carotid angiography revealed no significant implication of the cerebral vessels. As there was a strong suspicion of cerebral contusion or liquorrhea, a pterional craniotomy was so designed as to do removal of thie foreign body and repair of the dura mater in one stage. The post-operative couse was uneventful without liquorrhea or miningitis. It was emphasized that pterional approach used by Hamby (1970) for surgery of malignant exophthalmos was useful and felicitious in this case. It was additionally reported that cerebrospinal orbitorrhea observed in this case was rare and it might be the third case in the literature.

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398. Bababeygy, S. R. and A. A. Sadun (2013). "Bilateral oedipism." Ophthalmic plastic and reconstructive surgery 29(1): e11-12.

A 20-year-old woman presented with self-inflicted pencil wounds to her bilateral orbits. CT angiography revealed penetration of pencils through optic canals into temporal lobes. Examination revealed bilateral no light perception, fixed dilated pupils, complete ptosis, and complete ophthalmoplegia. The patient was admitted to the psychiatric ward and her vision and cranial nerve deficits did not improve.

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399. Babakhanian, R. V., et al. (1994). "[The possibility of inflicting injuries by shots from a gas weapon at close range]." O vozmozhnosti prichineniia povrezhdenii pri vystrelakh iz gazovogo oruzhiia s blozkogo rasstoianiia. 37(4): 5-7.

Two cases from practical forensic medical expert evaluation are presented, connected with injuries inflicted by point-blank shots from gas pistols of 8 and 9 mm caliber. These two examples demonstrate the difficulties in expert evaluation, which are explained by the absence of scientifically-based methodology. The authors emphasize the necessity of comprehensive studies in this field to develop methods for the differential diagnosis of injuries inflicted by gas weapons and those inflicted by blank cartridge gunshots.

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400. Babar, S., et al. (2016). "The Role of 320 Slice CT Angiography in Predicting Vascular Trauma." Journal of the College of Physicians and Surgeons--Pakistan : JCPSP 26(1): 23-26.

OBJECTIVE: To determine the accuracy of multidetector CT angiography (MDCT angiography) as initial diagnostic technique in depicting and characterizing post traumatic vascular injuries, looking for additional injuries and confirming the findings with intervention and follow-up., STUDY DESIGN: Descriptive analytical study., PLACE AND DURATION OF STUDY: Department of Radiology, Shifa International Hospital, Islamabad, from June 2010 to October 2013., METHODOLOGY: Patients who underwent MDCT angiography for clinically suspected post traumatic vascular injury were included. All MDCT angiographies were performed on 320 slice CT (Aquilion OneTM) and were reviewed by two independent consultant radiologists. The sites of injury were intracranial, neck and maxillofacial, chest, abdomen and extremities. The presence and characteristics of vascular injuries were confirmed by post-operative findings or digital subtraction angiography (DSA). Sensitivity and specificity was calculated., RESULTS: The age of the patients ranged from 7 to 90 years with 94% (48) males and 6% (3) females. Blunt trauma was commoner than penetrating trauma. The site of injury in majority was extremities. Majority of patients had post-traumatic pseudoaneurysm formation followed by arterial occlusion, thrombosis, active extravasation, spasm, arteriovenous malformation and combination injuries. Twenty-one (41%) patients were reported as having vascular injury and confirmed by surgery or DSA. Fifteen (29.5%) patients were reported as normal and had no intervention on follow-up. The sensitivity and specificity of MDCT angiography was found as 100% and 88%, NPV of 100%, PPV of 94% and accuracy of 96%., CONCLUSION: MDCT angiography can be reliably used as an initial diagnostic technique for the evaluation and characterization of post-traumatic vascular injuries.

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401. Babl, F. E., et al. (2017). "Diagnostic accuracy of the nexus II head injury clinical decision rule in children. a predict prospective cohort study." Archives of disease in childhood 102: A115.

Aims Clinical decision rules (CDRs) can be applied in Emergency Departments (EDs) to optimise the use of computed tomography (CT) in children with head trauma. The National Emergency XRadiography Utilisation Study II (NEXUS II) CDR, as amended for children, has not been externally validated in a large paediatric cohort. The objective of this study was to conduct a multicentre external validation of the NEXUS II CDR in children. Methods We performed a prospective observational study of patients<18 years presenting with head trauma of any severity to 10 Australian/New Zealand EDs. In a planned secondary analysis we assessed the performance of the NEXUS II CDR for its diagnostic accuracy (with 95% confidence intervals (CI)) in predicting clinically important intracranial injury (ICI) as identified in CT scans performed in ED. Results Of 20 137 total patients, we excluded 28 with suspected penetrating injury. Median age was 4.2 years. CTs were obtained in ED for 1962 (9.8%), of whom 377 (19.2%) had a clinically important ICI as defined by NEXUS II. 74 (19.6%) of these patients underwent neurosurgery. Sensitivity for clinically important ICI based on the NEXUS II CDR was 373/377 (98.9%; 97.3%-99.7%) and specificity 156/1585 (9.8%; 8.4%-11.4%). Positive and negative predictive values were respectively 373/1802 (20.7%; 18.8%-22.6%) and 156/160 (97.5%; 93.7%-99.3%). Of the 18 147 children who did not have a CT scan 49.5% had at least one NEXUS II risk criterion. Conclusions NEXUS II had very high sensitivity when analysed with a focus on head injured patients who have had a CT performed, similar to the derivation study. With half of the unimaged patients positive for NEXUS II risk criteria the use of this CDR has the potential to increase the number of CTs.

402. Babl, F. E., et al. (2018). "Penetrating head injuries in children presenting to the emergency department in Australia and New Zealand: A PREDICT prospective study." Journal of paediatrics and child health 54(8): 861-865.

AIM: Penetrating head injuries (pHIs) are associated with high morbidity and mortality. Data on pHIs in children outside North America are limited. We describe the mechanism of injuries, neuroimaging findings, neurosurgery and mortality for pHIs in Australia and New Zealand., METHODS: This was a planned secondary analysis of a prospective observational study of children <18 years who presented with a head injury of any severity at any of 10 predominantly paediatric Australian/New Zealand emergency departments (EDs) between 2011 and 2014. We reviewed all cases where clinicians had clinically suspected pHI as well as all cases of clinically important traumatic brain injuries (death, neurosurgery, intubation >24 h, admission >2 days and abnormal computed tomography)., RESULTS: Of 20 137 evaluable patients with a head injury, 21 (0.1%) were identified to have sustained a pHI. All injuries were of non-intentional nature, and there were no gunshot wounds. The mechanisms of injuries varied from falls, animal attack, motor vehicle crashes and impact with objects. Mean Glasgow Coma Scale on ED arrival was 10; 10 (48%) had a history of loss of consciousness, and 7 (33%) children were intubated pre-hospital or in the ED. Fourteen (67%) children underwent neurosurgery, two (10%) craniofacial surgery, and five (24%) were treated conservatively; four (19%) patients died., CONCLUSIONS: Paediatric pHIs are very rare in EDs in Australia and New Zealand but are associated with high morbidity and mortality. The absence of firearm-related injuries compared to North America is striking and may reflect Australian and New Zealand firearm regulations.

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403. Baccarani, A., et al. (2006). "Fascio-subcutaneous extension of a free radial forearm flap for frontonasal duct obliteration." The Journal of craniofacial surgery 17(6): 1163-1166.

Frontonasal duct injury is a critical factor in the treatment of frontal sinus fractures. We present the case of a 43-year-old man who sustained multiple comminuted fractures of the anterior table of the frontal sinus and of the orbital roof as the result of a gunshot. After adequate debridement, the combined bone and soft tissue defect was reconstructed with a titanium mesh and a free radial forearm flap. The frontonasal duct injury was treated by surgical obliteration with a custom designed fascio-subcutaneous extension of the free radial forearm flap. The postoperative course was uneventful with good functional and aesthetic results. No early or late complications have occurred.

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404. Bacciu, A., et al. (2009). "Intracranial facial nerve grafting after removal of vestibular schwannoma." American journal of otolaryngology 30(2): 83-88.

OBJECTIVE: The objectives of this study were to evaluate outcomes from facial nerve (FN) cable grafting in patients who experienced FN transection during vestibular schwannoma removal and to compare the FN outcomes of patients who underwent FN grafting by using fibrin glue with those of patients who underwent FN grafting by using microsuture., MATERIAL AND METHODS: We retrospectively evaluated a series of 33 patients in whom FN grafting was achieved either by using microsuture (8 cases) or fibrin glue (25 cases). Immediate repair of the FN was performed in all cases at the time of initial resection. The patients FN function was assessed preoperatively, in the immediate postoperative period, and at 3, 6, 9, and 12 months or more postoperatively using the House-Brackmann grading system. All patients had at least 1-year follow-up., RESULTS: At 12 months, a House-Brackmann grade III was achieved in 75% of those who underwent cable nerve graft interposition by using microsuture and in 76% of those who underwent cable nerve graft interposition by using fibrin glue. Analysis of final FN function outcomes demonstrated no statistically significant difference in FN outcomes between the 2 groups (P = .891, Mann-Whitney U test; P = .1, Fisher exact test).,

CONCLUSIONS: The functional results after FN cable grafting by using fibrin glue exclusively were equivalent to those obtained with microsuture. However, the technique of FN repair by means of fibrin glue is technically simple, less time-consuming, and imparts less trauma on the nerve than does the traditional suture method.

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405. Bacque, M. C., et al. (2018). "Neurocritical Patient Characteristics Related to Brain Death." Transplantation proceedings 50(2): 397-399.

BACKGROUND: The lack of viable organs for transplantation led to the creation in Argentina of the Glasgow 7 Program based on the detection and follow-up of acute neurologic patients admitted with Glasgow scores <=7 in selected hospitals. The objective of this study was to determine the likelihood of hospitalized acute neurologic patients progressing to brain death (BD) based on several variables, including age, sex, and admission diagnosis., METHODS: This study was a retrospective cohort analysis of data obtained from the SINTRA (Procurement and Transplantation National Information System) database between 2006 and 2015. Independent variables included the following: age, sex, and diagnosis at admission; ischemic stroke; spontaneous intracerebral hematoma (SIH); subarachnoid hemorrhage (SH); anoxia, meningitis; penetrating head injury (PHI); closed head injury; and tumors. A multivariate analysis was performed adjusting the diagnosis at admission according to age and sex., RESULTS: A total of 31,877 patients were included: 19,308 (61%) patients died and 9736 (30%) evolved to BD. Overall, 36% of women and 28% of men evolved to BD (relative risk, 0.87 [95% confidence interval (CI), 0.86-0.89]; P < .001). In the multivariate analysis adjusted for age and sex, we observed the following: SIH OR, 1.79 (95% CI, 1.69-1.9; P < .001); ischemic stroke OR, 0.82 (95% CI, 0.73-0.92; P < .001); SH OR, 2.33 (95% CI, 2.16-2.52; P < .001); anoxia OR, 0.71 (95% CI, 0.64-0.79; P < .001); closed head injury OR, 0.41 (95% CI, 0.38-0.43; P < .001); PHI OR, 2.64 (95% CI, 2.38-2.94; P < .001); and tumors OR, 1.07 (95% CI, 0.93-1.24; P = .31)., CONCLUSIONS: Thirty percent of the patients who entered the Glasgow 7 Program evolved with BD. The characteristics most likely to result in BD were age, female sex, PHI, SH, and SIH.

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406. Bacyinski, A., et al. (2017). "The paravascular pathway for brain waste clearance: Current understanding, significance and controversy." Frontiers in Neuroanatomy 11.

The paravascular pathway, also known as the “glymphatic” pathway, is a recently described system for waste clearance in the brain. According to this model, cerebrospinal fluid (CSF) enters the paravascular spaces surrounding penetrating arteries of the brain, mixes with interstitial fluid (ISF) and solutes in the parenchyma, and exits along paravascular spaces of draining veins. Studies have shown that metabolic waste products and solutes, including proteins involved in the pathogenesis of neurodegenerative diseases such as amyloid-beta, may be cleared by this pathway. Consequently, a growing body of research has begun to explore the association between glymphatic dysfunction and various disease states. However, significant controversy exists in the literature regarding both the direction of waste clearance as well as the anatomical space in which the waste-fluid mixture is contained. Some studies have found no evidence of interstitial solute clearance along the paravascular space of veins. Rather, they demonstrate a perivascular pathway in which waste is cleared from the brain along an anatomically distinct perivascular space in a direction opposite to that of paravascular flow. Although possible explanations have been offered, none have been able to fully reconcile the discrepancies in the literature, and many questions remain. Given the therapeutic potential that a comprehensive understanding of brain waste clearance pathways might offer, further research and clarification is highly warranted.

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407. Badhiwala, J. H., et al. (2014). "Neuropsychiatric changes following Penetrating head injury in children." Surgical neurology international 5(Supplement).

Case Description: We report the case of a 12-year-old boy who suffered a penetrating head injury to the frontal lobes secondary to a self-inflicted gunshot wound, and experienced subsequent resolution of pre-existing bipolar disorder and new onset of attention deficit hyperactivity disorder. Conclusion: Children with penetrating head injury require close multidisciplinary follow-up in order to monitor, and accordingly implement management strategies, for associated sequelae, including behavioral and neuropsychiatric changes. Background: Penetrating head injuries demand the prompt attention of a neurosurgeon. While most neurosurgical centers are experienced in the acute management of these injuries, less is known about the long-term neuropsychiatric sequelae of penetrating head trauma. In adults, direct injury to the frontal lobe classically has been associated with mental status changes. However, there is less published data in children. Copyright:

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408. Badidi, G., et al. (2019). "Posttraumatic sigmoid sinus thrombosis secondary to transmastoid foreign body." European annals of otorhinolaryngology, head and neck diseases 136(1): 57-58.

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409. Badugu, S., et al. (2012). "Projectile embolization to the left femoral artery with stroke following gunshot wound to the chest." Journal of Pediatric Intensive Care 1(4): 217-220.

Missile embolization is a rare phenomenon with most cases reported in the literature as a consequence of direct or indirect vascular trauma. Despite their characterization as toys, traumatic injuries from pellet guns are associated with significant rates of morbidity related to their vascular and neurological complications. We present a 9-year-old boy who was shot in the chest with a pellet gun and suffered a femoral arterial occlusion and a delayed stroke in the middle cerebral arterial distribution.

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410. Baek, S.-H., et al. (2008). "Trifocal distraction-compression osteosynthesis in conjunction with passive self-ligating brackets for the reconstruction of a large bony defect and multiple missing teeth." American journal of orthodontics and dentofacial orthopedics : official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics 133(4): 601-611.

Reconstruction of a maxillary dentoalveolar defect and closure of a wide oronasal fistula in a patient with a traumatic injury are challenging for both orthodontists and surgeons. A conventional bone graft is used to fill the alveolar bone defect, to restore continuity between bony segments, and to provide bony support for tooth eruption adjacent to the defect or for orthodontic tooth movement into the bony defect. However, if the defect is too large to allow for a conventional bone graft, transport distraction osteogenesis can be used for reconstruction of the alveolar bone and implant placement. However, there is usually a discrepancy in the movement rates between the bony segment and the teeth. Passive self-ligating brackets can minimize friction between the bracket and the archwire; therefore, the rate of tooth movement can be balanced with that of the bony segment. By using orthodontic miniscrew and elastomeric traction, the regenerated bony segments can be bent to form a curved arch in the alveolar bone. In the treatment reported here, trifocal distraction-compression osteosynthesis with orthodontic miniscrews and passive self-ligating brackets helped establish bone continuity in a bony defect area, created anterior curvature of the alveolar bone, and provided good-quality regenerated bone for implant placement.

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411. Baer, L. A., et al. (2013). "Coagulopathy in a swine model of penetrating ballistic-like brain injury and trauma patients with penetrating brain injury." Journal of neurotrauma 30(15): A35-A36.

Introduction Hemorrhage resulting from blunt brain injury is caused by the direct injury and secondary multifactorial coagulopthy. Viscoelastometry using thromboelastography (TEG) is a rapid method determining clotting function and coagulopathy. Coagulopathy was determined using a pig

model of penetrating ballistic-like brain injury (PBBI) and in trauma patients with penetrating brain injury. Methods Studies were approved by Institutional Animal Care and Use Committee and Institutional Review Board for the treatment of human subjects. Anesthetized mature male miniature swine were randomly selected: control (C; n = 5), 0.1% (probe only; n = 4) and 2.5% (n = 4) of estimated brain volumes. Following a craniotomy, a fluid-filled intracranial probe was inserted and varying cavitational injuries were created. TEG was measured every hour for 6 hrs. Clinically, patients admitted into the Texas Trauma Institute with a penetrating head injury (PEN; n = 18) and an AIS score of ≥ 3 from March 2012 until January 2013 were compared to a control group of trauma patients discharged within 24 hrs (CON; n = 132) of admission. Viscoelastometry, using Kaolin TEG, was used to determine coagulopathy: split time (SP), reaction time (R), K-time (K), Alpha-Angle (a) and maximum amplitude (MA). Values are mean ± SEM and differences were determined by ANOVA ($p < 0.05$). Results PBBI in swine elicited no changes in TEG between groups or over time. Sixty minutes after injury, SP (min; C: 4.1 ± 0.5; 0%: 4.1 ± 0.5: 2.5%: 3.9 ± 0.5), R (min; C: 5.1 ± 0.5; 0%: 4.9 ± 0.5: 2.5%: 4.7 ± 0.5), K (min; C: 1.1 ± 0.1; 0%: 1.3 ± 0.1: 2.5%: 1.1 ± 0.1), a (C: 75 ± 2; 0%: 74 ± 2: 2.5%: 75 ± 2) and MA (mm; C: 80.4 ± 0.9; 0%: 80.9 ± 0.9: 2.5%: 78.7 ± 1.1) were not different between treatments. To assess possible anesthetic and instrumentation effects on coagulopathy, we compared all TEG values to a group of sedated swine and they were similar.As no changes were observed over time in the large animalmodel we specifically wanted to determine if penetrating brain injuries in trauma patients would demonstrate differences. The PEN group had an overall mortality rate of 56%. No differences were observed between CON and PEN in SP (CON:3.4 ± 1.5; PEN:3.7 ± 1.6), R (CON:4.1 ± 1.5; PEN:4.4 ± 1.9), K (CON:1.8 ± 0.1; PEN:1.8 ± 0.2) or MA (62 ± 11 vs 61 ± 6, $p < 0.02$). Alpha-angle, which reflects the speed of fibrin accumulation, was significantly reduced in PEN (CON:65.2 ± 9.6; PEN:59.4 ± 15.6). Conclusions Though there is an extensive body of literature on coagulopathy in traumatic brain injury, data specific to penetrating brain injury is limited. Using a pig model of penetrating brain injury, we found no changes coagulation over time following a moderate penetrating injury. In addition, we found similar results in patients with penetrating brain injuries. In patients there was a reduction in a-angle indicative of a possible fibrinogen deficiency. The reported coagulapothy associated with blunt traumatic brain injury may not occur with penetrating brain injury.

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412. Bafaquh, M., et al. (2020). "Classification of internal carotid artery injuries during endoscopic endonasal approaches to the skull base." Surgical neurology international 11.

Background: Internal carotid artery (ICA) injuries are a major complication of endoscopic endonasal approaches (EEAs), which can be difficult to manage. Adding to the management difficulty is the lack of literature describing the surgical anatomical classification of these types of injuries. This article proposing a novel classification of ICA injuries during EEAs. Methods: The classification of ICA injuries during EEAs was generated from the review of the literature and analysis of the main author observation of ICA injuries in general. All published cases of ICA injuries during EEAs in the literature between January 1990 and January 2020 were carefully reviewed. We reviewed all patients' demographic features, preoperative diagnoses, modes of injury, cerebral angiography results, surgical and medical management techniques, and reported functional outcomes. Results: There were 31 papers that reported ICA injuries during EEAs in the past three decades, most studies did not document the type of injury, and few described major laceration type of it. From that review of the literature, we classified ICA injuries into three main categories (Types I-III) and six sub-types. Type I is ICA branch injury, Type II is a penetrating injury to the ICA, and Type III is a laceration of the ICA wall. The functional neurological outcome was found to be worse with Type III and better with Type I. Conclusion: This is a novel classification system for ICA injuries during EEAs; it defines the patterns of injury. It could potentially lead to advancements in the management of ICA injuries in EEAs and facilitate communication to develop guidelines.

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413. Bagga, V., et al. (2013). "Lymphoblastic leukaemia presenting as a carotid-cavernous fistula." The neuroradiology journal 26(1): 94-96.

A carotid-cavernous fistula is a life-threatening condition characterised by an abnormal communication between the carotid arterial vessels and the cavernous venous system. Although these fistulae can arise spontaneously, they mainly occur after trauma, especially road traffic accidents, falls and penetrating cranial or orbital injuries. The mainstay of treatment involves endovascular embolization, but in those patients where this is not possible or where embolization fails, direct surgical intervention and ligation of the artery may be necessary. Here we describe an interesting case of a suspected carotid-cavernous fistula which turned out to be cavernous sinus syndrome secondary to lymphoma.

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414. Bagheri, S. C., et al. (2005). "Comparison of the severity of bilateral Le Fort injuries in isolated midface trauma." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons 63(8): 1123-1129.

PURPOSE: The Le Fort classification pattern established in 1901 by the French surgeon Rene Le Fort is commonly used in describing midface fractures. This frequently used classification system is based on predictable patterns of midface fractures initially described for blunt trauma. The purpose of this study was to compare the profile and outcome of patients with isolated bilateral Le Fort I, II, and III fractures., PATIENTS AND METHODS: All patients presenting to the emergency department (ED) at Legacy Emanuel Hospital (Level I trauma center) in Portland, OR, between December 1990 and December 2003 with isolated bilateral Le Fort I, II, or III fractures with or without concomitant nonfacial injuries were identified retrospectively using the Hospital Trauma Registry. Patients were classified into study groups I (n = 22), II (n = 22), or III (n = 23) corresponding to the Le Fort classification, respectively., RESULTS: Sixty-seven patients had a diagnosis of isolated bilateral Le Fort I, II, or III fracture. The average Injury Severity Score (ISS) and hospital length of stay were 18.8 +/- 8.9 and 9.5 +/- 11.9 days, respectively. Blood alcohol was detected in 19 patients. Sixty-four injuries (95.5%) were secondary to blunt trauma, and the remaining 3 (4.5%), penetrating injuries. More than half of the patients (n = 35, 52.2%) were admitted to the intensive care unit (ICU), 18 patients (26.8%) were transferred to the hospital trauma ward from the ED, and 14 patients (20.9%) were taken directly to the operating room. Fifteen (22.4%) patients required a tracheostomy secondary to their maxillofacial injuries. A statistically significant difference in the ISS was detected between patients with Le Fort I versus those with II or III injuries ($P < .0001$). Patients with Le Fort II or III fractures had a significantly higher probability of ICU admission or immediate operative intervention. Ten patients (43.5%) with Le Fort III injuries required tracheostomy versus 3 patients (13.6%) with Le Fort I, and 2 patients (9.1%) with Le Fort II injuries. This was statistically significant. None of the patients with Le Fort I injuries had a negative outcome (death); however, 1 patient with Le Fort II injuries (4.5%) and 2 with Le Fort III injuries (8.7%) had a negative outcome. No statistically significant differences or emerging trends were observed among the 3 groups for age, gender, length of stay, number of operations, and number of associated injuries., CONCLUSIONS: Patients with higher Le Fort injuries are characterized by an overall greater severity of injuries as measured by the ISS and the more frequent need for a surgical airway. Patients with Le Fort III injuries have a higher chance of requiring neurosurgical intervention or of experiencing vision-threatening ocular trauma. Immediate operative intervention and/or ICU care is more frequently indicated in these patients.

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415. Bagi, Z., et al. (2018). "Selectively impaired vasodilation of human white matter penetrating cerebral arterioles in microvascular brain injury and Alzheimer's disease." FASEB Journal 32(1).

Microvascular brain injury (mVBI) is a common pathologic correlate of vascular contributions to cognitive impairment and dementia (VCID) that leads to white matter (WM) injury. VCID appears to arise from chronic recurrent WM ischemia. We hypothesized that in mVBI WM injury is specifically attributed to vasodilator dysfunction of WM penetrating arterioles. We analyzed 38 cases of mVBI with

low and high Alzheimer's disease (AD) neuropathologic changes in prefrontal cortex WM from rapid autopsies in a population-based cohort where VCID and AD frequently occur. Arteriolar vasodilator function was quantified by videomicroscopy. Acetylcholine-mediated arteriolar dilation in mVBI with low AD pathology was significantly reduced in WM penetrators relative to pial arterioles. Astrogliosis-defined WM injury was associated with impaired vasodilator function of WM penetrating arterioles. In mVBI with high AD pathology vasodilator function of WM penetrating arterioles was further diminished. Presence of moderate/frequent neuritic plaques and cerebral amyloid angiopathy were associated with impaired dilation in WM penetrating, but not in pial arterioles. In conclusion, we successfully assessed vasodilator function of human WM penetrating arterioles in postmortem rapid autopsy samples. We found that selectively impaired vasodilator function of WM penetrating arterioles in mVBI occurs in association with WM injury and AD neuropathologic change.

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416. Bahnini, A., et al. (1986). "Gunshot pellet embolus to the middle cerebral artery." Annals of vascular surgery 1(1): 139-142.

A 24-year-old man sustained a gunshot wound to the upper right hemithorax and neck, with injury to the subclavian and carotid arteries. A cerebral artery pellet embolus resulted in contralateral hemiplegia. The injured vessels were repaired, but the middle cerebral artery pellet was left undisturbed. Neurologic improvement occurred. Fifteen cases of foreign body embolus to cerebral vessels are reviewed and the management of this unusual injury is discussed.

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417. Bahram, R., et al. (2004). "Head and neck injury from a leopard attack: case report and review of the literature." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons 62(2): 247-249.

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418. Bai, W., et al. (2011). "Conservative management of transnasal intracranial injury." American journal of otolaryngology 32(2): 165-167.

The purpose of this study was to explore the conservative management for an unusual case of transnasal intracranial injury. A 3-year-old female child presenting with transnasal injuries after a domestic accident whereby she apparently fell while holding a large pair of scissors, which then penetrated her left nasal cavity, piercing her nasal cavity, ethmoid sinus, and skull base. The scissors were removed from her nasal cavity. The patient had scant cerebrospinal rhinorrhea and no other additional neurologic deficits noted at the time, as well as no long-term developmental deficits. This report highlights the occurrence of this rare condition. The role of radiologic studies such as computed tomographic scans and plain films in diagnosis and management of this case is affirmed. The strategy of minimally invasive treatment of this injury can be a reasonable treatment option.

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419. Bailey, D. J., et al. (2019). "Reliability and stability of the metrical stress effect on segmental production accuracy in persons with apraxia of speech." International journal of language & communication disorders 54(6): 902-913.

BACKGROUND: Acquired apraxia of speech (AOS) involves speech-production deficits on both the segmental and suprasegmental levels. Recent research has identified a non-linear interaction between the metrical structure of bisyllabic words and word-production accuracy in German speakers with AOS, with trochaic words (strong-weak stress) being resistant to errors compared with iambic words (weak-strong)., AIMS: To replicate previous findings in English speakers with AOS, to measure the test-retest reliability of the effect, and to examine the potential impact of different methods of word scoring., METHODS & PROCEDURES: Speech samples were collected from 27 speakers with AOS and aphasia. Participants were at least 12 months post-stroke or penetrating brain injury, and represented

a large range of AOS and aphasia severities. Productions were elicited via verbal model. Sampling was conducted on three separate occasions: the initial data-collection session and then repeated samplings at 1- and 4-week intervals. Bisyllabic words with a CVCVC segmental structure were selected. The list was divided into sublists representing differing lexical stress patterns: A list of 42 trochees, and one of 37 iambs. All speech samples were phonetically transcribed and then aligned with canonical transcriptions via an edit distance algorithm that followed transcription alignment principles. Phonetic-level errors (distortions) were penalized less severely than phonemic-level errors. Per cent consonants correct and whole-word accuracy were also examined. Trochee and iamb lists were analysed separately., OUTCOMES & RESULTS: Paired samples t-tests indicated that the modified edit distance was significantly lower for the trochee lists than for the iamb lists. There was a lack of a significant effect of time on the absolute difference between modified edit distance for both lists. Intraclass coefficients suggested the list and procedures used are appropriate as an outcome measure for group research., CONCLUSIONS & IMPLICATIONS: The results suggest that in English, as in German, the trochaic structure is more resistant to segmental errors in persons with AOS and aphasia, providing replication of the findings of Aichert et al. in 2016. Further, this effect is stable over repeated sampling occasions. Implications for clinical management of AOS include possible ways to scaffold item difficulty and potentially improve stimulus generalization. Copyright Published 2019. This article is a U.S. Government work and is in the public domain in the USA.

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420. Bailey, Z., et al. (2018). "Resuscitative endovascular balloon occlusion of the aorta alters cerebral physiology and blood composition after brain injury." Journal of neurotrauma 35(16): A214.

Recent technical advancements have created opportunity for resuscitative endovascular balloon occlusion of the aorta (REBOA) as a promising alternative to control non-compressible hemorrhage in a pre-hospital setting. Traumatic events often elicit a multifaceted pathology including both hemorrhage and traumatic brain injury (TBI). While REBOA treatment has proven efficacious in increasing afterload and reducing mortality, the effects on concomitant TBI is not well understood. This study sought to elucidate the REBOA effects on systemic and cerebral physiology in the acute stages following TBI. Rats were randomly divided into four groups (n = 10/ group): penetrating ballistic-like brain injury (PBBI), continuous REBOA, PBBI+cREBOA, PBBI+intermittent REBOA (iREBOA). Continuous measurements of mean arterial pressure (femoral and common carotid), intracranial pressure (ICP) and brain tissue oxygen tension (PbtO2) were recorded. All animals underwent a 10-minute baseline recording followed by PBBI or sham procedures (craniotomy). PBBI was induced via inflation/deflation of a balloon probe within the right frontal cortex. REBOA was initiated 30 minutes afterwards and maintained continuously (cREBOA) or intermittently for 30 minutes (iREBOA: three 10-minute occlusions separated by 1-minute reperfusions). Physiological parameters were monitored for an additional 60 minutes following REBOA. PBBI elicited a decrease in PbtO2 and an increase in ICP. cREBOA caused a transient decrease in ICP which correlated with increased PbtO2 levels. No significant differences were observed between PBBI and sham levels of ICP and PbtO2 following cREBOA. Alternatively, iREBOA increased ICP and decreased PbtO2 for the remainder of the experiment. The blood composition was evaluated during the baseline, during occlusion, and immediately following occlusion. A significant increase in lactate levels were observed in each treatment group receiving REBOA. The lactate levels were strongly correlated with decreased pH, indicating lactic acidosis. Increased blood glucose levels were also observed which may be detrimental to PBBI recovery as hyperglycemia has been correlated to cerebral edema. No significant changes were observed for oxygen, carbon dioxide, electrolyte, hematocrit, or hemoglobin levels of the blood. Overall, these results suggest that cREBOA may aide in acute TBI stabilization whereas iREBOA may exacerbate injury. Further optimization should mitigate REBOA-induced lactic acidosis and hyperglycemia which may further complicate secondary injury cascades.

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421. Bailey, Z., et al. (2019). "Hematological changes induced by polytrauma with concomitant concussion involve altered coagulopathy and biomarker levels." Journal of neurotrauma 36(13): A108.

Traumatic brain injury (TBI) is not an isolated injury to the brain but also results in widespread systemic changes to the blood involving coagulation, gas delivery, and ion balance. Importantly, the damage to brain can also result in the release of brain proteins to the blood. However, the hematological changes and biomarker levels are not well understood in patients that have sustained TBI with hypoxia and hemorrhagic insults. To elucidate these changes, rats were divided into six groups: sham, hemorrhage and hypoxia (HH), single-TBI (sTBI), repeated-TBI (rTBI, 3x5min), sTBI+HH, and rTBI+HH. Hypoxia was induced following TBI/sham procedures by decreasing the inspired air to 10% oxygen for 60 minutes. Normoxia was returned and hemorrhagic shock was induced for 60 minutes before resuscitation with lactated Ringer's. Blood samples were collected immediately following these procedures for blood gas and thromoboelastography and at 2 or 24 hrs post-injury for biomarker (GFAP, UCHL1, neurofilament-light chain (NF-L), tau) analysis. Indications of a hypercoagulable state was observed from HH, sTBI+HH, and rTBI+HH groups following resuscitation compared to sham ($p < 0.05$). These groups also demonstrated increased lactate levels and decreased oxygen in the blood ($p< 0.05$). The rTBI group showed similar pathology including an increased K value and decreased blood oxygen compared to sham ($p< 0.05$). The effects of HH were prominent on circulating biomarker levels. At 2 hours post-injury, GFAP, UCHL1, and NF-L were significantly increased in sTBI+HH and rTBI+HH groups. NF-L was also increased in sTBI and rTBI groups. At 24 hours post-injury, NF-L had returned to sham levels but GFAP and UCHL1 remained increased compared to sham ($p< 0.05$). No significant changes were observed for tau. These results suggest that hemorrhage and hypoxia may exacerbate the TBI pathology and alter blood-based biomarker dynamics.

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422. Bailey, Z. S., et al. (2019). "The Effects of Balloon Occlusion of the Aorta on Cerebral Blood Flow, Intracranial Pressure, and Brain Tissue Oxygen Tension in a Rodent Model of Penetrating Ballistic-Like Brain Injury." Frontiers in neurology 10: 1309.

Trauma is among the leading causes of death in the United States. Technological advancements have led to the development of resuscitative endovascular balloon occlusion of the aorta (REBOA) which offers a pre-hospital option to non-compressible hemorrhage control. Due to the prevalence of concomitant traumatic brain injury (TBI), an understanding of the effects of REBOA on cerebral physiology is critical. To further this understanding, we employed a rat model of penetrating ballistic-like brain injury (PBBI). PBBI produced an injury pattern within the right frontal cortex and striatum that replicates the pathology from a penetrating ballistic round. Aortic occlusion was initiated 30 min post-PBBI and maintained continuously (cAO) or intermittently (iAO) for 30 min. Continuous measurements of mean arterial pressure (MAP), intracranial pressure (ICP), cerebral blood flow (CBF), and brain tissue oxygen tension (PbtO2) were recorded during, and for 60 min following occlusion. PBBI increased ICP and decreased CBF and PbtO2. The arterial balloon catheter effectively occluded the descending aorta which augmented MAP in the carotid artery. Despite this, CBF levels were not changed by aortic occlusion. iAO caused sustained adverse effects to ICP and PbtO2 while cAO demonstrated no adverse effects on either. Temporary increases in PbtO2 were observed during occlusion, along with restoration of sham levels of ICP for the remainder of the recordings. These results suggest that iAO may lead to prolonged cerebral hypertension following PBBI. Following cAO, ICP, and PbtO2 levels were temporarily improved. This information warrants further investigation using TBI-polytrauma model and provides foundational knowledge surrounding the non-hemorrhage applications of REBOA including neurogenic shock and stroke.

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423. Bailey, Z. S., et al. (2021). "Prehospital Whole Blood Resuscitation Reduces Fluid Requirement While Maintaining Critical Physiology in a Model of Penetrating Traumatic Brain Injury and

Hemorrhage: Implications on Resource-Limited Combat Casualty Care." Shock (Augusta, Ga.) 55(4): 545-553.

ABSTRACT: Prehospital resuscitation using whole blood (WB) is the standard of care for hemorrhagic shock (HS) but there is no consensus recommendation for resuscitation in the presence of traumatic brain injury (TBI) due to a lack of sufficient evidence. In order to evaluate the optimal resuscitation strategies for TBI+HS, Sprague-Dawley rats were randomized into four groups based on resuscitation fluid and prehospital mean arterial pressure (MAP) threshold (n = 9-10/group): Lactated Ringer's (LR)-60 mm Hg (LR60), LR-70 mm Hg (LR70), WB-60 mm Hg (WB60), WB-70 mm Hg (WB70). All groups received a frontal penetrating ballistic-like brain injury followed by a 35-min period of HS. During the prehospital phase, rats received an initial bolus of resuscitation fluid (WB or LR) followed by LR as needed to maintain MAP above the designated threshold for 90 min. During the in-hospital phase, rats received definitive resuscitation with shed WB. Physiological parameters were recorded continuously and cerebral edema was measured at 3 and 24 h postinjury. The WB60 group demonstrated a significantly lower prehospital fluid requirement compared WB70, LR60, and LR70 ($P < 0.05$). Compared to the respective LR groups, both the WB60 and WB70 groups also demonstrated improved MAP, cerebral perfusion pressure, brain tissue oxygen tension, and cerebral edema. The edema benefits were observed at 3 h, but not 24 h postinjury, and were localized to the injury site. Together, these results provide evidence that prehospital WB resuscitation and lower MAP resuscitation thresholds can reduce the prehospital fluid requirement while still maintaining critical cerebral physiology in a model of HS and concomitant TBI.

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424. Baillard, C., et al. (2002). "Brain death assessment using instant spectral analysis of heart rate variability." Critical care medicine 30(2): 306-310.

OBJECTIVE: Confirmation of brain death requires an urgent diagnosis to allow rapid vital organ removal for transplantation. Evaluation of forebrain functions is commonly performed through electroencephalogram. Nevertheless, there are, for the moment, no methods that allow for an instantaneous evaluation of brainstem functions. During acute brain injury, heart rate variability is an independent neurologic prognosis indicator resulting from a close relationship between brain stem and cardiac autonomic nervous system. This study aims to evaluate a new heart rate variability spectral analysis method, on a beat-to-beat basis, continuously over the time, during brain death., DESIGN: Prospective, nonrandomized, observational study., SETTING: Intensive care unit., SUBJECTS: Ten patients (age range 25-64 yrs, mean age 41 yrs) with acute brain injury leading to brain death., INTERVENTION: No intervention beyond standard of care, MEASUREMENTS AND MAIN RESULTS: Heart rate, arterial blood pressure, heart rate variability in time and frequency domains method, which included calculation of the instant center frequency of spectrum. Brain death was associated with tachycardia (R-R interval 703 +/- 69 vs. 551 +/- 34 msec, $p < .05$), dramatic reduction of the global spectral power (44.919 +/- 31.511 vs. 3.204 +/- 1.469 msec(2), $p < .05$), and an abrupt shift of instant center frequency to a higher frequency range (0.17 +/- 0.01 vs. 0.26 +/- 0.03 Hz, $p < .05$)., CONCLUSIONS: Such a method allows an instant, noninvasive determination of brainstem death based on a time and frequency domain analysis of heart rate variability.

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425. Baillif, S. and V. Paoli (2012). "[Open-globe injuries and intraocular foreign bodies involving the posterior segment]." Plaies et corps etrangers du segment posterieur. 35(2): 136-145.

Open globe injuries involving the posterior segment remain a major cause of visual loss in young adults. They occur more frequently in male than in female populations. The majority is due to domestic accidents, since work-related injuries have been decreasing due to proper education and use of safety equipment. However, leisure-related open globe injuries are on the increase. Prompt recognition and treatment of open globe injuries are essential. At presentation, it is necessary to collect etiological data such as cause, nature, time and place of injury. Anti-tetanus immunization must be confirmed. The presenting visual acuity and clinical examination data must be recorded. The lesion type is classified in

accordance with the Birmingham Eye Trauma Terminology. Ocular ultrasound or computed tomography is performed for patients suspected of having an intra- or periocular foreign body. Functional prognosis is negatively influenced by a posterior or large rupture, the presence of an intraocular foreign body, the presence of retinal lacerations or retinal detachment, or the occurrence of posttraumatic infectious endophthalmitis. Recent advances in microsurgical techniques such as pars plana vitrectomy and new visualization techniques may improve the anatomical and functional prognosis for these patients. However, postoperative proliferative vitreoretinopathy remains a major concern: it is responsible for a significant rate of secondary retinal detachment with negative consequences for visual prognosis.

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426. Bair, R. L., et al. (1994). "Imaging in orbital trauma." Seminars in ophthalmology 9(3): 185-192.

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427. Baishya, B. K., et al. (2015). "Penetrating brain injury by multiple low-velocity objects: Report of two rare cases and review of literature." Indian Journal of Neurotrauma 12(2): 158-161.

We are reporting two rare cases of multiple penetrating brain injuries by an indigenously made traditional fishing gear used in an Indian village. Although penetrating injury from varied objects (viz., arrow, smear gun, knife, rod, bullets, etc.) have been reported earlier in the literature, but low-velocity penetrating brain injury by multiple objects is the first to our knowledge. In this report, we discuss the surgical management and outcome with relevant review of literature.

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428. Bakan, S., et al. (2016). "Embolism of a pellet after shotgun injury: From liver to right ventricle." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 22(4): 395-398.

Bullet embolism to the heart is a rare but serious complication of penetrating trauma. Distant migration of foreign bodies via the vascular system must be taken into consideration following penetrating gunshot trauma. Delays in diagnosis may result in poor management and subsequent complications that may lead to grave prognosis. Presently described was a conservatively managed case of asymptomatic intracardiac pellet embolization. Highlighted was the importance of serial scanning for intravascular migration of pellet following penetrating gunshot injury, in addition to conservative management in asymptomatic patients.

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429. Bakay, L. (1982). "Missile injuries of brain." New York state journal of medicine 82(3): 313-319.

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430. Bakay, L. (1984). "The value of CT scan in gunshot injuries of the brain." Acta neurochirurgica 71(3-4): 189-204.

Fourteen cases of gunshot wounds of the brain, evaluated by CT scanning are presented. The results indicate that CT scanning is superior to other diagnostic tests in missile wounds of the brain. In individual patients it revealed gross injury to the skull, the location of the bullet or its fragments and indriven bone fragments, the track of the bullet, the gross injury suffered by the brain, the extent of oedema, the presence of any intracranial haematoma and late cerebral atrophy. Visualization of the missile track is of particular importance; this cannot be achieved by any other diagnostic method. It is essential for the planning of the surgical approach in these lesions.

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431. Bakay, L., et al. (1977). "Unusual intracranial foreign bodies. Report of five cases." Acta neurochirurgica 39(3-4): 219-231.

Five patients surgically treated for unusual intracranial foreign bodies are presented. They include representative cases of the three most commonly encountered types of these injuries: industrial accidents, suicidal attempts and the result of criminal assault. Immediate radiological examination is mandatory because the deceptively small entrance wound is usually in no way commensurate with the large size of the foreign body the presence of which is frequently not suspected. The surgical removal of these foreign bodies requires careful pre-operative assessment to avoid hemorrhages and undue injury to the surrounding normal brain tissue.

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432. Baker, A. L. and C. R. Sharp (2016). "Decompressive craniotomy for traumatic skull fractures in dogs and cats: A retrospective case series." Journal of Veterinary Emergency and Critical Care 26: S33-S34.

Introduction: Little data has been reported about presentation, diagnosis, and outcome for dogs and cats with traumatic skull fractures requiring decompressive craniotomy. Objectives: The objectives of this studywere to summarize the type of trauma, neurological status at presentation, imaging findings, treatment, and outcome for small animal patients requiring decompressive craniotomy for the management of traumatic skull fractures. We hypothesized that dogs and cats requiring decompressive craniotomy would have predominantly penetrating trauma resulting in depressed skull fractures and variable neurologic status. In addition, we hypothesized that these patients would have a good prognosis, both for return to function and survival to discharge. Methods: Single center, retrospective study of dogs and cats at a university teaching hospital with traumatic skull fractures requiring craniotomy. Patients were identified via medical record search. Results: Over a period of 12 years, 9 dogs and 1 cat sustained traumatic skull fractures and underwent craniotomy. Eight animals suffered bite wounds to the head, one was kicked by a horse, and another was hit by a car. Modified Glasgow Coma Scale (mGCS) scores at presentation ranged from 7 to 17. All animals underwent CT imaging prior to surgery. All animals survived to dischargewith neurological status ranging from normal (8), to mild neurologic deficits (1), and significant disability (1). Decreased mGCS score at admission was associated with increased duration of neurological deficits. One dog was reported to have seizures post discharge. Conclusion: Animals suffering severe head trauma present with a wide range of neurological deficits. Most improved rapidly after craniotomy and were discharged with mild to no neurological signs.

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433. Baker, A. M., et al. (2005). "Central penetration and stability of N-terminal tripeptide of insulin-like growth factor-I, glycine-proline-glutamate in adult rat." Neuropeptides 39(2): 81-87.

Insulin-like growth factor-I is a neurotrophic factor and can prevent neurons from ischemic brain injury. However, the large molecular weight and metabolic effects can be problematic in its central delivery. Glycine-proline-glutamate (GPE) is the N-terminal tripeptide of insulin-like growth factor-I, which is naturally cleaved in the plasma and brain tissues. GPE reduces neuronal loss from hypoxic-ischemic brain injury following central administration. Central penetration and the stability of GPE in the plasma and central nervous system were examined in rats using radioimmunoassay and HPLC. GPE was rapidly metabolised in the plasma (8 min) after intraperitoneal administration. Despite having a short half-life in plasma, GPE was detected in the cerebrospinal fluid up to 40 min after intraperitoneal administration. With present of peptidase inhibitors, GPE existed in the brain tissue up to 3 h after intracerebroventricular administration, suggesting a role for peptolysis in its stability. The endopeptidase inhibitors 4- (2-aminoethyl) benzenesulfonyl fluoride hydrochloride (AEBSF) reduced GPE metabolism in the brain tissue while acid peptidase inhibitor pepstatin-A decreased GPE metabolism in the plasma. GPE reduced neuronal loss in the CA1-2 sub-region of the hippocampus given (intraperitoneally) after 30 min of hypoxic-ischemic injury in adult rats, further suggested the effectiveness of GPE central uptake. These results indicated that GPE crosses the blood-CSF and the functional CSF-brain barriers. The longer half-life of GPE in the CNS may be due to its unique enzymatic stability.

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434. Baker, C. C., et al. (1980). "Epidemiology of trauma deaths." American journal of surgery 140(1): 144-150.

The records of all 437 persons who died from trauma in San Francisco in 1977 were examined. Sixty-five percent of the sample (285 younger than 50 years, and 119 were between ages 21 and 30. Gunshot wounds (140 or 32 percent) and falls (122 or 28 percent) were the most common causes of injury. Fifty-three percent of the sample were dead at the scene of injury before transport could be accomplished, 7.5 percent died in the emergency room, and 39.5 percent died in the hospital. Fifty-five percent of the 359 patients who died within the first 2 days died from brain injury, while 78 percent of the 55 late deaths were due to sepsis and multiple organ failure. In 10 cases (2 percent), death was due to delayed transport or to errors in diagnosis and treatment and was deemed preventable. The key areas in which advances are necessary in order to reduce the number of trauma deaths are prevention of trauma, more rapid and skilled transport of injured victims, better early management of primary brain injuries, and more effective treatment of the late complications of sepsis and multiple organ failure.

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435. Baker, R. S. and D. Rowed (1984). "Neuro-anatomical feature photo. Penetrating skull injury." Journal of clinical neuro-ophthalmology 4(2): 143.

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436. Baker, S. A. (2020). "The Morphology of Ballistic Trauma." FASEB Journal 34(SUPPL 1).

In forensic anthropology, bone fracture morphology provides potential evidence in the mechanism of injury or death. Specifically, the type of weapon used, the trajectory of impact, and the direction of fire can also be interpreted from internal and external bone morphology. Morphological characteristics, such as buttresses and sutures, are also applicable when analyzing ballistic trauma. This study analyzed fracture morphology of sagittal and coronal plane cranio-maxillofacial gunshot wounds of five specimens from the Applied Anatomical Research Center's (AARC) skeletal collection. Methodologies include enumerating and describing the etiology of ectocranial fractures, any missing bony segments, and the macroscopic fractures for each specimen. Sliding calipers were used to measure the distance (mm) of the entrance and exit wounds in relation to identifiable bony landmarks. The distribution of fractures and fracture locations on the cranio-maxillofacial region were analyzed and assessed to determine similarities and differences among the sagittal and coronal plane gunshot wound specimens. Results indicate that radiating fractures run parallel to buttressed areas of the cranial vault in both sagittal and coronal plane gunshot wounds but run perpendicular to buttressed areas of the face in sagittal plane specimens only. The value of this research could provide additional evidence to reconstruct death histories of relatively incomplete skulls with suspected ballistic trauma. The ultimate goal is to provide the medicolegal community with a larger, more refined data set to better understand ballistic trauma by examining fracture morphologies of sagittal and coronal gunshot wounds in skeletonized human remains.

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437. Bakhos, D., et al. (2015). "Head Spear Gun Injury: An Atypical Suicide Attempt." The Journal of craniofacial surgery 26(6): e547-548.

Weapon injuries with spear gun are rare. The aim of this case report is to report the emergency and surgical management when this event occurs. A 35-year-old man attempted suicide with a spear gun. The entry of the shaft was localized through the submental area without an obvious exit point. The projectile passed through the tongue and palatal bone. A tracheotomy was performed. Preoperative cranial computed tomography (CT) showed the harpoon was gone upward through the submental area, the oral cavity, the ethmoid paranasal sinus, the cribriform plate, and the frontal region without vessel damages. Under general anesthesia, the harpoon was pulled out in order to extract the shaft tip and the articulated wishbone. Osteo-meningeal defect of the ethmoid roof was closed using a middle turbinate flap. There were no neurologic deficit and no cerebro-spinal rhinorrhea at his 3-year follow-up visit. The trajectory of the shaft is different between attempted suicide and accident. Cranial CT scan is helpful to

show the trajectory of the shaft. Angiogram can be helpful to see the relations between the tip shaft and the vessels. The knowledge of the shaft tip and the imagery findings are important to decide the best surgical approach.

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438. Bakir, A., et al. (2005). "High-velocity gunshot wounds to the head: analysis of 135 patients." Neurologia medico-chirurgica 45(6): 281-287.

Head injuries due to high-velocity missiles and shrapnel as a result of military conflicts have become a very important cause of death or severe neurological deficits. Military-type missiles have high velocities and transfer higher amounts of energy to neural tissue, compared to civil-type missiles. This physical phenomenon also causes greater neural tissue destruction. Shrapnel particles derive from blasts and cause less severe injury because of the irregular particle shape and low energy transmission. This study analyzed 135 patients with head trauma, 80 patients (59%) injured by missiles and 55 patients (41%) by shrapnel. Glasgow Coma Scale (GCS) scores at admission were 3 to 7 in 69 patients, 8 to 10 in 29 patients, and 11 to 15 in 37 patients. The most common anatomical localizations were the right frontoparietal region in 42 patients and the left frontoparietal region in 40 patients. One hundred patients (74%) were operated on immediately and 35 patients (26%) were treated conservatively in the intensive care unit. Ten of the 135 patients died (7.4%), seven from missile injury and three from shrapnel injury. In this study, we found that high mortality was associated with low GCS score at admission, presence of multilobar or skull base injuries, and involvement of ventricles. Early and aggressive surgical intervention decreased the mortality.

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439. Bakker, K., et al. (2017). "Olfactory function in paediatric traumatic brain injury: Recovery patterns and functional implications." Brain Impairment 18(3): 392-393.

Background and aims: Recent research indicates that disruption of olfactory function after paediatric traumatic brain injury (pTBI) is common. Importantly, olfactory dysfunction (OD) is known to have significant functional implications in areas of health, safety and quality of life. Despite this longitudinal research investigating olfactory recovery and the functional impact of OD in pTBI is limited. This study aimed to track the recovery of olfactory function following pTBI and investigate predictors of early and late olfactory outcomes. Method: The olfactory function of 37 children with TBI, aged 8-16 years, was assessed at 0-3, 8 and 18 months post-injury using the University of Pennsylvania Smell Identification Test. Data were collected on demographic and injury variables as well as the impact of OD on day-to-day function. Results: Significant improvements in olfactory performance were evident over time in the group presenting with OD acutely. For the subgroup with the most severe OD only 16% showed recovery to normal olfactory function, with the remainder demonstrating ongoing olfactory impairment 18months post-injury. While predictors of early and late olfactory outcomes varied, occipital site of impact was a significant predictor of later olfactory performance. Conclusions: Our results suggest that while there is evidence of recovery of OD over time after pTBI, those children with more severe OD acutely are likely to have persisting OD. Given this limited recovery, understanding the functional implications of OD and implementation of appropriatemanagement strategies is considered an important aspect of overall rehabilitation management of children with TBI.

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440. Bakker, K., et al. (2017). "The relationship between olfactory dysfunction and executive function in children with traumatic brain injury." Journal of clinical and experimental neuropsychology 39(9): 876-889.

INTRODUCTION: Olfactory dysfunction (OD) has been suggested as a possible marker of executive function (EF) deficits after traumatic brain injury (TBI) in adults. Little is known about the relationship between EF and OD in pediatric TBI (pTBI). This study aimed to investigate EF, explore the relationship between OD and EF, and determine the utility of olfactory performance as a marker of later EF in pTBI. It was hypothesized that (i) children with TBI would perform more poorly on EF

measures relative to normative expectation; (ii) children with OD would perform more poorly on tests of EF than those with normal olfaction after TBI; and (iii) acute olfactory function would predict later EF for children with TBI., METHOD: This was a prospective longitudinal study. Twenty seven children aged 8-16 with TBI completed olfactory assessment using the University of Pennsylvania Smell Identification Test at 0-3, 8 and 18 months post injury. Assessment of EF occurred at 8 and 18 month follow-up., RESULTS: At 8 month follow-up the pTBI cohort did not demonstrate a consistent pattern of impairment in EF, contrary to our first hypothesis. Children with OD showed significantly poorer performance on a single EF measure of Fluency when compared to those with normal olfaction at 8 months post injury, partially supporting our second hypothesis. Acute olfactory function did not significantly predict EF outcomes at either 8 or 18 months post injury., CONCLUSIONS: Overall our findings provide little support for a significant relationship between EF and OD in pTBI. In particular, there was no strong evidence that acute olfactory function is an accurate predictor of later EF in pTBI. Given the dearth of pediatric research, the limitations of our study and the potential significance of acute olfactory performance as an early marker of later EF deficits in children, further investigation is warranted.

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441. Balabanov, V. I., et al. (1987). "[Detection of knife fragments in human skulls]." Obnaruzhenie klinka nozha v polosti cherepa cheloveka. 30(4): 61.

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442. Balac, K., et al. (2019). "Globe rupture caused by a camel bite." Trauma case reports 21.

Camel bites are uncommon. They are more common during the rutting season where male camels become more aggressive. Herein, we report a unique case of a 25-year-old man who was repeatedly bitten to his face and neck by an aggressive camel that resulted in left eye evisceration, parotid duct, and facial nerve injury. To our knowledge, Globe rupture caused by a camel bite has not been previously reported.

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443. Balak, N., et al. (2009). "Intracranial retained stone after depressed skull fracture: problems in the initial diagnosis." The American journal of forensic medicine and pathology 30(2): 198-200.

In this article, a 9-year-old male patient with a compound depressed skull fracture overlying the superior sagittal sinus and an intracranial stone foreign body is presented. A cerebral penetrating injury caused by a stone is rare. The computed tomography images obtained at standard window widths and window density levels may not reveal a retained stone, which has a chemical structure similar to bone and may not show any artifacts in the computed tomography scans.

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444. Balasingam, V., et al. (1994). "Reactive astrogliosis in the neonatal mouse brain and its modulation by cytokines." The Journal of neuroscience : the official journal of the Society for Neuroscience 14(2): 846-856.

Reactive astrogliosis is a characteristic response of astrocytes to inflammation and trauma of the adult CNS. To assess the hypothesis that cytokines from inflammatory mononuclear cells that accumulate around lesion sites have a role in modulating astrogliosis, this study sought to take advantage of the neonatal system in which astrogliosis is reported to be minimal following injury and in which the immune system is relatively immature compared to adult animals. A nitrocellulose membrane implant into the cortex of postnatal day 3 mice resulted in a tremendous astrogliotic response 4 d later, as measured by glial fibrillary acidic protein (GFAP) immunoreactivity and GFAP content. In contrast, a neonatal stab wound produced limited astroglial response when compared to the adult stab wound. Utilizing the neonatal stab wound model, cytokines were microinjected into the wound site at the time of injury. All cytokines tested (gamma-IFN, IL-1, IL-2, IL-6, TNF-alpha, and M-CSF) resulted in a significantly increased astrogliosis. The specificity of the cytokine response was demonstrated by the

inability of human gamma-IFN, but not mouse gamma-IFN, in enhancing neonatal mouse astrogliosis, in accordance with reports that the interaction of gamma-IFN with its receptor occurs in a species-specific manner. We conclude that neonatal astrocytes can become reactive if an adequate injury stimulus is presented, and that the release of immunoregulatory cytokines by cells around lesion sites may be a mechanism that contributes to the production of gliosis.

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445. Balasubramanian, C., et al. (2009). "Transorbital intracranial penetrating injury-an anatomical classification." Surgical neurology 71(2): 238-240.

BACKGROUND: A transorbital intracranial injury with a wooden foreign body can be very difficult to diagnose and manage. The orbit forms an easy path for low-velocity foreign bodies into the intracranial space. The severity of the injury is often masked by unobtrusive superficial wounds. Computed tomography (CT) findings may be misinterpreted as pneumocephalus., CASE DESCRIPTION: We present a young gentleman who had a fall under the influence of alcohol near a bush and, on clinical presentation, had very little signs of a penetrating injury in the skin. There was some numbness in the V1 distribution of the trigeminal nerve. Further investigation and management are described., CONCLUSION: Although magnetic resonance imaging is more sensitive and specific, a CT angiogram with 3-dimensional reconstruction will provide much insight into the mode of intervention required. We present an anatomical classification for such injuries.

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446. Balbir, A., et al. (2009). "The effect of topiramate on electroencephalography in a model of penetrating ballistic-type brain injury in rats." Journal of neurotrauma 26(8): A30.

We recently characterized pathological electroencephalographic (EEG) activity associated with severe penetrating ballistic-type brain injury (PBBI; 12-13% of the total brain volume). These include the presence of significantly increased EEG-slowing in the form of polymorphic delta activity, and sporadic non-convulsive seizures (NCS) persisting for 72h. Topiramate (TPM), a broad spectrum anti-epileptic drug, has been shown to attenuate NCS in a model of middle cerebral artery occlusion and offer neuroprotection in a variety of brain injury models. In this study we evaluated the effect of TPM on PBBI induced EEG pathology. Rats (n= 17) were instrumented with 7 electrodes for cortical topographical EEG recording prior to injury. Following injury, rats were treated with a TPM loading dose (30mg/kg, i.v, 30 min post-PBBI) and a subsequent daily maintenance dose (15mg/kg, i.v.) for 72h. Control rats received a matching volume of saline treatment. EEG was recorded continuously for the 72h period as well as on the 7 day post-injury. TPM treated rats (10/10) survived the protocol while some control rats (3/7) died within the 72h treatment phase. Neurological impairment was measured using a neuroscore evaluation (0 = no deficit; lO = maximum deficit) 3Omin, 72h and 7d post-PBBI. Both TPM treated (n=10; neuroscore = 7.1 ±0.6) and vehicle (VEH) treated rats (n = 4; 8.8 ±0.5) demonstrated acute neurological deficits 30 min following injury which did not resolve at 7d. EEG delta power (expressed as a percent of the total EEG power) increased significantly compared to the baseline levels ($p < 0.05$) in both treatment groups and remained elevated through 72h post-injury (VEH-Baseline: 40.0 ±2.4% vs. VEH-72h: 69.4±3.5%; TPM-Baseline: 4l.8±2.l% vs. TPM-72h: 56.9±3.5%). However, when compared to VEH treated, delta power was significantly lower in the TPM group at 24h and 72h post-injury (VEH-24h: 83.4 ± 3.7% vs. TPM-24h: 73.7 ± 2.3%; VEH-72h: 69.4 ± 3.5% vs. TPM-72h: 56.9 ± 3.5%). NCS activity was presentinTPM (40%; 4/10) and VEH (71%; 5/7) treated groups. The significance of the effect of TPM on measures of NCS frequency and duration are the subject of ongoing experiments. In summary, TPM significantly attenuated injury-induced polymorphic delta activity, and appears to decrease the NCS activity and mortality associated with a severe PBBI trauma providing support for its role as a potential neuroprotection therapeutic.

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447. Baleydier, C. and C. Quoex (1975). "Epileptic activity and anatomical characteristics of different lesions in cat cortex. Ultrastructural study." Acta neuropathologica 33(2): 143-152.

Three different types of lesions have been studied in the cortex of the cat, by means of electroencephalography and electron microscopy. These three types of lesions can be listed in order of increasing magnitude according to their capacity to induce abnormal electrical activity: 1. incision of the cortex gives paroxymal activity, 2. intracortical insertion of a resin pellet generates weak epileptic activity, 3. intracortical insertion of a colbalt resin pellet produces epileptic activity. A parallel can be drawn between electrophysiological and anatomical data: there seems to be a quantitative relationship between the degree of epileptic activity and the extent of perilesional tissue. Furthermore, in this perilesional tissue, oedema is observed, the intensity of which varies according to the type of lesion. Thus, the epileptic activity of a lesion seems to be proportional not only to the volume of the perilesional tissue but also to the development of the oedema.

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448. Ball, C. G. (2015). "Penetrating nontorso trauma: the head and the neck." Canadian journal of surgery. Journal canadien de chirurgie 58(4): 284-285.

Acute penetrating injuries to the head and neck cause considerable anxiety for most clinicians owing to concern for airway control and neurologic injury and to limited clinician experience in most centres. This article discusses an organized approach to the evaluation and initial treatment of penetrating injuries to the head and neck based on regional anatomy and clinical examination. The approach is particularly helpful in the context of ongoing hemorrhage and/or airway compromise.

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449. Balseris, S., et al. (2008). "Sinoorbital gunshot injuries. Endoscopic diagnostics and management." Medicina (Kaunas, Lithuania) 44(4): 308-312.

Gunshot injuries to the paranasal sinuses and orbita are uncommon. Their severity depends on missile track in tissues. Such injuries can involve the orbit, paranasal sinuses, or brain. This article reports the main clinical criteria and the aspects of surgical management. Functional endoscopic sinus surgery is the most appropriate technique for removing projectiles left. This article also presents one case of airgun injury to the sphenoid sinus with retained missile that was safely removed using endoscopic procedures.

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450. Bamjee, Y., et al. (1996). "Maxillofacial injuries in a group of South Africans under 18 years of age." The British journal of oral & maxillofacial surgery 34(4): 298-302.

OBJECTIVE: To find out the incidence of maxillofacial injuries in South African children aged 18 years or less., DESIGN: Retrospective study of casenotes., SETTING: Six teaching hospitals affiliated to the University of Witwatersrand, Johannesburg, serving a population of about 5 million people., SUBJECTS: All 326 children treated for facial injuries in the maxillofacial and oral departments of the six hospitals between 1 January 1989 and 30 June 1992., MAIN OUTCOME MEASURES: Classification of the types of injury, associated injuries, cause of the injury, and methods of diagnosis., RESULTS: Of the total of 4192 patients of all ages treated for facial injuries, 326 (8%) were within the age range of the study. The female:male ratio was 1:2.3. Most of the injuries (227, 70%) occurred in the 13-18 age group, and assaults, fights and gunshot wounds accounted for 155 injuries (48%). Of the 326 children, 173 (53%) had single injuries and 153 (47%) had multiple injuries. Mandibular fractures were the most common (64%) followed by maxillomandibular fractures (25%). Violence was the most common cause of injury, as in the USA and Zimbabwe, but unlike the rest of the world in which it is motor vehicle accidents. Soft tissue injuries were the most common associated injuries, and conventional plain radiography was the usual investigation., CONCLUSION: The incidence of 8% compares favourably with those in other countries, but far too many injuries are the result of violence.

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451. Ban, L. H., et al. (2008). "Craniocerebral penetrating injury caused by a spear gun through the mouth: case report." Journal of neurosurgery 108(5): 1021-1023.

The authors report a case of a craniocerebral penetrating injury caused by the shaft of a spear gun. The entry point of the spear was located in the mouth without an obvious exit point. The authors first note the presentation of the patient, whose airway was obstructed by the shaft, and then discuss the surgical procedure, which was focused on removing the shaft in an anterograde direction because of an articulated wishbone located at the tip of the shaft.

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452. Bandeira-de-Mello, R. G., et al. (2018). "Pyogenic Liver Abscess Secondary to Foreign Body (Fish Bone) Treated by Laparoscopy: A Case Report." Annals of hepatology 17(1): 169-173.

Liver abscess due to perforation of the gastrointestinal tract by a foreign body is a rare and possibly fatal event. Diagnosing this pathology is complicated by the lack of specific symptoms and unfamiliarity of ingestion by the patient and low clinical suspicion of this disease. In the case of liver abscess unresponsive to aspiration and administration of antibiotics, this hypothesis must be made, despite its low incidence. This case report describes and illustrates a case of liver abscess secondary to fish bone ingestion with consequent piercing of the lesser gastric curvature, diagnosed by computed tomography and specific anamnesis. Laparoscopy was performed to extract the foreign body, without complications; the patient is currently asymptomatic and does not present any abnormal physical examination findings. We believe this represents the first case report of a successful laparoscopic treatment in South America for the removal of an ingested foreign body associated with pyogenic liver abscess.

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453. Bandt, S. K., et al. (2012). "Management of pediatric intracranial gunshot wounds: predictors of favorable clinical outcome and a new proposed treatment paradigm." Journal of neurosurgery. Pediatrics 10(6): 511-517.

OBJECT: There has been an increase in civilian gun violence since the late 1980s, with a disproportionately high increase occurring within the pediatric population. To date, no definite treatment paradigm exists for the management of these patients, nor is there a full understanding of the predictors of favorable clinical outcome in this population., METHODS: The authors completed a retrospective review of all victims of intracranial gunshot injury from birth to age 18 years at a major metropolitan Level 1 trauma center (n = 48) from 2002 to 2011. The predictive values of widely accepted adult clinical and radiographic factors for poor prognosis were investigated., RESULTS: Eight statistically significant factors ($p < 0.05$) for favorable outcome were identified. These factors include single hemispheric involvement, absence of a transventricular trajectory, < 3 lobes involved, >= 1 reactive pupil on arrival, systolic blood pressure > 100 mm Hg on arrival, absence of deep nuclei and/or third ventricular involvement, initial ICP < 30 mm Hg when monitored, and absence of midline shift. Of these 8 factors, 5 were strong predictors of favorable clinical outcome as defined by Glasgow Outcome Scale score of 4 or 5. These predictive factors included absence of a transventricular trajectory, < 3 lobes involved, >= 1 reactive pupil on arrival, absence of deep nuclei and/or third ventricular involvement, and initial ICP < 30 mm Hg. These findings form the basis of the St. Louis Scale for Pediatric Gunshot Wounds to the Head, a novel metric to inform treatment decisions for pediatric patients who sustain these devastating injuries., CONCLUSIONS: The pediatric population tends to demonstrate more favorable outcomes following intracranial gunshot injury when compared with the adult population; therefore some patients may benefit from more aggressive treatment than is considered for adults. The St. Louis Scale for Pediatric Gunshot Wounds to the Head may provide critical data toward evidence-based guidelines for clinical decision making.

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454. Bandyopadhyay, S., et al. (2021). "Traumatic brain injury related paediatric mortality and morbidity in low-and middle-income countries: A systematic review and meta-analysis." British Journal of Surgery 108(SUPPL 6): vi1.

Aim: Three million cases of paediatric traumatic brain injury (pTBI) occur annually, the majority of which occur in low-and-middle-income countries (LMICs). However, there is a paucity of data on the outcomes of pTBI available. We aimed to systematically review and synthesise the reported morbidity andmortality from pTBI in the published literature about LMICs. Method: A systematic review and meta-analysis were conducted. MEDLINE, EMBASE, Global Health, and Global Index Medicus were searched for relevant articles from January 2000 to May 2020. Observational or experimental studies on pTBI (individuals between the ages of 0 to 16 years) in LMICs were included. Morbidity data were descriptively analysed, and a random-effects model was used to pool mortality rates. PROSPERO ID: CRD42020171276. Results: We included 145 studies from 38 countries representing 174073 patients with pTBI. Males were twice (95% CI: 1.6 - 2.4) as likely to have a pTBI than females. Where available, mild TBI represented ≥ 60% of all pTBI cases in most reports (n=24/43, 56%). The commonest cited cause of pTBI was road traffic accidents (n=16643/43083, 39%), followed by falls (n=10927/43083, 25%). 4385 patients (n=4385/18092, 24%) had a reduction from normal function on discharge. On average, there were 6.7 deaths per 100 cases of pTBI. Conclusions: Only 38 LMICs have published data on the volume and burden of pTBI in their country. Limited data available suggests that young male children are at a high-risk of pTBIs in LMICs, particularly from road traffic accidents.

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455. Banerjee, A., et al. (2003). "Late spontaneous extrusion of a wooden intraorbital foreign body." Indian journal of ophthalmology 51(1): 83-84.

Wooden intraorbital foreign body is characteristic for delayed manifestation, silent progression and unpredictable outcome. A silent wooden intraorbital foreign body is difficult to diagnose clinically. Spontaneous expulsion of entire foreign body is rare.

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456. Bank, D. E. and P. L. Carolan (1993). "Cerebral abscess formation following ocular trauma: a hazard associated with common wooden toys." Pediatric emergency care 9(5): 285-288.

Penetrating orbital trauma is an uncommon pediatric emergency with potentially devastating consequences. We report a five-year-old child who fell on a wooden toy and sustained an orbital roof fracture. He subsequently developed an intracranial abscess. Current information pertaining to penetrating orbitocranial trauma will be reviewed, stressing the importance of early recognition of the intracranial injury in these cases. Both parents and toy manufacturers must remain aware of the potential for injury involving these common toys.

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457. Bank, M. A., et al. (2004). "Use of FAST to prioritize treatment of concomitant penetrating head, chest and torso wounds." The American journal of emergency medicine 22(6): 491-492.

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458. Bank, W. O., et al. (1978). "Traumatic aneurysm of the basilar artery." AJR. American journal of roentgenology 130(5): 975-977.

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459. Banker, T. P., et al. (2017). "Culture-Positive Endophthalmitis After Open Globe Injuries With and Without Retained Intraocular Foreign Bodies." Ophthalmic surgery, lasers & imaging retina 48(8): 632-637.

BACKGROUND AND OBJECTIVE: To report the visual and anatomical outcomes and microbiologic spectrum of culture-positive endophthalmitis in open globe injuries (OGIs) with or without intraocular foreign bodies (IOFBs)., PATIENTS AND METHODS: A retrospective,

interventional case series of OGIs (n = 718) treated between 2004 and 2015. Patients underwent a management protocol for OGI, including systemic broad-spectrum antibiotics, on presentation., RESULTS: Culture-positive cases of endophthalmitis after open globe repair occurred in 2.1% of eyes (n = 15 of 718 eyes); two eyes had evidence of endophthalmitis on presentation. The most common organism was Staphylococcus species (five of 17 eyes). An IOFB was present in 6.8% of eyes (n = 49 of 718 eyes). All of these eyes received prophylactic intravitreal antimicrobials. In eyes with IOFB, the rate of culture-positive endophthalmitis after initial globe repair was 8.1% (n = 4 of 49 eyes) versus 1.6% (n = 11 of 669 eyes) in eyes without IOFB (P < .01)., CONCLUSION: Culture-positive endophthalmitis was identified after OGIs more often in eyes with a concurrent IOFB. [Ophthalmic Surg Lasers Imaging Retina. 2017;48:632-637.]. Copyright 2017, SLACK Incorporated.

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460. Banks, G., et al. (1989). "The alien hand syndrome. Clinical and postmortem findings." Archives of neurology 46(4): 456-459.

Two patients had automatonlike movements of their left hands and arms (alien hand syndrome) following damage to the brain. Autopsy findings in one patient demonstrated gunshot wound damage to the medial frontal white matter bilaterally, as well as the corpus callosum, right basal ganglia, internal capsule, and thalamus. The other patient had a ruptured anterior communicating aneurysm, with subsequent resection of the right frontal gyrus rectus. We postulate that this syndrome is due to the combination of a partial callosectomy and mesial frontal lesions.

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461. Banks, P. and T. H. Redpath (1972). "Closed carotid artery hemorrhage as a complication of minor gunshot wounds of the face and jaws." Journal of oral surgery (American Dental Association : 1965) 30(3): 176-183.

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462. Bannon, M. J., et al. (2015). "Investigating the potential influence of cause of death and cocaine levels on the differential expression of genes associated with cocaine abuse." PloS one 10(2): e0117580.

The development of new therapeutic strategies for the treatment of complex brain disorders such as drug addiction is likely to be advanced by a more complete understanding of the underlying molecular pathophysiology. Although the study of postmortem human brain represents a unique resource in this regard, it can be challenging to disentangle the relative contribution of chronic pathological processes versus perimortem events to the observed changes in gene expression. To begin to unravel this issue, we analyzed by quantitative PCR the midbrain expression of numerous candidate genes previously associated with cocaine abuse. Data obtained from chronic cocaine abusers (and matched control subjects) dying of gunshot wounds were compared with a prior study of subjects with deaths directly attributable to cocaine abuse. Most of the genes studied (i.e., tyrosine hydroxylase, dopamine transporter, forkhead box A2, histone variant H3 family 3B, nuclear factor kappa B inhibitor alpha, growth arrest and DNA damage-inducible beta) were found to be differentially expressed in chronic cocaine abusers irrespective of immediate cause of death or perimortem levels of cocaine, suggesting that these may represent core pathophysiological changes arising with chronic drug abuse. On the other hand, chemokine C-C motif ligand 2 and jun proto-oncogene expression were unaffected in cocaine-abusing subjects dying of gunshot wounds, in contrast to the differential expression previously reported in cocaine-related fatalities. The possible influence of cause of death and other factors on the cocaine-responsiveness of these genes is discussed.

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463. Barac, Y. D., et al. (2019). "Heart Transplantation Survival and the Use of Traumatically Brain-Injured Donors: UNOS Registry Propensity-Matched Analysis." Journal of the American Heart Association 8(17): e012894.

Background The transplantation of hearts from traumatically brain-injured (TBI) donors has been associated with inferior long-term survival in single-center analyses. However, in a more recent analysis, death caused by cerebrovascular accident was associated with worse posttransplant survival in recipients. The purpose of this study was to explore the outcomes of heart transplantation in recipients receiving donor hearts from TBI and non-TBI donors in a large national registry. Methods and Results We performed a retrospective cohort analysis of the UNOS (United Network of Organ Sharing) Registry Organ Procurement and Transplantation Network between 2006 and 2018 for adult candidates wait-listed for isolated heart transplantation. Recipients were stratified into 2 groups, TBI and non-TBI donors. Propensity score matching was performed. Kaplan-Meier analysis was used to estimate survival posttransplant. A total of 24 894 candidates met inclusion criteria. TBI was the leading cause of death in the donor population. Recipients of TBI donor hearts (N=13 07) were younger (median age, 55 versus 57 years; P<0.001) and less likely women (21.6% versus 29.8%; P<0.001). At 10 years, the TBI group had better long-term survival compared with the non-TBI group (62.8% versus 59.9%; P<0.001). After propensity group matching, the 10-year survival was similar between groups. Conclusions In the largest analysis of heart transplants and their survival, according to the type of donor injury (TBI versus non-TBI), we found similar survival in heart transplant recipients. Future studies should address specific subpopulations (eg, hemorrhagic stroke) in the non-TBI group to address concerns about reduced posttransplant survival.

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464. Barakat, K. and A. Ali (2014). "Thermoplastic vestibuloplasty: A novel technique for treatment of lip and cheek adhesion." Craniomaxillofacial Trauma and Reconstruction 7(4): 258-262.

Lip and cheek adhesion to the opposing alveolus with complete or partial loss of the vestibular dimension represents a challenging problem for reconstruction. It usually occurs due to primary inadequate vestibular soft tissue repair following complicated trauma cases, burns, and lesions of the oral cavity. Surgical removal of scar tissue and creation of new vestibule is complicated by readhesion between the opposing connective tissue surfaces. Skin grafts and acellular dermal matrix represent the most dominant modalities used to treat deficient vestibule dimensions, but they are difficult to fix and lack the required stability during healing. Several devices have been created in an attempt to keep the tissues apart but their complex anchorage methods seriously reduced their reliability and usage. We devised a simple and reliable technique "thermoplastic vestibuloplasty" (TV) that benefit from the inherent reepithelialization capabilities of the oral mucosa to prevent readhesion and to resurface the created vestibule with its exact tissue color and texture. In total, 10 patients suffering from complete or partial lip or cheek adhesion with concomitant loss of vestibule were surgically treated by excising scar tissue and creating a new vestibule, followed by TV technique. Pre and posttreatment results were compared in terms of vestibular length, lip or cheek mobility, and change by time in vestibular length from 2 weeks up to 3months. Moreover, the patient satisfaction and outcomes were measured using visual analogue scale score. All patients tolerated the procedure without complication. The mean vestibule length and mobility signi ficantly increased from 3.8 + 0.6 mm to 11.4 + 1.4 mm ($p < 0.001$) and from 0.3 to 2 ($p < 0.001$), respectively. Regarding the stability of the achieved vestibular length it decreased by 14% when compared from 2 weeks to 3 months postoperatively. TV technique is a new simple and reliable technique that can effectively prevent readhesion of opposing connective tissue surfaces until intrinsic reepithelialization can resurface the newly created vestibular tissues forming a stable vestibular length with excellent color and texture.

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465. Baranov, I. V., et al. (2011). "[Surgical treatment of posttraumatic deformity of the orbital floor]." Vestnik khirurgii imeni I. I. Grekova 170(6): 63-65.

The article is devoted to an actual problem of surgical treatment of patients with posttraumatic deformities of the orbital floor. On the material of 21 observations it was shown that for the successful treatment of deformities of the orbit bottom autogenous costal cartilage graft should be used as a plastic material. Removal of enophthalmos in longstanding fractures can be reached only by reducing the

volume of the orbit which can be achieved by retrobulbar placement of the graft. An analysis of the results demonstrated high efficiency of this method in the treatment of such patients.

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466. Baransel, A., et al. (2004). "Loss of facial identification of the survivor after firearm injury to the head." Military medicine 169(3): 227-229.

Firearm wounds to the head are often fatal and are routinely encountered in the practice of forensic medicine. Herein we presented a patient who was wounded with a military rifle. This condition is unique and interesting for forensic medicine because none of the vital structures or major vessels were injured although the patient had a firearm injury to his head. In contrast to many other cases, the vital signs of our patient were normal and he was conscious on admission. Although the patient was considered lucky because he was still alive, he now had an unrecognizable face.

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467. Baranwal, V. K., et al. (2016). "A case of orbitocranial foreign body." Medical Journal Armed Forces India 72(1): 82-84.

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468. Barbey, A. K., et al. (2014). "Architecture of fluid intelligence and working memory revealed by lesion mapping." Brain structure & function 219(2): 485-494.

Although cognitive neuroscience has made valuable progress in understanding the role of the prefrontal cortex in human intelligence, the functional networks that support adaptive behavior and novel problem solving remain to be well characterized. Here, we studied 158 human brain lesion patients to investigate the cognitive and neural foundations of key competencies for fluid intelligence and working memory. We administered a battery of neuropsychological tests, including the Wechsler Adult Intelligence Scale (WAIS) and the N-Back task. Latent variable modeling was applied to obtain error-free scores of fluid intelligence and working memory, followed by voxel-based lesion-symptom mapping to elucidate their neural substrates. The observed latent variable modeling and lesion results support an integrative framework for understanding the architecture of fluid intelligence and working memory and make specific recommendations for the interpretation and application of the WAIS and N-Back task to the study of fluid intelligence in health and disease.

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469. Barbian, L. T. and P. S. Sledzik (2008). "Healing following cranial trauma." Journal of forensic sciences 53(2): 263-268.

This paper reports on the gross appearance of the initial osseous response following cranial gunshot wounds. A total of 127 adult crania and cranial sections were analyzed for four types of bone response: osteoblastic, osteoclastic, line of demarcation, and sequestration. In general, no osteoblastic or osteoclastic response was noted during the first week. This response was followed by an increasing prevalence of expression after this time. By the sixth week postfracture both osteoclastic and osteoblastic activity was scored for 100% of the sample. Further, our observations suggest that the line of demarcation may establish the boundary between the living bone and bone not surviving the fracture. Sequestration appears to be a long-term event and was scored as present well past the eighth week of healing. The osseous expression of infection following fracture was also considered.

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470. Barbois, S., et al. (2016). "Management of penetrating abdominal and thoraco-abdominal wounds: A retrospective study of 186 patients." Journal of visceral surgery 153(4 Suppl): 69-78.

This is a single center retrospective review of abdominal or abdomino-thoracic penetrating wounds treated between 2004 and 2013 in the gastrointestinal and emergency unit of the university hospital of Grenoble, France. This study did not include patients who sustained blunt trauma or non-traumatic wounds, as well as patients with penetrating head and neck injury, limb injury, ano-perineal

injury, or isolated thoracic injury above the fifth costal interspace. In addition, we also included cases that were reviewed in emergency department morbidity and mortality conferences during the same period. Mortality was 5.9% (11/186 patients). Mean age was 36 years (range: 13-87). Seventy-eight percent (145 patients) suffered stab wounds. Most patients were hemodynamically stable or stabilized upon arrival at the hospital (163 patients: 87.6%). Six resuscitative thoracotomies were performed, five for gunshot wounds, one for a stab wound. When abdominal exploration was necessary, laparotomy was chosen most often (78/186: 41.9%), while laparoscopy was performed in 46 cases (24.7%), with conversion to laparotomy in nine cases. Abdominal penetration was found in 103 cases (55.4%) and thoracic penetration in 44 patients (23.7%). Twenty-nine patients (15.6%) had both thoracic and abdominal penetration (with 16 diaphragmatic wounds). Suicide attempts were recorded in 43 patients (23.1%), 31 (72.1%) with peritoneal penetration. Two patients (1.1%) required operation for delayed peritonitis, one who had had a laparotomy qualified as "negative", and another who had undergone surgical exploration of his wound under general anesthesia. In conclusion, management of clear-cut or suspected penetrating injury represents a medico-surgical challenge and requires effective management protocols.

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471. Barbosa, G. d. S., et al. (2022). "Performance of the Modified Rapid Emergency Medicine Score in Patients With and Without Traumatic Brain Injury." The Journal of neuroscience nursing : journal of the American Association of Neuroscience Nurses 54(3): 130-135.

ABSTRACT: BACKGROUND: The modified Rapid Emergency Medicine Score (mREMS) is a recently published index to estimate the severity of trauma patients; however, little is known about its performance in patients with different types of trauma. This study verified the predictive capacity of mREMS in-hospital mortality in patients of blunt and penetrating trauma with and without traumatic brain injury (TBI) and the performance of this index compared with the Rapid Emergency Medicine Score, Injury Severity Score, New Injury Severity Score, and Trauma and Injury Severity Score. METHODS: This is a retrospective, correlational study that analyzed trauma patients 18 years or older, who attended at a hospital in Rio de Janeiro, Brazil. The receiver operating characteristic (ROC) curve was applied in the analyses. RESULTS: The sample consisted of 987 patients, 359 (36.4%) with TBI (225 blunt and 134 penetrating trauma). Regarding mREMS, the area under the ROC curve for TBI patients for in-hospital mortality was 0.506 (95% confidence interval [CI], 0.404-0.609) for penetrating injuries and 0.486 (95% CI, 0.402-0.571) for blunt injuries; the values in patients without TBI were 0.629 (95% CI, 0.554-0.703) and 0.618 (95% CI, 0.552-0.684), respectively. In relation to the other indices the mREMS presented the lowest area under the curve/ROC for penetrating and blunt TBI, and the Rapid Emergency Medicine Score for extracranial injuries. CONCLUSION : The mREMS showed no prognostic capacity for patients with TBI, and it presented the worst performance in relation to the Injury Severity Score, New Injury Severity Score, and Trauma and Injury Severity Score to discriminate cases of in-hospital mortality when considering trauma patients with and without TBI.

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472. Bard, L. A. and W. H. Jarrett (1964). "INTRACRANIAL COMPLICATIONS OF PENETRATING ORBITAL INJURIES." Archives of ophthalmology (Chicago, Ill. : 1960) 71: 332-343.

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473. Barfield, D. M., et al. (2016). "Retrospective evaluation of recurrent secondary septic peritonitis in dogs (2000-2011): 41 cases." Journal of veterinary emergency and critical care (San Antonio, Tex. : 2001) 26(2): 281-287.

OBJECTIVE: To describe the clinical characteristics of recurrent septic peritonitis in dogs., DESIGN: Multicenter retrospective observational study., ANIMALS: Client-owned dogs with recurrent septic peritonitis., SETTING: Three university emergency and referral hospitals., INTERVENTIONS: None., MEASUREMENTS AND MAIN RESULTS: Medical records from 3 veterinary university

teaching hospitals were reviewed and data were collected using a standardized data collection sheet for all cases of septic peritonitis during the study period (2000-2011). Forty one dogs met the inclusion criteria for recurrent peritonitis. All dogs underwent relaparotomy. The original cause of septic peritonitis in these cases included previous surgery for gastrointestinal foreign body removal (n = 26), gastrointestinal neoplasia (n = 3), gastric or duodenal ulceration (n = 3), biliary tract leakage (n = 2), and single instance for each of the following: penetrating foreign body, hernia strangulation, intussusception, mesenteric volvulus, infection of the laparotomy incision, prostatic abscess, and trauma. Eighteen animals survived to discharge. There was no difference detected between survivors and nonsurvivors with recurrent peritonitis in terms of inciting cause, serum albumin concentration, surgical management, or provision of appropriate initial antimicrobials. The survival rate for dogs having recurrent peritonitis was 43.9% (18/41 dogs)., CONCLUSIONS: This retrospective study did not identify any significant prognostic indicators for dogs with recurrent peritonitis and that the mortality rate for dogs having more than one surgery for septic peritonitis is similar to that reported for a single surgery for septic peritonitis.

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474. Barhoum, M., et al. (2015). "Syria civil war: Outcomes of humanitarian neurosurgical care provided to Syrian wounded refugees in Israel." Brain injury 29(11): 1370-1375.

BACKGROUND: As an expected consequence of the civil war in Syria, emergent neurosurgical care for battlefield trauma has been provided for severely head-injured Syrians transferred to Northern Israel., METHODS: Sixty-six patients suffering from brain injury were brought to the border and then referred to the institution after initial resuscitation. Both the time and type of injury were recorded based on paramedic testimony, forensic material or on details provided by patients. A retrospective analysis of all medical charts and imaging material was performed., RESULTS: Most injuries were combat-related, either caused by blast (13.6%), shrapnel (24.2%), assault (28.8%) or gunshot wound (15.2%). Only a minority of patients (18.2%) suffered from injuries that were not directly caused by weapon. A total of 55 surgical procedures were performed in 46 out of 66 patients, including craniotomies in 40 patients, burr hole alone for placement of intraparenchymal intracranial pressure (ICP) sensor in nine instances and ventricle peritoneal shunt in two patients. Decompressive craniectomy was used only for the treatment of gunshot wound and was performed in eight out of 10 patients. The most common complication consisted in cerebrospinal fluid fistulas (16.7%). Post-operative infections occurred in seven patients (10.6%). Short-term outcomes were favourable in 60.7%, with a mortality rate of 4.5%., DISCUSSION: The present findings suggest that aggressive surgery and neuro-intensive care measures may lead to good functional results, even in the presence of seemingly devastating injuries in some selected patients.

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475. Barker, F. G. (1997). "Repairing holes in the head: a history of cranioplasty." Neurosurgery 41(4): 999.

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476. Barker-Griffith, A. E., et al. (1998). "Potato gun ocular injury." Ophthalmology 105(3): 535-538.

PURPOSE: This study aimed to identify a dangerous new weapon capable of causing damage to the ocular and periocular regions., METHODS: The authors report two patients who had penetrating ocular injury in the past year because of homemade recreational potato guns., RESULTS: In one 14-year-old boy, projectiles from the firing of a potato gun resulted in orbital and cranial injuries that were life threatening with widespread fractures, marked disruption of facial structures, a cerebrospinal fluid fistula requiring bifrontal surgical repair, and loss of one eye. In a separate accident with a different potato gun, a 14-year-old boy who was wearing glasses at the time of injury had a sight-threatening perforating corneal laceration., CONCLUSION: Practitioners must be aware of the existence of these new, homemade unregulated devices. Information about the use and construction of these guns is

widespread on the Internet, but no injuries resulting from these guns currently are documented in the medical literature.

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477. Barnard, E. B. G., et al. (2013). "Anterior chamber gas bubbles in open globe injury." Journal of the Royal Naval Medical Service 99(2): 53-54.

We present a case of a 40-year-old soldier who was in close proximity to the detonation of an improvised explosive device (IED). Bubbles of gas were visible within the anterior chamber of his left eye. The authors propose that intraocular gas, present acutely after trauma, is diagnostic of open globe injury and is of particular importance in remote military environments.

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478. Barnung, S. and J. Steinmetz (2014). "A prehospital use of ITClamp for haemostatic control and fixation of a chest tube." Acta anaesthesiologica Scandinavica 58(2): 251-253.

We here present three cases in which a new device, the ITClamp Hemorrhage Control System (Innovative Trauma Care, Inc., Edmonton, Canada), was used for bleeding control and for securing a chest tube. Copyright © 2013 The Acta Anaesthesiologica Scandinavica Foundation. Published by John Wiley & Sons Ltd.

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479. Barreda-Manso, M. A., et al. (2017). "Neuroprotection and Blood-Brain Barrier Restoration by Salubrinal After a Cortical Stab Injury." Journal of cellular physiology 232(6): 1501-1510.

Following a central nervous system (CNS) injury, restoration of the blood-brain barrier (BBB) integrity is essential for recovering homeostasis. When this process is delayed or impeded, blood substances and cells enter the CNS parenchyma, initiating an additional inflammatory process that extends the initial injury and causes so-called secondary neuronal loss. Astrocytes and profibrotic mesenchymal cells react to the injury and migrate to the lesion site, creating a new glia limitans that restores the BBB. This process is beneficial for the resolution of the inflammation, neuronal survival, and the initiation of the healing process. Salubrinal is a small molecule with neuroprotective properties in different animal models of stroke and trauma to the CNS. Here, we show that salubrinal increased neuronal survival in the neighbourhood of a cerebral cortex stab injury. Moreover, salubrinal reduced cortical blood leakage into the parenchyma of injured animals compared with injured controls. Adjacent to the site of injury, salubrinal induced immunoreactivity for platelet-derived growth factor subunit B (PDGF-B), a specific mitogenic factor for mesenchymal cells. This effect might be responsible for the increased immunoreactivity for fibronectin and the decreased activation of microglia and macrophages in injured mice treated with salubrinal, compared with injured controls. The immunoreactivity for PDGF-B colocalized with neuronal nuclei (NeuN), suggesting that cortical neurons in the proximity of the injury were the main source of PDGF-B. Our results suggest that after an injury, neurons play an important role in both, the healing process and the restoration of the BBB integrity. J. Cell. Physiol. 232: 1501-1510, 2017. © 2016 Wiley Periodicals, Inc. Copyright © 2016 Wiley Periodicals, Inc.

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480. Barreto, G. E., et al. (2014). "Selective estrogen receptor modulators regulate reactive microglia after penetrating brain injury." Frontiers in Aging Neuroscience 6(JUN).

Following brain injury, microglia assume a reactive-like state and secrete pro-inflammatory molecules that can potentiate damage. A therapeutic strategy that may limit microgliosis is of potential interest. In this context, selective estrogen receptor modulators, such as raloxifene and tamoxifen, are known to reduce microglia activation induced by neuroinflammatory stimuli in young animals. In the present study, we have assessed whether raloxifene and tamoxifen are able to affect microglia activation after brain injury in young and aged animals in time points relevant to clinics, which is hours after brain trauma. Volume fraction of MHC-II+ microglia was estimated according to the point-counting method of Weibel within a distance of 350 μm from the lateral border of the wound, and cellular morphology

was measured by fractal analysis. Two groups of animals were studied: (1) young rats, ovariectomized at 2 months of age and (2) aged rats, ovariectomized at 18 months of age. Fifteen days after ovariectomy animals received a stab wound brain injury and the treatment with estrogenic compounds. Our findings indicate that raloxifene and tamoxifen reduced microglia activation in both young and aged animals. Although the volume fraction of reactive microglia was found lower in aged animals, this was accompanied by important changes in cell morphology, where aged microglia assume a bushier and hyperplasic aspect when compared to young microglia. These data suggest that early regulation of microglia activation provides a mechanism by which selective estrogen receptors modulators (SERMs) may exert a neuroprotective effect in the setting of a brain trauma.© 2014 Barreto, Santos-Galindo and Garcia-Segura.

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481. Barreto, S. M., et al. (2000). "Predictors of first nonfatal occupational injury following employment in a Brazilian steelworks." Scandinavian journal of work, environment & health 26(6): 523-528.

OBJECTIVES: This study investigated the influence of sociodemographic and occupational factors on the risk of 1st injury among Brazilian steelworkers., METHODS: Workers 1st employed between 1 January 1977 and 31 December 1985 and still employed on 1 December 1983 were followed from the date of hire until 30 October 1992. Occupational injuries were ascertained from a database. Kaplan-Meier curves for time to 1st injury were calculated for the total cohort and for different subgroups. A multivariate analysis of risk factors for 1st injury was carried out using the Cox proportional hazards regression model., RESULTS: Forty-one percent of the workers had > or = 1 occupational injuries, and 39% of 1st injuries occurred in the 1st year of employment. Lacerations, contusions, penetration by foreign bodies, bums, sprains, and fractures constituted the main diagnostic groups. Injuries to the hands, eyes, feet, arms, and legs dominated. Over 5% of the injured workers were on temporary disability leave (cumulative total 10,660 days). The probability for an occupational injury was 16% for the 1st year, rising to 25% in the 2nd year. The risk of nonfatal injury was highest for laborers [hazard ratio (HR) 1.76, 95% confidence interval (95% CI) 1.35-2.29] and employees in the steel mill (HR 1.40, 95% CI 1.21-1.63), and inversely related to worker age and educational level. The risk of injury decreased significantly with calendar period of employment., CONCLUSIONS: Substantial reductions in nonfatal injuries may reflect changes in work organization, increased automation, and improved safety standards. Knowledge of predictors of work-related injury may contribute to injury prevention strategies, especially among newly employed workers.

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482. Barros, J. J. (1967). "Foreign body localization." Oral surgery, oral medicine, and oral pathology 24(3): 368.

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483. Barrow, D. L., et al. (1984). "The use of greater omentum vascularized free flaps for neurosurgical disorders requiring reconstruction." Journal of neurosurgery 60(2): 305-311.

The heterotopic transfer of composite tissue, with microvascular anastomosis of an arterial supply and venous drainage to locally existing vessels, has received considerable attention in the plastic surgical literature. The use of latissimus dorsi musculocutaneous free flaps has been reported in the repair of large defects of the scalp, cranium, and dura following resection of invasive neoplasms or trauma. When the defect involves primarily subcutaneous tissue loss resulting in abnormal contour, omental free flaps provide effective coverage and restoration of contour. In addition, the inherent capability of the omentum to combat infection and form an ideal bed for the establishment of skin or bone grafts provides further indications for its use. The authors have used omental free flaps in nine cases to reconstruct gunshot wounds of the head, orbit, and face, heal chronic cavitating frontal sinus infections, form a base over exposed dura for reconstruction of the skull with rib grafts, and cover large defects after resection of invasive tumors or infected scalp. These wounds of neurosurgical interest were reconstructed with acceptable structural and aesthetic results. The indications, surgical techniques,

results, alternative procedures, and potential complications of this procedure are discussed. The authors believe that omental free flaps should be considered an option in the armamentarium of reconstructive approaches for skull, dural, scalp, orbital, and facial wounds.

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484. Barrs, D. M. (1991). "Facial nerve trauma: optimal timing for repair." The Laryngoscope 101(8): 835-848.

Due to the uncertainty of optimal timing for facial nerve repair after severe trauma, a study was designed to investigate facial nerve repair in micro-pigs by grafting at intervals after nerve transection ranging from 0 to 90 days. Following adequate time for regeneration, it was possible to electrically stimulate across the nerve graft in all animals. No significant difference existed between operative groups for electrophysiologic testing. Axon counts demonstrated a trend toward a lower regeneration rate in more delayed grafts. This trend and the ease of grafting with less scar and nerve stump resection suggest that the best results may be obtained with grafting as early as possible. Grafting at 21 days, the peak of neuron cell-body metabolic activity, did not produce better results. Since statistically significant differences do not exist between individual groups, grafting several months after trauma can be successful, if medically necessary.

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485. Barrs, V. R., et al. (2007). "Intracranial empyema: literature review and two novel cases in cats." The Journal of small animal practice 48(8): 449-454.

OBJECTIVES: To review the literature on intracranial empyema and report two new cases in cats., METHODS: Literature review and case reports., RESULTS: Intracranial empyema has been rarely reported in small animals. In two novel cases in cats, the route of infection was postulated to be local extension from a retrobulbar abscess of odontogenic origin in one case and direct inoculation from a penetrating bite wound to the skull, confirmed at post-mortem examination, in the other. On magnetic resonance imaging of the first case, there was a contrast-enhancing large extra-axial fluid collection overlying the right cerebral hemisphere, consistent with subdural empyema. Infection was caused by an Actinomyces spp. This is the first report of successful treatment of intracranial empyema by craniotomy, drainage and antibiotics., CLINICAL SIGNIFICANCE: Intracranial empyema is a neurosurgical emergency. Favourable outcomes may be achieved with surgical decompression, antimicrobial therapy and intensive care.

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486. Bartee, B. K. (1995). "The use of high-density polytetrafluoroethylene membrane to treat osseous defects: clinical reports." Implant dentistry 4(1): 21-26.

Alveolar bone resorption can result from tooth loss, periodontal disease, or trauma. Guided tissue regeneration is used in an attempt to exclude tissues devoid of osteogenic potential from a bone defect or cavity and promote new bone growth to replace missing osseous structure. Many types of barrier membranes have been used, but none have been found to be ideal for every clinical situation. Macroporous membranes, such as expanded polytetrafluoroethylene, require primary closure and a second surgical procedure for their removal. Macroporous membranes can incorporate bacteria and may become infected if exposed in the oral cavity. Membranes manufactured of resorbable polymers require primary closure of the augmentation site and exhibit variable patterns of resorption, introducing a degree of unpredictability into the procedure. The use of high-density polytetrafluoroethylene membrane to promote deposition of bone for ridge augmentation in the oral cavity is described. Two clinical reports are presented.

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487. Bartholomew, B. J., et al. (2003). "Unusual transoral penetrating injury of the foramen magnum: case report." Neurosurgery 53(4): 989-991.

OBJECTIVE AND IMPORTANCE: Penetrating injuries of the cranium and spine are frequent to the civilian neurosurgical practice. Although a variety of unusual objects have been reported, to our knowledge, there has never been a craniocerebral or spinal injury caused by a fish. An unusual case of transoral penetration of the foramen magnum by a billed fish is described. The history, radiographic studies, and treatment are presented., CLINICAL PRESENTATION: A fisherman struck by a jumping fish initially presented with severe neck pain and stiffness, bleeding from the mouth, and a laceration in the right posterior pharynx. A computed tomographic scan of the cervical spine revealed a wedge-shaped, hyperdense object extending from the posterior pharynx into the spinal canal between the atlas and the occiput. Because of the time factor involved, the fisherman was brought directly to surgery for transoral removal of the object., INTERVENTION: The patient was placed under general anesthesia, and with a tonsillar retractor, a kipner, and hand-held retractors, the object was visualized and identified as a fish bill. Further dissection above the anterior aspect of the atlas permitted removal of the object by means of a grabber from an arthroscopic set. No expression of cerebrospinal fluid was noted, and a Penrose drain was placed., CONCLUSION: The patient was treated under the assumption that penetrating foreign objects in continuity with the cerebrospinal fluid space and the outside environment should be removed as soon as possible. The patient was provided appropriate antibiotics to treat potential infection of normal pharyngeal flora and organisms unique to the marine environment. The patient recovered and did not experience any residual neurological deficit.

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488. Bartholomew, S. and A. Young (2019). "Observing pneumothoraces: The 35-millimeter rule is safe for both blunt and penetrating chest trauma: Eddine SBZ, Boyle K, Dodgion CM, et al. J Trauma Acute Care Surg. 2019;86(4):557–564." Journal of Emergency Medicine 57(3): 420.

With the increased use of chest computed tomography (CT) in trauma patients, providers are detecting occult pneumothoraces more frequently. While standard practice has been to place a chest tube in all patients with a traumatic pneumothorax, more recently providers are observing some hemodynamically stable patients with pneumothoraces. Prior trials have concluded that using a cut-off of pneumothoraces <35mm could predict successful observation. This study aimed to demonstrate that there is an objective measurement that can be used to determine which traumatic pneumothoraces can be safely observed without requiring placement of a chest tube. This was a single center retrospective study of patients admitted to a level 1 trauma center between 2011 and 2016. Inclusion criteria consisted of patients over age 18 that had chest CT at the time of admission following trauma. Exclusion criteria included patients who had no chest CT performed, had an ipsilateral hemothorax or hemopneumothorax, had a chest tube inserted before doing a chest CT, and patients who were mechanically ventilated during their index admission. To obtain the measurement for the cutoff value, study authors measured the distance between the parietal pleura and the mediastinum in a line perpendicular to the chest wall, measuring the largest air pocket. Measurements were categorized into those with a measurement greater than or less than 35mm. Patient management was categorized into those who were observed or those who had placement of a chest tube. Observation was defined as not requiring a chest tube within 4 hours of presentation to the emergency department (ED). The primary outcome was successful observation of the pneumothorax. Failure of observation included interventions such as delayed chest tube placement, video assisted thorascopic surgery (VATS), intrapleural tissue plasminogen activator, or thoracotomy. Secondary outcomes included hospital length of stay and intensive care unit (ICU) length of stay. 1,767 patients with a traumatic pneumothorax were identified in the institution’s trauma registry, of which 935 were immediately excluded due to presence of hemothorax or hemopneumothorax, 116 excluded due to initiation of mechanical ventilation, resulting in 336 eligible patients with CT identified occult pneumothorax. 94.3% of the patients had a blunt mechanism of injury. The median measurement of pneumothoraces was 10.4mm, with 293 (87.2%) of the pneumothoraces measuring 35mm or less. The median length of stay in the hospital was 4 days. 47 patients received a chest tube within the first 4 hours and 257 (89%) were observed. There were 272 patients in the trauma registry with pneumothorax ≤ 35mm; of these, 25 patients (9%) failed observation. There were 17 patients with a pneumothorax of >35mm, of which 41% failed observation. Reasons for failure included progression of pneumothorax,

development of pleural effusion, tension pneumothorax, and hemothorax. In those with a pneumothorax of 35mm or less, there was a positive predictive value of successful observation of 90.8%, with a negative predictive value of 41.2%. Significant predictors for failing observation included: pneumothorax measurement category (≤35 mm vs. >35 mm) ($P < 0.0001$), GCS ($p = 0.012$), and number of rib fractures ($p = 0.048$) in a univariate logistic regression analysis, but in a multivariate logistic regression analysis, the size of pneumothorax ≤ 35mm was the single predictor of success (OR for failure 0.142, 95% CI 0.047-0.428). The authors of the article conclude that although Advanced Trauma Life Support (ATLS) suggests the placement of a chest tube for all traumatic pneumothoraces to prevent the development of a tension pneumothorax, given the lack of guidelines the decision to place a chest tube in these pneumothoraces should be balanced between the risks and benefits to potentially spare patients the avoidable morbidity and even mortality. The authors concluded that this study adds validity to the use of the 35-mm rule in guiding decisions to observe stable patients with pneumothoraces based on their low failure rate of 9% and use of the rule at a different institution and with a different practice group than prior studies. The limitations of the study include determination of a 4 hour cut-off for observation based on institution physician practice patterns, unclear reasons for placing the chest tube in 34.4% of the patients, visual measurement of the largest air pocket on CT, and imbalance between incidence of blunt (94.3%) and penetrating trauma. The latter raises the question as to whether the results are generalizable to penetrating trauma resulting in isolated pneumothorax. Commentary: Avoiding unnecessary chest tube placement in traumatic pneumothorax is a no-brainer. This study showed that pneumothorax size ≤ 35mm was an independent predictor of successful observation without chest tube placement. However, the retrospective nature of this study does limit it's applicability. Significant selection bias exists and it is not clear which of the patients who had physiologic deterioration or required a second intervention were in the observed cohort ≤ 35mm and or not. A prospective observational or randomized trial will be needed before this suggested algorithm should be adopted for all traumatic pneumothorax.

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489. Barton, J. J. S. (2008). "Structure and function in acquired prosopagnosia: lessons from a series of 10 patients with brain damage." Journal of neuropsychology 2(1): 197-225.

Acquired prosopagnosia varies in both behavioural manifestations and the location and extent of underlying lesions. We studied 10 patients with adult-onset lesions on a battery of face-processing tests. Using signal detection methods, we found that discriminative power for the familiarity of famous faces was most reduced by bilateral occipitotemporal lesions that involved the fusiform gyri, and better preserved with unilateral right-sided lesions. Tests of perception of facial structural configuration showed severe deficits with lesions that included the right fusiform gyrus, whether unilateral or bilateral. This deficit was most consistent for eye configuration, with some patients performing normally for mouth configuration. Patients with anterior temporal lesions had better configuration perception, though at least one patient showed a more subtle failure to integrate configural data from different facial regions. Facial imagery, an index of facial memories, was severely impaired by bilateral lesions that included the right anterior temporal lobe and marginally impaired by fusiform lesions alone; unilateral right fusiform lesions tended to spare imagery for facial features. These findings suggest that (I) prosopagnosia is more severe with bilateral than unilateral lesions, indicating a minor contribution of the left hemisphere to face recognition, (2) perception of facial configuration critically involves the right fusiform gyrus and (3) access to facial memories is most disrupted by bilateral lesions that also include the right anterior temporal lobe. This supports assertions that more apperceptive variants of prosopagnosia are linked to fusiform damage, whereas more associative variants are linked to anterior temporal damage. Next, we found that behavioural indices of covert recognition correlated with measures of overt familiarity, consistent with theories that covert behaviour emerges from the output of damaged neural networks, rather than alternative pathways. Finally, to probe the face specificity of the prosopagnosic defect, we tested recognition of fruits and vegetables: While face specificity was not found in most of our patients, the data of one patient suggested that this may be possible with more focal lesions of the right fusiform gyrus.

490. Barua, N. U., et al. (2007). "Traumatic callosomarginal aneurysm following orbital gunshot wound in a 16-year-old girl." British journal of neurosurgery 21(2): 237-238.

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491. Bashir, M.-U., et al. (2013). "Craniocerebral injuries in war against terrorism --- a contemporary series from Pakistan." Chinese journal of traumatology = Zhonghua chuang shang za zhi 16(3): 149-157.

OBJECTIVE: Terrorism-related bomb attacks on civilian population have increased dramatically over the last decade. Craniocerebral injuries secondary to improvised explosive devices have not been widely reported in the context of unarmored civilians. This series intends to report the spectrum of these injuries secondary to suicidal and implanted bombs as encountered at the Aga Khan University Hospital, Pakistan (AKUH). Further, a few pertinent management guidelines have also been discussed., METHODS: The hospital database and clinical coding during a 5-year period were examined for head injuries secondary to terrorism-associated blasts. In addition to patient demographics, data analysis for our series included initial Glasgow Coma Scale, presenting neurological complaints, associated non-neurological injuries, management (conservative or operative) to associated complications, and discharge neurological status., RESULTS: A total of 16 patients were included in this series. Among them 9 were victims of suicidal blasts while 7 were exposed to implanted devices. The patients presented with diverse patterns of injury secondary to a variety of shrapnel. A follow-up record was available for 12 of the 16 patients (mean follow-up: 7.8 months), with most patients having no active complaints., CONCLUSION: The results of this series show that civilian victims of suicidal and improvised bombings present with a wide range of neurological symptoms and injury patterns, which often differ from the neurological injuries incurred by military personnel in similar situations, and thereby often require individualized care.

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492. Basit, R., et al. (2023). "Simulating traumatic brain injury in vitro: Developing high throughput models to test biomaterial based therapies." Neural Regeneration Research 18(2): 289-292.

Traumatic brain injuries are serious clinical incidents associated with some of the poorest outcomes in neurological practice. Coupled with the limited regenerative capacity of the brain, this has significant implications for patients, carers, and healthcare systems, and the requirement for life-long care in some cases. Clinical treatment currently focuses on limiting the initial neural damage with long-Term care/support from multidisciplinary teams. Therapies targeting neuroprotection and neural regeneration are not currently available but are the focus of intensive research. Biomaterial-based interventions are gaining popularity for a range of applications including biomolecule and drug delivery, and to function as cellular scaffolds. Experimental investigations into the development of such novel therapeutics for traumatic brain injury will be critically underpinned by the availability of appropriate high throughput, facile, ethically viable, and pathomimetic biological model systems. This represents a significant challenge for researchers given the pathological complexity of traumatic brain injury. Specifically, there is a concerted post-injury response mounted by multiple neural cell types which includes microglial activation and astroglial scarring with the expression of a range of growth inhibitory molecules and cytokines in the lesion environment. Here, we review common models used for the study of traumatic brain injury (ranging from live animal models to in vitro systems), focusing on penetrating traumatic brain injury models. We discuss their relative advantages and drawbacks for the developmental testing of biomaterial-based therapies.

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493. Basit, R. H., et al. (2021). "New in vitro model of traumatic brain injury to assess biomaterial based regenerative strategies." British Journal of Surgery 108(SUPPL 2): ii1.

Introduction: Penetrating traumatic brain injury (pTBI) management is largely supportive, with no clinically established regenerative therapies. Neurocompatible biomaterials offer a high potential to

promote regenerative mechanisms but facile, high throughput, pathomimetic in vitro pTBI models for the developmental testing of neuro-materials is lacking. Method: A mouse mixed glial culture system was utilised within which penetrating injuries could be induced. DuraGen Plus™-an FDA approved neurosurgical grade biomaterial could be implanted into lesions to assess cell-biomaterial responses. Reactive gliosis (astrocytic morphological responses/GFAP expression) and microglial infiltration (Iba1 expression) were assessed/quantified. Results: Key pathological features of pTBI were observed in the model, with the ability to (i) introduce reproducible lesions (diameter 949 6 26 μm) and (ii) for DuraGen Plus™ to be implanted into lesions. Perilesional astrocytes displayed hypertrophic palisading morphologies and GFAP upregulation, analogous to gliosis in vivo. Significant microglial numbers infiltrated the DuraGen Plus™ implant at 7 days post-lesion (132.41 ± 15.83 cells/mm2) versus lesion only (82.04 ± 5.11 cells/ Mm2), $p<0.05$). Conclusions: We have developed a novel, neuropathomimetic pTBI model, wherein biomaterial implantation enables investigation of neural cell-biomaterial responses. This model can facilitate early-stage evaluation of novel biomaterials as high throughput, inexpensive and facile screening tool.

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494. Basit, R. H., et al. (2021). "In vitro model of traumatic brain injury to screen neuro-regenerative biomaterials." Materials science & engineering. C, Materials for biological applications 128: 112253.

Penetrating traumatic brain injury (pTBI) causes serious neurological deficits with no clinical regenerative therapies currently available. Tissue engineering strategies using biomaterial-based 'structural bridges' offer high potential to promote neural regeneration post-injury. This includes surgical grade materials which can be repurposed as biological scaffolds to overcome challenges associated with long approval processes and scaleup for human application. However, high throughput, pathomimetic models of pTBI are lacking for the developmental testing of such neuro-materials, representing a bottleneck in this rapidly emergent field. We have established a high throughput and facile culture model containing the major neural cell types which govern biomaterial handling in the central nervous system. We show that induction of traumatic injuries was feasible in the model, with post-injury implantation of a surgical grade biomaterial. Cellular imaging in lesions was achievable using standard epifluorescence microscopy methods. Key pathological features of pTBI were evident in vitro namely immune cell infiltration of lesions/biomaterial, with responses characteristic of cell scarring, namely hypertrophic astrocytes with GFAP upregulation. Based on our observations, we consider the high-throughput, inexpensive and facile pTBI model can be used to study biomaterial 'implantation' and evaluate neural cell-biomaterial responses. The model is highly versatile to test a range of laboratory and clinical grade materials for neural regeneration.

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495. Basmadjian, G., et al. (1975). "Retinal detachment after strabismus surgery." American journal of ophthalmology 79(2): 305-309.

Four nonmyopic eyes in three patients developed retinal detachment after strabismus surgery. Certain features common in all four eyes included the presence of a chorioretinal scar corresponding in location to the muscle operated on, proliferating fibrous tissue adjacent to the scar, and varying degrees of vitreous hemorrhage. These findings were similar to those in retinal detachments after perforation of the eye by foreign bodies. Penetration of the globe by the needle during muscle surgery was considered the etiologic factor. The use of spatula needles to prevent piercing of the globe is suggested, and in case such accident is suspected, diathermy or cryoapplication over the perforation site is advised.

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496. Bast, C., et al. (2018). "Incidence of infection in patients receiving short vs. long duration of antimicrobial prophylaxis in neurosurgery." Open forum infectious diseases 5: S631.

Background. Surgical site infections in neurosurgery occur in up to 10% of procedures. The American Society of Health-System Pharmacists guidelines promote antimicrobial prophylaxis (AP) for up to 24 hours from neurosurgery using cefazolin while the Neurocritical Care Society guidelines

promote single pre-procedural dose of AP for extraventricular drain (EVD) monitoring. Despite these guidelines, practice variation exists with often longer antimicrobial exposure and subsequent complications. Methods. This retrospective study included patients admitted to Baylor University Medical Center from January 1, 2014 to September 20, 2017 and underwent cranial or spinal neurosurgery requiring AP. This study excluded patients with basilar skull fracture, presence of cerebrospinal fluid leak, penetrating trauma, meningitis, and patients receiving antibiotics for documented or suspected infection unrelated to neurosurgery. Patients who received AP for up to 24H (short course) were compared with patients who received AP for greater than 24H (long course) at 90 days. Data were analyzed using the Fisher exact test, Student's t-test and Wilcoxon rank-sum tests as applicable. Results. A total of 183 patients were included with 90 and 93 patients receiving short or long courses of AP, respectively. Baseline characteristics were similar for the groups. Patients in the short course AP group received a mean antibiotic duration of 16.9 ± 4.3H while those in the long course AP group received 72.2 ± 50.9H ($P < 0.001$). The mean number of antimicrobials prescribed was 1.1 vs. 1.8 ($P < 0.001$) in the short vs. long groups, respectively. At 90 days, there were no significant differences in the rate of surgical site infections (1.1% vs. 2.1%, $P = 0.99$), development of multi-drug-resistant infections (2.2% vs. 2.2%, $P = 0.99$), and Clostridium difficile infection (0% vs. 1.1%, $P = 0.99$) in the short vs. long groups, respectively. Conclusion. The rate of surgical site infections was not significantly different in patients that received short vs. long durations of antimicrobial prophylaxis. These results highlight an opportunity to improve antibiotic use and promote principles of antimicrobial stewardship in neurosurgery.

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497. Bater, M. C., et al. (2007). "Use of an inferior orbitotomy for safe removal of a wooden foreign body penetrating the orbit." The British journal of oral & maxillofacial surgery 45(8): 664-666.

Penetrating orbital foreign bodies must be removed in a safe and controlled manner. Adequate access is necessary so that there is no further damage to the orbital structures and to allow haemostasis. We describe a case of a wooden foreign body that penetrated the left orbit and its subsequent removal using an inferior orbitotomy. To our knowledge, this technique has not been previously described for removal of a foreign body.

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498. Bates, R. C., et al. (2015). "Increasing pro-survival factors within whole brain tissue of Sprague Dawley rats via intracerebral administration of modified valproic acid." Journal of pharmacological sciences 128(4): 193-201.

Neural tissue exposure to valproic acid (VPA) increases several pro-survival phospho-proteins that can be used as biomarkers for indicating a beneficial drug response (pAkt(Ser473), pGSK3beta(Ser9), pErk1/2(Thr202/Tyr204)). Unfortunately, targeting VPA to neural tissue is a problem due to severe asymmetrical distribution, wherein the drug tends to remain in peripheral blood rather than localizing within the brain. Intracerebral delivery of an amide-linked VPA-PEG conjugate could address these issues by enhancing retention and promoting cerebro-global increases in pro-survival phospho-proteins. It is necessary to assay for the retained bioactivity of a PEGylated valproic acid molecule, along with locating an intracranial cannula placement that optimizes the increase of a known downstream biomarker for chronic VPA exposure. Here we show an acute injection of VPA-PEG conjugate within brain tissue increased virtually all of the assayed phospho-proteins, including well-known pro-survival factors. In contrast, an acute injection of VPA expectedly decreased signaling throughout the hour. Needle penetration into whole brain tissue is the intentional cause of trauma in this procedure. The trauma to brain tissue was observed to overcome known phospho-protein increases for unmodified VPA in the injected solution, while VPA-PEG conjugate appeared to induce significant increases in pro-survival phospho-proteins, despite the procedural trauma.

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499. Batsaikhan, B., et al. (2019). "Post-Injury Neuroprotective Effects of the Thalidomide Analog 3,6'-Dithiothalidomide on Traumatic Brain Injury." International journal of molecular sciences 20(3).

Traumatic brain injury (TBI) is a major cause of mortality and disability worldwide. Long-term deficits after TBI arise not only from the direct effects of the injury but also from ongoing processes such as neuronal excitotoxicity, inflammation, oxidative stress and apoptosis. Tumor necrosis factor-alpha (TNF-alpha) is known to contribute to these processes. We have previously shown that 3,6'-dithiothalidomide (3,6'-DT), a thalidomide analog that is more potent than thalidomide with similar brain penetration, selectively inhibits the synthesis of TNF-alpha in cultured cells and reverses behavioral impairments induced by mild TBI in mice. In the present study, we further explored the therapeutic potential of 3,6'-DT in an animal model of moderate TBI using Sprague-Dawley rats subjected to controlled cortical impact. A single dose of 3,6'-DT (28 mg/kg, i.p.) at 5 h after TBI significantly reduced contusion volume, neuronal degeneration, neuronal apoptosis and neurological deficits at 24 h post-injury. Expression of pro-inflammatory cytokines in the contusion regions were also suppressed at the transcription and translation level by 3,6'-DT. Notably, neuronal oxidative stress was also suppressed by 3,6'-DT. We conclude that 3,6'-DT may represent a potential therapy to ameliorate TBI-induced functional deficits.

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500. Batur, M., et al. (2018). "Posttraumatic Oculorrhea From the Eyelid." Pediatric emergency care 34(8): e150-e151.

We report a 21-month-old boy with a sutured laceration of the left upper eyelid with drainage of cerebrospinal fluid. Careful evaluation, including computerized tomography, revealed a penetrating injury of the left orbital wall and a linear bone fracture. The wound was resutured carefully. There was no cerebrospinal fluid leakage in the postoperative follow-up period.

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501. Bauch, C. D., et al. (1999). "Penetrating injury to the brainstem after a nailgun accident: a case study." American journal of audiology 8(1): 57-64.

Nonfatal penetrating injuries to the brainstem offer a unique opportunity to assess subcortical auditory pathway function. A case study of a patient suffering a severe nailgun accident is presented. Hearing sensitivity and acoustic reflexes were normal bilaterally, but word recognition was reduced for one ear. Auditory brainstem response results indicated waves I-IV were present bilaterally, but wave V was absent bilaterally. Results of vestibular findings indicated central pathology also. Results of audiologic, vestibular, radiologic, neurologic, and physical medicine examinations are discussed.

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502. Bauer, M. and D. Patzelt (2002). "Intracranial stab injuries: case report and case study." Forensic science international 129(2): 122-127.

Non-missile penetrating brain injuries are rare events in western countries. We report a case with lethal stab injury of the brain and identification of the weapon used in the assault by digital superimposition on CT scans taken at admission of the victim to a hospital. Furthermore, all cases with knife stab wounds of the skull between 1971 and 2000 were analyzed and compared with literature reports. Results of this study show that there is no region preference despite of differences in bone thickness, that stab wounds of the brain are almost invariably associated with multiple stab wounds to the trunk and that the wound tract may correspond to the dimensions of the blade allowing the identification of the weapon by digital image analysis.

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503. Baumgart, E. V., et al. (2012). "Stab wound injury of the zebrafish telencephalon: a model for comparative analysis of reactive gliosis." Glia 60(3): 343-357.

Reactive glia, including astroglia and oligodendrocyte progenitors (OPCs) are at the core of the reaction to injury in the mammalian brain with initially beneficial and later partially adverse functions

such as scar formation. Given the different glial composition in the adult zebrafish brain with radial ependymoglia but no parenchymal astrocytes, we examined the glial response to an invasive stab wound injury model in the adult zebrafish telencephalon. Strikingly, already a few days after injury the wound was closed without any scar tissue. Similar to mammals, microglia cells reacted first and accumulated close to the injury site, while neither GFAP+ radial ependymoglia nor adult OPCs were recruited to the injury site. Moreover, OPCs failed to increase their proliferation after this injury, while the number of proliferating GFAP+ glia was increased until 7 days after injury. Importantly, neurogenesis was also increased after injury, generating additional neurons recruited to the parenchyma which survived for several months. Thus, these data suggest that the specific glial environment in the adult zebrafish telencephalon is not only permissive for long-term neuronal survival, but avoids scar formation. Invasive injury in the adult zebrafish telencephalon may therefore provide a useful model to untangle the molecular mechanisms involved in these beneficial glial reactions.

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504. Baumrucker, S. J., et al. (2007). "Withdrawing treatment for the "wrong" reasons." The American journal of hospice & palliative care 24(6): 509-514.

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505. Baumrucker, S. J., et al. (2007). "Brain death and organ transplantation." The American journal of hospice & palliative care 24(4): 325-330.

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506. Bauza, A. M., et al. (2013). "Work-related open-globe injuries: demographics and clinical characteristics." European journal of ophthalmology 23(2): 242-248.

PURPOSE: To describe the demographics and clinical characteristics of work-related open-globe injuries (OGIs) at a level I trauma center over a 10-year period., METHODS: Retrospective series., RESULTS: A total of 183 eyes with work-related OGIs were identified. The majority of injuries occurred in men (96.7%). The anatomic site of the wound was zone 1 in 107 eyes (72.3%). The most common cause was nail gun use (47.0%). The types of OGI included 32 ruptures (17.5%), 112 penetrating injuries (61.2%), 38 intraocular foreign bodies (IOFB) (20.8%), and 1 mixed rupture/IOFB injury (0.5%). Presenting visual acuity (VA) was worse than 20/200 in 112 eyes (65.9%) and no light perception (NLP) in 10 eyes (5.8%). Final VA worse than 20/200 occurred in 64 eyes (37.2%); 11 eyes underwent enucleation. In comparison to non-work-related OGIs (420 eyes), we found significant differences in types and zones of injury, initial and final mean VA, enucleation rate, incidence of cataracts, hyphema, retinal detachment, hemorrhagic choroidals, and afferent pupillary defect (APD). Using multivariate analysis, significant prognostic factors for a final VA of NLP were zone 3 injury, rupture injury, and initial VA of NLP. Risk factors for enucleation included zone 3 injury, APD, and endophthalmitis., CONCLUSIONS: Work-related injuries were noted to have a much higher incidence of IOFBs and cataracts compared to non-work-related OGIs. Zone 3 injuries, rupture injuries, and a presenting VA of NLP were found to be significant predictors for a final VA of NLP. Zone 3 injury, APD, and endophthalmitis were found to be significant predictors for enucleation.

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507. Bavishi, S., et al. (2010). "Chronic post-traumatic headache resolution after ventriculoperitoneal shunt placement: A case report." Brain injury 24(3): 370.

Objectives: Introduction Decompressive craniectomy is an effective treatment for uncontrolled intracranial hypertension due to severe traumatic Brain Injury (Toussaint&Origitano 2008). However, late complications after this procedure can include post-traumatic hydrocephalus (PTH), particularly when there is also a history of traumatic subarachnoid hemorrhage (SAH), and cerebellar herniation through a craniectomy defect. This case report will summarize the recovery of a 36 y/o Army Staff Sergeant who suffered a severe penetrating traumatic Brain Injury (TBI) while on active duty in

Operation Iraqi Freedom. He was hit by shrapnel from an improvised explosive device while working as a turret gunner in a Humvee. Injuries included obliteration of the right occipital lobe, subdural hemorrhage (SDH), SAH, intraventricular hemorrhage (IVH), retained foreign body, and cortical blindness. He underwent emergent right occipital and posterior fossa craniectomy with intracranial hemorrhage and lateral IVH evacuation. He was stabilized and underwent extensive rehabilitation at the inpatient Polytrauma Rehabilitation Center. He functionally recovered well in spite of significant residual visual impairment. He had a cranioplasty 5 months after injury and serial brain imaging showed right occipital encephalomalacia and stable right cerebellar herniation through his residual craniectomy skull defect. He was followed in the outpatient setting by PM&R and Neurosurgery for nearly two years for severe persistent daily headaches (HAs) and gradual cognitive decline. Objectives This case report discusses the importance of recognizing late complications of decompressive craniectomies that can lead to significant declines in function and quality of life. Method: Case Report Results: Ambulatory EEG demonstrated epileptiform activity; Topamax was started without improvement in either headaches or cognition. CT scan did not show significant ventriculomegaly but did show persistent cerebellar herniation at the posterior skull base under the craniectomy repair. Patient was admitted for a diagnostic high volume spinal tap and experienced temporary resolution of HAs for a four-day period. A ventriculo-peritoneal (VP) shunt was placed, following which the patient had complete resolution of his headaches and experienced significant improvement in cognition. Conclusions: The incidence of post-traumatic hydrocephalus (PTH) varies widely. A higher incidence of PTH is associated with increased length of coma, increased age, decompressive craniectomy (DC), and SAH (Mazzini et al., 2003). This patient had DC, traumatic SAH, and head CTs that showed persistent cerebellar herniation through the residual craniectomy defect. It is possible that the cranioplasty may have altered the pattern of CSF flow at this level leading to late development of PTH. When persisting refractory posttraumatic headaches occur in a patient with this history, one should suspect PTH, particularly since this condition can respond to treatment with a VP shunt.

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508. Bayat, M., et al. (2010). "Comparison of conchal cartilage graft with nasal septal cartilage graft for reconstruction of orbital floor blowout fractures." The British journal of oral & maxillofacial surgery 48(8): 617-620.

Our aim was to compare autogenous nasal septal cartilage and conchal cartilage as grafts for reconstruction of orbital blowout fractures. Twenty-two patients with blowout fractures were randomly assigned to two groups for treatment with a graft of nasal septal cartilage or conchal cartilage. Patients were evaluated for the presence of enophthalmos, diplopia, dysfunction of the infraorbital nerve, and restriction of the ocular muscles. Patients with enophthalmos of more than 2 mm were included in the study, and were followed up postoperatively at 10 days, 1 month, and 3-6 months. The patients treated with a nasal septal cartilage graft had significantly better correction of enophthalmos than those treated with conchal cartilage (p=0.02) after 10 days (p=0.02), 1 month (p=0.004), and 3-6 months (p=0.001). There was significantly less residual enophthalmos in the nasal septal graft group after 1 month (0.91 compared with 1.72 mm, p=0.02), and after 3-6 months (1.0 compared with 2.54 mm, p=0.008). Correction of enophthalmos was considerably better in patients who were operated on within 4 weeks of injury. We think that nasal septal cartilage is a better graft than conchal cartilage for reconstruction of blowout fractures. The time to intervention (the earlier the better) is a critical point in the correction of enophthalmos.

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509. Bayramoglu, S. E., et al. (2018). "Delayed diagnosis of an intraorbital wooden foreign body." Orbit (Amsterdam, Netherlands) 37(6): 468-471.

A 35-year-old male patient was presented with pain on his right upper eyelid. A piece of wood injured his orbital and supraorbital regions while working at a furniture factory 10 days prior to our hospital admission. It was learned that the patient was discharged following the primary would closure

procedure. Subsequent to the craniofacial computed tomography, primary wound closure was performed in the emergency room of previous hospital. In our clinic, a skin suturing on the nasal side of the right eyebrow was inspected and a foreign body (FB) was palpated on the superonasal contiguity of the patients' right globe. A hyperdense FB measuring 30 x 10 x 5 mm in size with smooth margins on superonasal contour of the globe was detected. Superonasal orbitotomy was performed and the FB was completely removed. Finally, visual acuity was 20/20 and a mild residual ptosis was observed.

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510. Bayston, R., et al. (2000). "Use of antibiotics in penetrating craniocerebral injuries. "Infection in Neurosurgery" Working Party of British Society for Antimicrobial Chemotherapy." Lancet (London, England) 355(9217): 1813-1817.

The Working Party was instituted to investigate the rationale of prophylactic and therapeutic antibiotic use in penetrating craniocerebral injuries (PCCI), and to make recommendations for current practice. A systematic review of papers on civilian and military PCCI over the past 25 and 50 years, respectively, was done via electronic databases and secondary sources, and data were evaluated. Guidelines on the removal of indriven bone or metal fragments only if further neural damage can be avoided were supported. However, no publications were identified where the data on infection or its treatment and prevention were complete or satisfactorily derived, and no controlled trials have been published. All studies were retrospective or anecdotal. Working Party recommendations are based on the data available and the professional experience and knowledge of the members. Broad-spectrum antibiotic prophylaxis is recommended for both military and civilian PCCI, Including those due to sports or recreational injuries.

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511. Bazarian, J. J., et al. (2018). "Serum GFAP and UCH-L1 for prediction of absence of intracranial injuries on head CT (ALERT-TBI): a multicentre observational study." The Lancet. Neurology 17(9): 782-789.

BACKGROUND: More than 50 million people worldwide sustain a traumatic brain injury (TBI) annually. Detection of intracranial injuries relies on head CT, which is overused and resource intensive. Blood-based brain biomarkers hold the potential to predict absence of intracranial injury and thus reduce unnecessary head CT scanning. We sought to validate a test combining ubiquitin C-terminal hydrolase-L1 (UCH-L1) and glial fibrillary acidic protein (GFAP), at predetermined cutoff values, to predict traumatic intracranial injuries on head CT scan acutely after TBI., METHODS: This prospective, multicentre observational trial included adults (>=18 years) presenting to participating emergency departments with suspected, non-penetrating TBI and a Glasgow Coma Scale score of 9-15. Patients were eligible if they had undergone head CT as part of standard emergency care and blood collection within 12 h of injury. UCH-L1 and GFAP were measured in serum and analysed using prespecified cutoff values of 327 pg/mL and 22 pg/mL, respectively. UCH-L1 and GFAP assay results were combined into a single test result that was compared with head CT results. The primary study outcomes were the sensitivity and the negative predictive value (NPV) of the test result for the detection of traumatic intracranial injury on head CT., FINDINGS: Between Dec 6, 2012, and March 20, 2014, 1977 patients were recruited, of whom 1959 had analysable data. 125 (6%) patients had CT-detected intracranial injuries and eight (<1%) had neurosurgically manageable injuries. 1288 (66%) patients had a positive UCH-L1 and GFAP test result and 671 (34%) had a negative test result. For detection of intracranial injury, the test had a sensitivity of 0.976 (95% CI 0.931-0.995) and an NPV of 0.996 (0.987-0.999). In three (<1%) of 1959 patients, the CT scan was positive when the test was negative., INTERPRETATION: These results show the high sensitivity and NPV of the UCH-L1 and GFAP test. This supports its potential clinical role for ruling out the need for a CT scan among patients with TBI presenting at emergency departments in whom a head CT is felt to be clinically indicated. Future studies to determine the value added by this biomarker test to head CT clinical decision rules could be warranted., FUNDING: Banyan Biomarkers and US Army Medical Research and Materiel Command.

512. Bazarian, J. J., et al. (2009). "Long-term neurologic outcomes after traumatic brain injury." The Journal of head trauma rehabilitation 24(6): 439-451.

OBJECTIVE: To determine the relations between traumatic brain injury (TBI) and several neurologic outcomes 6 months or more after TBI., PARTICIPANTS: Not applicable., DESIGN: Systematic review of the published, peer-reviewed literature., PRIMARY MEASURES: Not applicable., RESULTS: We identified 75 studies that examined the relations between TBI and neurologic outcomes. Unprovoked seizures are causally related to penetrating TBI as well as to moderate and severe TBI. There was only limited evidence of an association between seizures and mild TBI. Dementia of the Alzheimer's type (DAT) was associated with moderate and severe TBI, but not with mild TBI unless there was loss of consciousness (LOC); the evidence for the latter was limited. Parkinsonism was associated with moderate and severe TBI, but there was only modest evidence of a link with mild TBI without LOC. Dementia pugilistica was associated with professional boxing. There was insufficient evidence to support an association between TBI and both multiple sclerosis and amyotrophic lateral sclerosis. TBI appeared to produce a host of postconcussive symptoms (eg, memory problems, dizziness, and irritability). Moderate and severe TBI were associated with endocrine problems such as hypopituitarism and growth hormone deficiency and possibly with diabetes insipidus. There was only limited evidence of an association between mild TBI and the development of ocular/visual motor deterioration., CONCLUSION: TBI is strongly associated with several neurologic disorders 6 months or more after injury. Clinicians caring for TBI patients should monitor them closely for the development of these disorders. While some of these disorders can be treated after they arise (eg, seizures), a greater public health benefit would be achieved by preventing them before they develop. Research efforts to develop therapies aimed at secondary prevention are currently underway.

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513. Bearcroft, P. W. and C. E. Freer (1995). "CT of a peripatetic intracranial foreign body." Neuroradiology 37(7): 542-544.

We report the CT appearances of a low-velocity missile that lodged within the brain and which subsequently migrated spontaneously back along the entry path. We review the literature of similar instances of migration and draw conclusions about the presurgical radiological management.

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514. Beattie, G., et al. (2020). "Automatic acoustic gunshot sensor technology's impact on trauma care." The American journal of emergency medicine 38(7): 1340-1345.

INTRODUCTION: As cities nation-wide combat gun violence, with less than 20% of shots fired reported to police, use of acoustic gunshot sensor (AGS) technology is increasingly common. However, there are no studies to date investigating whether these technologies affect outcomes for victims of gunshot wounds (GSW). We hypothesized that the AGS technology would be associated with decreased prehospital transport time., METHODS: All GSW patients from 2014 to 2016 were collected from our institutional registry and cross-referenced with local police department data regarding times and locations of AGS alerts. Each GSW incident was categorized as related or unrelated to an AGS alert. Admission data, trauma outcomes, and prehospital time were then compared., RESULTS: We analyzed 731 patients. Of these, 192 were AGS-related (26%) and 539 were not (74%). AGS-related patients were more likely to be female ($p < 0.01$), have a higher injury severity score (ISS) ($p < 0.01$), and require an operation ($p = 0.03$). Ventilator days ($p < 0.05$) and hospital length of stay ($p < 0.01$) was greater in the AGS cohort. Mortality, however, did not differ between groups ($p = 0.5$). On multivariable analysis, both total prehospital time and on-scene time were lower in the AGS group ($p < 0.01$)., CONCLUSION: Our study suggests reduced transport times, decreased prehospital and emergency medical service on-scene times with AGS technology. Additionally, despite higher ISS and use of more hospital resources, mortality was similar to non-AGS counterparts. The potential of AGS technology to further decrease

prehospital times in the urban setting may provide an opportunity to improve outcomes in trauma patients with penetrating injuries.

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515. Beattie, G., et al. (2022). "A comparison of clinical characteristics, radiographic findings, and outcomes of bihemispheric versus unihemispheric gunshot wounds to the head." The American journal of emergency medicine 60: 78-82.

INTRODUCTION: Unihemispheric head gunshot wound (HGSW) are associated with improved survival; however, specific clinical and radiographic characteristics associated with survival have not been clearly defined. To further guide prognosis estimates and care discussions, this study aims to identify unihemispheric HGSWs injury patterns; comparing them to bihemispheric HGSWs characterizing factors associated with improved clinical outcomes and survival., METHODS: Patients presenting to our Level 1 trauma center from January 2013 through May 2019 with HGSW injury were reviewed. Patients were grouped into those with unihemispheric versus bihemispheric HGSWs and survivors versus non-survivors. Clinical variables and head computed tomography (CT) features were compared using comparative statistics., RESULTS: 62 HGSW patients met study criteria (unihemispheric = 33, bihemispheric = 29). Regardless of injury type, avoidance of injury to multiple lobes, temporal, parietal and basal ganglia brain regions and intracranial vascular injury were also associated with survival ($p < 0.05$). Lower admission GCS score and lower motor GCS score was associated with reduced survival in unihemispheric HGSW injury ($p < 0.05$). Unihemispheric HGSW survivors demonstrated improved clinical outcomes, with reduced hospital length of stay (5 days vs. 47 days, $p = 0.014$) and intensive care unit length of stay (3 days vs. 20 days, $p = 0.021$) and more favorable disposition location., CONCLUSION: We found presenting clinical features and CT imaging patterns previously associated with improved survival in HGSW patients is similar in unihemispheric specific injuries. Importantly, a more favorable admission GCS score may portend survivability in unihemsipheric HGSW. Furthermore, unihemispheric HGSW survivors may have improved clinical outcomes, length of stay and disposition location.

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516. Beaty, N. B., et al. (2012). "Penetrating intracranial gunshot wound transecting the right transverse sinus." BMJ case reports 2012.

A 23-year-old man sustained a gunshot wound to the posterior head. Imaging demonstrated a transection of the right transverse sinus, a retained bullet fragment and significant cerebellar oedema. The patient emergently underwent suboccipital decompression associated with brisk bleeding from the transverse sinus. Reported examples of surgical management of cerebral venous sinuses include: packing, grafting, patching and ligation. Our patient had a codominant transverse sinus and underwent successful unilateral ligation. His postoperative course was uneventful, however, he did require a ventriculoperitoneal shunt. He was subsequently discharged to rehab with a favourable outcome.

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517. Bebarta, V. S., et al. (2009). "Disease and non-battle traumatic injuries evaluated by emergency physicians in a U.S. tertiary combat hospital." Annals of emergency medicine 54(3): S59.

Study Objectives: Emergency physicians have played a central role in medical care delivery in Operation Iraqi Freedom. Medical war planning has focused on combat-related injuries; however, since 2004 nearly half of the patients treated in a tertiary U.S. combat hospital in Iraq are not combat related. In order to plan for future wars and properly train emergency physicians, the common emergent and urgent non-combat diagnoses and complex procedures performed should be identified. These data have not been previously collected or studied to determine the types of non-combat injuries and illnesses seen at a tertiary combat hospital and the types of procedures performed to manage these patients. Methods: In our institutional review board-approved study, we enrolled all non-combat injured patients over one year who were evaluated in the emergency department (ED) of a US military tertiary hospital in Iraq. The treating emergency physician used a standard data collection form to enroll all patients who arrived

to the ED whose injury or illness was unrelated to combat. Data collected included age, time of visit, ED diagnoses, emergency procedures, disposition, and consultations. The diagnosis and procedure lists were defined before study start. Results: Data were gathered on 1745 patients with a mean age of 30.2 years (range 6 months - 72 years). 1460 (83%) patients were male and 1316 (75.4%) were U.S. military personnel, with Iraqis, foreign military members and third country nationals making up the remaining. The most common diagnoses evaluated in the ED were abdominal disorders (302 cases, 17.3%), orthopedic injuries (209, 12%), headache (108, 6.2%), ophthalmologic injuries (106, 6.1%), lacerations or abrasions (99, 5.7%), soft tissue infections (94, 5.4%), and renal colic (88, 4.7%). Emergent medical diagnoses consisted of 10.2% (179) of cases (aortic dissection, meningitis, altered mental status, overdose, pulmonary embolism, intestinal bleeding, acute myocardial infarction, chest pain, atrial fibrillation). Urgent medical diagnoses consisted of 4.4% (78) of cases (pneumonia, diverticulitis, deep venous thrombosis, seizure, syncope). Emergent surgical diagnoses consisted of 10.7% (186) of cases (appendicitis, cholecystitis, bowel obstruction, peritonsillar abscess, fracture, dislocation, gunshot wound, eye trauma, brain injury). 52% (909 cases) required IV access, 45% (793) received laboratory testing, 31% (537) received radiographs, and 28% (488) received CT scans. Complex procedures include ECG interpretation (9%, 160 cases), lumbar puncture (1.1%, 20), procedural sedation (0.8%, 14), endotracheal intubation (10), and central line (4). 4.5% of cases were admitted to the operating room, 6.5% to the ICU, and 21.6% to the ward. 12.6% of patients were evacuated out of Iraq. Conclusion: Life-threatening diseases and non-battle traumatic injuries are common in a tertiary-combat hospital emergency department. Providers working in similar settings should have diagnostic and procedural skills to evaluate and treat a range of emergently ill patients.

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518. Becelli, R., et al. (2011). "Major facial trauma after helicopter landing." The Journal of craniofacial surgery 22(4): 1517-1519.

Injuries in civil aviation can occur as a consequence of work-related accidents happening in airport. The ground crew can sustain slips, trips, falls, and machinery accidents. Most such accidents are observed when aircraft is departing. This clinical report describes a case of an airport ground assistant severely injured by a helicopter after the strike with a main rotor blade that was slowing after that the craft was landed and the engine was stopped, and reports surgical emergency treatment of life-threatening facial lesions.

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519. Becker, H. and E. Schneider (1981). "[CT of the base of the skull in bacterial meningitis (author's transl)]." CT der Schadelbasis bei bakterieller Meningitis. 49(12): 446-450.

CT examinations of 42 cases of bacterial meningitis revealed in 38, 1% of the cases relevant inflammatory processes at the base of the skull which were of significant importance for a transmitted infection. Such infections were: Sinusitis frontalis, ethmoidalis, maxillaris and sphenoidalis, mastoiditis or petrositis, suppurating mucocele, impression fracture, and an intracranially penetrated foreign body. Excepting the identification of fine fractures, conventional x-ray films were diagnostically superior. Hence, especially in the acute stages, special projections can be omitted, if CT is effected in the region of the osseous base of the skull. CT performed in inflammatory diseases of the brain must include the base of the skull, since this will yield reliable pointers to an original focus of the inflammation requiring appropriate treatment and elimination.

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520. Beckers, H. (1987). "[Primary management of 2 unusual facial injuries]." Zur Primarversorgung von zwei ungewohnlichen Gesichtsverletzungen. 372: 715-719.

In the first patient a spinning saw-blade cut through the soft tissues and bony structures of the face in a paramedian, vertical section; in another patient a dum-dum bullet fired in suicidal intention from submentally destroyed the frontal half of the mandible and maxilla, the nose and the medial part of both orbits. The facial soft tissues, however, suffered only minor injuries. In the first patient the

immediate treatment included inspection of the frontal sinus, preserving all loose bone fragments, and immediate reconstruction of the medial orbital frame employing bonewires, identification of the lacrimal ducts, reapproximation and stabilisation of these ducts with very flexible silicone threads, soft-tissue closure employing a running z-plasty, interdigitating the z-shaped wound edges caused by the saw. In the second patient stability of the remaining mandibular portions was achieved by mandibular reconstruction plates to which all remaining mandibular bone fragments were attached with bone screws or wires. The stabilized mandible allowed suspension of the tongue.

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521. Bede, S. (2013). "Mandibular fractures in Iraq: An epidemiological study." Craniomaxillofacial Trauma and Reconstruction 8(1): 59-63.

The purpose of this study was to evaluate the epidemiological characteristics of the mandibular fractures relating to gender, age, the etiology of injury, and the rendered treatment modalities and complications. The data of the patients who sustained mandibular fractures were retrieved and were analyzed retrospectively, and based on these data a descriptive analysis was conducted. A total of 112 patients were included in this study; the most common cause was road traffic accidents (RTAs) followed by assaults and missile injuries. The most frequently involved age group was 11 to 20 years, treatment modalities included conservative, closed reduction and indirect fixation, and open reduction and internal fixation (ORIF) in 11.6, 79.5, and 8.9% of the cases, respectively. Most of the major complications were injury related. This study showed RTAs to be the most frequent cause followed by assaults, it also showed that a high percentage of assault victims were females mainly of low socioeconomic status. Another distinguishing feature in this study was the high incidence of missile injuries in the form of bullets and blasts. Closed reduction still has an important role in the treatment of fractures of mandible especially when the necessary equipments for ORIF are not readily available. A higher complication rate was observed in patients diagnosed with multiple and comminuted fractures as well as those caused by violence in the form of missile and assault injuries.

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522. Bede, S. Y. H. and F. T. Ahmed (2011). "Management of retained foreign bodies in missile injuries of the maxillofacial region." The Journal of craniofacial surgery 22(4): 1440-1444.

This study evaluates 22 patients with retained foreign bodies in the maxillofacial region that were all caused by penetrating missile injuries. Surgical intervention for the retrieval of the foreign bodies was carried out in 20 patients through the existing wounds and through separate incisions; all patients were followed up for a minimum of 2 months during which all the complications were registered and managed. Preoperative imaging is a prerequisite for the accurate localization of the foreign body and the subsequent successful removal of it. All patients developed complications that were categorized in this study into those that result from the injury itself and those that occur because of the retrieval procedure, the latter category being mostly easily managed. In general, all foreign bodies in the maxillofacial region should be removed; the surgeon involved should weigh the benefits and the perils of the removal, and the patient should be well informed about the possibility of the failure of removal of the foreign body.

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523. Behera, C., et al. (2008). "Decapitation with egg shelling of the skull in a road traffic accident: a case report." Medicine, science, and the law 48(1): 87-88.

A 40-year-old lady was found dead on a road early one morning. She had allegedly been run over by a speeding vehicle. The head of the deceased had been decapitated, with egg shelling of the skull from the scalp and face. The skull was lying a little distance away from the rest of the body. Although decapitation is not an unknown entity in a road traffic accident, subsequent egg shelling of the skull, leaving behind scalp and face tissue, has not been reported in a road traffic accident in the forensic literature.

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524. Behnia, H. and M. H. Motamedi (1997). "Reconstruction and rehabilitation of short-range, high-velocity gunshot injury to the lower face: a case report." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery 25(4): 220-227.

War injuries can range from the most minor to the devastating and life-threatening. Multidisciplinary care is required for successful management of survivors. In the acute phase, care may involve emergency surgeons, anaesthetists, neurosurgeons, ophthalmic surgeons, vascular surgeons and ENT specialists in addition to the oral and maxillofacial surgeon. Afterwards, definitive treatment of facial hard and soft tissue gunshot injuries depends ultimately on the abilities and skills of the oral and maxillofacial surgeon and his appreciation of such injuries. The timing and sequence of the surgical procedures used for reconstruction and rehabilitation of maxillofacial gunshot injuries are crucial to a successful outcome and aesthetic result. If incorrect, they may lead indefinitely to infection, graft rejection, wound dehiscence with consequent multiple revisional operations and complications which will prolong hospital stay, and increase treatment costs and morbidity in these patients. In this article, we describe the treatment protocol for reconstruction and rehabilitation of a typical case of devastating gunshot injury to the lower face and propose a staged sequence of surgical treatment based on an 8-year experience gained in treating war casualties during the Iraq-Iran war (1980-1988).

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525. Bein, T., et al. (2006). "[Prevention of organ failure in an organ donor. Early identification and maximum protective therapy after multiple trauma]." Verhinderung des Organversagens beim Organspender. Fruhzeitige Identifikation und maximale protektive Therapie nach Polytrauma. 131(44): 2465-2468.

ANAMNESIS: A 18-year-old woman suffered from severe multi-trauma in combination with acute brain injury (Glasgow Coma Scale Score = 4) after road accident. After prolonged rescue measures and emergency stabilisation the patient was transferred by helicopter to the emergency department of our clinic., INVESTIGATIONS: Cranial computer tomography showed a severe general cerebral edema and a marked reduction in cerebral perfusion. Additionally, blunt abdominal injury, severe chest injury and multiple fractures were seen. Due to the severe and diffuse brain injury, a neurosurgical intervention was not possible. The patient was transferred to the intensive care unit., THERAPY AND COURSE: Intensive supportive therapy was started (artificial ventilation, massive transfusion, volume replacement, insertion of a chest tube, renal replacement therapy). Control cerebral computer tomography indicated a complete destruction of the cerebral parenchyma and infarction. Sedation was stopped. After 48-hours of intensive care therapy brain death was stated and the approval for organ donation was given by the next of kin. Heart and kidneys were explanted and transplanted successfully., CONCLUSION: Even under conditions of limited organ functions early identification and maximal supportive therapy may help to supply organ donation. Under certain condition, multiorgan failure may be reversible in possible organ donors.

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526. Beining, T., et al. (2020). "Projectile Wound to Head from Modified Electronic Cigarette Explosion." Journal of forensic sciences 65(4): 1365-1367.

One of the dangers of a rapidly growing technology industry is the risk involved in being intimately close to lithium-ion batteries. When exposed to improper conditions, lithium-ion batteries in a variety of devices have been reported to ignite and, in some cases, explode. With the rise of electronic cigarette use and modifications, the lithium-ion batteries in these devices are subject to a higher risk of malfunction. This is a retrograde analysis of a 38-year-old man who experienced fatal penetrating head trauma while using a modified electronic cigarette device. The findings suggest that the trauma from the explosion was caused by the thermal runaway of the lithium-ion battery in the modified e-cigarette.

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527. Beirouty, Z. A., et al. (1996). "Another disappearing bullet." Eye (London, England) 10 (Pt 1): 148-149.

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528. Bekiroglu, F. and N. M. Whear (2007). "An unusual "sebaceous cyst"." The British journal of oral & maxillofacial surgery 45(4): 338.

A 41-year-old man was referred by his general practitioner to the general surgeons with an "infected sebaceous cyst" above the right medial canthus. "Cyst" was excised by the general surgeons. But this was followed by its recurrence after a number of weeks. A lateral skull radiograph showed the presence of a radio-opaque foreign body within the right orbit.

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529. Belanger, M. E., et al. (2019). "First Canadian facial transplantation: A case report of the anesthetic management." Canadian Journal of Anesthesia 66(2): S189-S191.

Background Globally, facial transplantation has been performed by only a few teams (1). This complex procedure presents many surgical and anesthetic challenges (1,2,3). Here, we report on the anesthetic management of the first Canadian face transplant. Case presentation Extensive preparation and coordination were key to the success of this procedure. The face harvest and transplantation were performed simultaneously in one operating theatre. Each patient had a primary and secondary anesthesiologist at all times. It was understood by all that the viability of the solid organs took precedence over the face. The recipient, who consented to this report's publication, was a 64-year-old man who suffered ballistic trauma to the lower two thirds of the face. His surgery started four hours before the donor's face was harvested in order to minimize the time of graft ischemia (4). Major blood losses and hemodynamic instability were anticipated (3,5). Thus, two arterial lines ' a cardiac output monitor (NICOM cheetah Medical) and femoral central access ' were installed. As the patient had a background of chronic pain, a pain monitor (NOL Medasense) was utilized. The airway was managed with an armored endotracheal tube in the existing tracheostomy. Anesthesia was maintained with sevoflurane, remifentanil, and ketamine infusions. The surgery lasted 36 hours and total blood loss was 2000 ml. Antibiotics and immunosuppressants were meticulously administered to prevent graft rejection and infection (1). The patient was extubated on postoperative day 12 and was discharged from the hospital on day 60. Acute pain management was the cause for the prolonged intubation and hospital stay. The donor was a 48-year-old man who was declared brain dead after a cerebral hemorrhage. The organs selected for transplant were face, heart, kidneys, and liver. He developed anemia, thrombocytopenia, and insipidus diabetes, which were corrected prior to harvesting. In preparation for the facial harvest, a tracheotomy and jaw fixation were performed the day prior to the transplant. Femoral venous and arterial access with cardiac output monitoring (FloTrac, Edwards medical) were utilized as most of the neck was part of the graft. The face was harvested first, followed by the liver, kidneys, and heart. Major blood losses were anticipated during the facial osteotomies and the hepatectomy. Dissection of the facial nerves prevented the patient from being paralyzed, while remifentanil and sevoflurane were used to prevent spinal reflexes. The facial harvest lasted 14 hours and the other organs were successfully harvested afterwards. The total blood loss was 1400 mL. A silicone mask was created with the donor's facial impression and sutured to his face to preserve dignity. Conclusion This case report illustrates the anesthetic challenges that were encountered during the first Canadian facial transplantation and credits its success to the coordinated efforts of the entire team.

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530. Bel'chenko, V. A., et al. (1996). "[Endoprosthesis of the cranium and facial skull with perforated plates made of titanium]." Endoprotezirovanie mozgovogo i litsevogo cherepa perforirovannymi plastinami iz titana. 75(2): 52-54.

Perforated titanium plates were effectively used as endoprostheses in 137 patients with extensive posttraumatic defects of cerebral and facial skull bones. Use of these plates appreciably accelerated the

operation. Due to exceptional qualities of truly pure medical titanium these plates are absolutely biologically inert.

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531. Belding, J. N., et al. (2021). "Occupational Risk of Low-Level Blast Exposure and TBI-Related Medical Diagnoses: A Population-Based Epidemiological Investigation (2005-2015)." International journal of environmental research and public health 18(24).

Because traumatic brain injury (TBI)-most often caused by exposure to high-level blast (HLB)-is a leading cause of medical evacuations of deployed U.S. service members in recent conflicts, researchers seek to identify risk factors for TBI. Previous research using self-reported data has identified low-level blast (LLB) as one such risk factor and suggests an association with susceptibility to and symptoms associated with TBI. This article presents a population-based study of all branches of military service that examines the association between occupational risk for LLB and both clinically diagnosed TBIs-from concussions to severe and penetrating TBIs-and conditions commonly comorbid with concussion. Using archival medical and career records from >2 million service members between 2005-2015, this work demonstrates that occupational risk of LLB is associated with any TBI, mild TBI, moderate TBI, cognitive problems, communication problems, hearing problems, headaches, any behavioral health condition, anxiety, drug abuse/dependence, alcohol abuse/dependence, delirium/dementia, posttraumatic stress disorder, post-concussive syndrome, tinnitus, fatigue, and migraines. Understanding the full scope of the effects of LLB on service members will help ensure the health and readiness of service members and may influence both military policy and clinical practice guidelines for blast-induced injuries.

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532. Belen'kaia, R. M. and V. P. Chernenkov (1988). "[Late epilepsy in patients with cerebrovascular pathology with a history of craniocerebral injury]." Pozdniaia epilepsiia u bol'nykh s tserebrovaskuliarnoi patologiei, perenesshikh cherepno-mozgovuiu travmu. 88(5): 22-25.

The authors examined 200 patients with various types of cerebral circulation disorders and a history of a war-time craniocerebral trauma. Twenty-six percent of patients developed late epilepsy or a recurrence of epileptic attacks in old and advanced age. A craniocerebral trauma is a risk factor for the development of late epilepsy. Groups with a "pseudotumorous" and "pseudostroke" course of vascular-traumatic epilepsy have been differentiated. The authors consider the relationship between the traumatic and vascular factors in the etiopathogenesis of "late" epilepsy.

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533. Belhumeur, V., et al. (2022). "Cerebrospinal fluid external leak after penetrating trauma in a neurologic intact infant patient: a case report." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery 38(8): 1647-1649.

Cranial cerebrospinal fluid (CSF) leak is an extremely rare complication of blunt head trauma causing skull fractures, especially fractures involving the skull base. We present the case of a 10-month-old male who received glass fragments on the midline and posterior tier of his anterior fontanelle producing a cranial cerebrospinal fluid leak without any skull fracture or symptoms. Neurologic exam was completely normal and a superficial stitch wound repair was performed. He was observed for 24 h, had no antibiotic, and left with a 1-week outpatient neurosurgical follow-up. The patient had no negative outcome. Cerebrospinal fluid leak should be included in the differential diagnosis of a head trauma in a patient with open fontanelles. No similar case was found in literature.

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534. Bell, C. C. (1990). "Neuropsychiatry and gun safety." The Journal of neuropsychiatry and clinical neurosciences 2(2): 145-148.

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535. Bell, D. G. and E. T. McCann (2016). "Transfusions in trauma Topical Collection on Pulmonology in Combat Medicine." Current Pulmonology Reports 5(2): 94-100.

Trauma associated with massive bleeding carries a high mortality even in the setting of early care in a trauma center. Such patients develop a significant coagulopathy soon after injury which contributes to these poor outcomes. Practices such as aggressive resuscitation with crystalloid fluids and red blood cell (RBC) transfusions appear to be associated with worse outcomes when compared to a practice of early blood product resuscitation with a ratio of plasma to platelets to RBCs approaching 1:1:1. Early therapy with tranexamic acid (TXA) appears beneficial as well, perhaps helping to prevent fibrinolysis. Viscoelastic testing offers advantages over conventional coagulation testing in the evaluation of further fibrinolysis and offers some guidance for additional targeted therapy. Many societies and organizations have released updated guidelines and recommendations that reflect these changes.

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536. Bell, M. D. D. (2005). "Non-heartbeating organ donation: clinical process and fundamental issues." British journal of anaesthesia 94(4): 474-478.

This case report outlines the clinical process whereby a patient with severe traumatic brain injury became a non-heartbeating organ donor after a withdrawal-of-care decision. This process raises a series of ethical questions regarding decision-making on grounds of futility, the role of the next of kin, informed consent, the accommodation of manoeuvres directed towards organ retrieval at maximal viability, and the timing and determination of death. Although many aspects of the process can be accommodated within fundamental ethical principles and a broad interpretation of the concept of the 'best interests', the variance with established law requires authoritative clarification if a need for transplantable organs is to be responded to without compromising the reputation of practitioners involved in this area of care. Therefore, this recruitment strategy warrants wide public and professional debate to achieve longer-term sustainability and ensure the protection of all parties.

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537. Bell, R. S. (2016). "Comment." Clinical neurosurgery 78(5): E760.

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538. Bell, R. S. (2016). "Comments." Neurosurgery 78(5): E760.

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539. Bell, R. S., et al. (2010). "The evolution of the treatment of traumatic cerebrovascular injury during wartime." Neurosurgical focus 28(5): E5.

The approach to traumatic craniocervical vascular injury has evolved significantly in recent years. Conflicts prior to Operations Iraqi and Enduring Freedom were characterized by minimal intervention in the setting of severe penetrating head injury, in large part due to limited far-forward resource availability. Consequently, sequelae of penetrating head injury like traumatic aneurysm formation remained poorly characterized with a paucity of pathophysiological descriptions. The current conflicts have seen dramatic improvements with respect to the management of severe penetrating and closed head injuries. As a result of the rapid field resuscitation and early cranial decompression, patients are surviving longer, which has led to diagnosis and treatment of entities that had previously gone undiagnosed. Therefore, in this paper the authors' purpose is to review their experience with severe traumatic brain injury complicated by injury to the craniocervical vasculature. Historical approaches will be reviewed, and the importance of modern endovascular techniques will be emphasized.

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540. Bell, R. S., et al. (2010). "Early decompressive craniectomy for severe penetrating and closed head injury during wartime." Neurosurgical focus 28(5): E1.

OBJECT: Decompressive craniectomy has defined this era of damage-control wartime neurosurgery. Injuries that in previous conflicts were treated in an expectant manner are now aggressively decompressed at the far-forward Combat Support Hospital and transferred to Walter Reed Army Medical Center (WRAMC) and National Naval Medical Center (NNMC) in Bethesda for definitive care. The purpose of this paper is to examine the baseline characteristics of those injured warriors who received decompressive craniectomies. The importance of this procedure will be emphasized and guidance provided to current and future neurosurgeons deployed in theater., METHODS: The authors retrospectively searched a database for all soldiers injured in Operations Iraqi Freedom and Enduring Freedom between April 2003 and October 2008 at WRAMC and NNMC. Criteria for inclusion in this study included either a closed or penetrating head injury suffered during combat operations in either Iraq or Afghanistan with subsequent neurosurgical evaluation at NNMC or WRAMC. Exclusion criteria included all cases in which primary demographic data could not be verified. Primary outcome data included the type and mechanism of injury, Glasgow Coma Scale (GCS) score and injury severity score (ISS) at admission, and Glasgow Outcome Scale (GOS) score at discharge, 6 months, and 1-2 years., RESULTS: Four hundred eight patients presented with head injury during the study period. In this population, a total of 188 decompressive craniectomies were performed (154 for penetrating head injury, 22 for closed head injury, and 12 for unknown injury mechanism). Patients who underwent decompressive craniectomies in the combat theater had significantly lower initial GCS scores (7.7 +/- 4.2 vs 10.8 +/- 4.0, $p < 0.05$) and higher ISSs (32.5 +/- 9.4 vs 26.8 +/- 11.8, $p < 0.05$) than those who did not. When comparing the GOS scores at hospital discharge, 6 months, and 1-2 years after discharge, those receiving decompressive craniectomies had significantly lower scores (3.0 +/- 0.9 vs 3.7 +/- 0.9, 3.5 +/- 1.2 vs 4.0 +/- 1.0, and 3.7 +/- 1.2 vs 4.4 +/- 0.9, respectively) than those who did not undergo decompressive craniectomies. That said, intragroup analysis indicated consistent improvement for those with craniectomy with time, allowing them, on average, to participate in and improve from rehabilitation ($p < 0.05$). Overall, 83% of those for whom follow-up data are available achieved a 1-year GOS score of greater than 3., CONCLUSIONS: This study of the provision of early decompressive craniectomy in a military population that sustained severe penetrating and closed head injuries represents one of the largest to date in both the civilian and military literature. The findings suggest that patients who undergo decompressive craniectomy had worse injuries than those receiving craniotomy and, while not achieving the same outcomes as those with a lesser injury, did improve with time. The authors recommend hemicraniectomy for damage control to protect patients from the effects of brain swelling during the long overseas transport to their definitive care, and it should be conducted with foresight concerning future complications and reconstructive surgical procedures.

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541. Bell, R. S., et al. (2009). "Military traumatic brain and spinal column injury: a 5-year study of the impact blast and other military grade weaponry on the central nervous system." The Journal of trauma 66(4 Suppl): S104-111.

BACKGROUND: During the past 5 years of Operation Iraqi Freedom (OIF), a significant majority of the severe closed and penetrating head trauma has presented for definitive care at the National Naval Medical Center (NNMC) in Bethesda, MD, and at the Walter Reed Army Medical Center (WRAMC) in Washington, DC. The purpose of this article is to review our experience with this population of patients., MATERIALS: A retrospective review of all inpatient admissions from OIF was performed during a 5-year period (April 2003 to April 2008). Criteria for inclusion in this study included either a closed or penetrating head trauma suffered during combat operations in Iraq who subsequently received a neurosurgical evaluation at NNMC or WRAMC. Exclusion criteria included all patients for whom primary demographic data could not be verified. Primary outcome data included the type and mechanism of injury, Glasgow coma scale (GCS) and injury severity score at admission, and Glasgow outcome scale (GOS) at discharge, 6 months, and 1 to 2 years., RESULTS: Five hundred thirteen consultations were performed by the neurosurgery service on the aforementioned population. Four hundred eight patients met the inclusion criteria for this study (401:7, male: female; 228 penetrating brain injury, 139 closed head injury, 41 not specified). Explosive blast injury (229 patients; 56%)

constituted the predominant mechanism of injury. The rates of pulmonary embolism (7%), cerebrospinal fluid leak (8.6%), meningitis (9.1%), spinal cord or column injury (9.8%), and cerebrovascular injury (27%) were characterized. Cerebrospinal fluid leak, vasospasm, penetrating head injury, and lower presenting GCS were statistically associated with longer intensive care unit stays and higher presenting injury severity scores ($p < 0.05$). While presenting GCS 3-5 correlated with worsened short-term and long-term GOS scores ($p < 0.001$), almost half of these patients achieved GOS >or=3 at 1- to 2-year follow-up. Total mortality after reaching NNMC/WRAMC was 4.4%., CONCLUSIONS: OIF has resulted in the highest concentration of severe closed and penetrating head trauma to return to NNMC and WRAMC since the Vietnam Conflict. Management scenarios were complex, incorporating principles designed to maximize outcomes in all body systems. Meaningful survival can potentially be achieved in a subset of patients with presenting GCS <or=5.

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542. Bell, R. S., et al. (2010). "Wartime traumatic aneurysms: acute presentation, diagnosis, and multimodal treatment of 64 craniocervical arterial injuries." Neurosurgery 66(1): 66-79.

OBJECTIVE: Operation Iraqi Freedom has resulted in a significant number of closed and penetrating head injuries, and a consequence of both has been the accompanying neurovascular injuries. Here we review the largest reported population of patients with traumatic neurovascular disease and offer our experience with both endovascular and surgical management., METHODS: A retrospective analysis of all military casualties returning to the Walter Reed Army Medical Center and the National Naval Medical Center, Bethesda, Maryland, from April 2003 until April 2008 was performed. All patients undergoing diagnostic cerebral angiography during their inpatient stay were included in the study., RESULTS: A total of 513 war trauma-related consults were performed from April 2003 to April 2008, resulting in the evaluation of 408 patients with closed and penetrating head injuries. In this population, 279 angiographic studies were performed in 187 patients (25 closed craniocervical injuries, 162 penetrating craniocervical injuries), resulting in the detection of 64 vascular injuries in 48 patients (26.2% of those studied, 34% prevalence). Vascular injuries were characterized by traumatic intracranial aneurysms (TICAs) (n = 31), traumatic extracalvarial aneurysms (TECAs) (n = 19), arterial dissections (n = 11), and arteriovenous fistulae (n = 3). The average TICA size on admission was 4.1 mm, with an observed increase in aneurysm size in 11 cases. In the TICA/TECA group, 24 aneurysms in 23 patients were treated endovascularly with either coiling or stent-assisted coiling, resulting in preservation of the parent artery in 12 of 24 vessels (50%). The injuries in 3 patients in this group progressed despite endovascular treatment and required definitive clip exclusion. Thirteen additional aneurysms in 8 patients were treated surgically, resulting in parent artery preservation in 4 cases (30.8%). Eleven of the 13 remaining TICAs/TECAs resolved spontaneously without treatment. A total of 6 aneurysm ruptures (average size, 8.25 mm) occurred, resulting in 3 deaths. Four of 6 ruptures occurred in TICAs in which the interval size increase was noted angiographically., CONCLUSION: The management of traumatic vascular injury has evolved with technological advancement and the willingness of the neurosurgeon to intervene. Although open surgical intervention remains a viable solution, endovascular options are available and safe and can effectively temporize a patient while acute sequelae of serious head injury resolve.

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543. Bellamy, R. F., et al. (1986). "Epidemiology of trauma: military experience." Annals of emergency medicine 15(12): 1384-1388.

Battle injuries sustained in conventional warfare are more likely to be lethal than are injuries sustained by civilians. Depending on the tactical situation, mortality may range from 20% to more than 80% of all casualties. The American experience indicates that about 90% of the total mortality occurs on the battlefield. Such casualties, those classified as killed in action, die before reaching medical care. More than 90% of all battle injuries (morbidity) are caused by penetrating missiles. Exsanguination from wounds of the heart/great vessels and penetrating/perforating wounds of the skull cause the majority of battlefield deaths. The frequency distribution of injury severity appears to be bimodal. A large peak

occurs at low injury severity and indicates a population of casualties with relatively benign soft tissue wounds. A smaller peak at high injury severity represents those killed in action.

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544. Bellinger, S. B. (1972). "Penetrating chest injuries in children." The Annals of thoracic surgery 14(6): 635-644.

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545. Beloded, V. G. and V. V. Ryvniak (1985). "[Xenoplasty of the dura mater by means of formalinized grafts]." Ksenoplastika tverdoi mozgovoi obolochki formalinizirovannymi transplantatami.(3): 49-54.

The possibility of using as plastic material animal (neat cattle, pig) dura mater stored in 0.5% formaldehyde solution was studied. The structure of the dura mater tissue is maintained for a 3-year storage period, and it therefore can be used during this period. The results of experiments (on 30 dogs) and clinical observations (63 patients) show that dura mater grafts used to repair a defect ensure airtightness of the subdural space and separate the brain from the overlying tissues, thus preventing the development of an adhesive-cicatricial process. On resorption, the graft is replaced by an organ-typical regenerated material performing the function of the lost dura mater.

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546. Beltman, J. J. and J. Wilde (2007). "[Diagnostic image (310). A man with a knife in his head]." Diagnose in beeld (310). Een man met een mes in zijn hoofd. 151(6): 358.

A 30-year-old man presented with a knife in his head; it had perforated the left temporal area and its point was located in the mouth. After surgical removal of the knife, the patient left the hospital without functional deficits.

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547. Belzberg, H., et al. (2007). "Hemodynamic and oxygen transport patterns after head trauma and brain death: implications for management of the organ donor." The Journal of trauma 63(5): 1032-1042.

OBJECTIVES: The aims of the present study were to describe the temporal hemodynamic and oxygen transport patterns of patients with head injuries as well as the patterns of those who became brain dead to better understand the role of underlying central regulatory hemodynamic mechanisms and ultimately to improve rates of organ donation., METHODS: We studied 388 consecutive noninvasively monitored patients with severe head trauma; 79 of these became brain dead. Monitoring was started shortly after admission to the emergency department and was designed to describe the sequence of cardiac, pulmonary, and tissue perfusion functions by cardiac index (CI), mean arterial pressure, heart rate, arterial saturation by pulse oximetry (Sapo2), and transcutaneous oxygen and carbon dioxide (Ptco2/Fio2 and Ptcco2) patterns. The latter were used as markers of tissue perfusion or oxygenation., RESULTS: Patients with head injuries who subsequently became brain dead initially had low CI with poor tissue perfusion beginning shortly after emergency department admission. This was followed by a prolonged period characterized by high CI (4.43 +/- 1.3 L x min(-1) x m2) and enhanced tissue oxygenation (Ptco2/Fio2 238 +/- 186). In the late or end stage of brain death, hemodynamic deterioration and collapse led rapidly to arrest. In attempts to maintain hemodynamic stability for organ donation, the effects of various therapies on the hemodynamic patterns were preliminarily described., CONCLUSIONS: The hyperdynamic state with exaggerated peripheral tissue perfusion or oxygenation in brain-dead patients associated with loss of central vasoconstrictive mechanisms of the stress response resulted in unopposed peripheral metabolic vasodilatation producing high CI and tissue perfusion.

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548. Ben Abdessalem, N., et al. (2022). "A challenging case of an intraorbital foreign body in a child: A case report." Annals of Medicine and Surgery 76.

Apart from congenital causes, orbital trauma is a leading cause of unilateral vision loss in children. We report the case of a 2-year-old child who was victim of an orbital trauma of the right eye caused by a ballpoint pen. He consulted us the day after the trauma with significant palpebral edema making the examination difficult. An emergency CT scan of the orbit and brain showed the presence of a right intraorbital foreign body. The patient underwent removal of the foreign body by an anterior orbitotomy with general antibiotic therapy and a simple postoperative course. Penetrating trauma to the orbit should raise the suspicion of the presence of a foreign body. A CT scan should be performed to specify its location. The extraction of the foreign body can be a challenge that requires an experienced surgical team.

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549. Benali, L., et al. (2013). "An unusual case of attempted suicide by a depressive woman: self-inflicted intracranial stabbing." Forensic science international 226(1-3): e9-11.

Self-inflicted stab injury to the skull, particularly in the neurocranium, is a rare method used to commit suicide. Herein is presented a case of a 26-year old woman with a temporal wound found by her partner in their home. No weapon was found in the approximate environment and the victim said that she fell. A CT scan performed at admission to the emergency room was interpreted as being compatible with injury from falls. A second CT scan in a neurosurgical unit suggested a cranio-cerebral injury from a sharp object; aggression was suspected. The discording elements led to an interview with a psychiatrist and diagnosis of attempted suicide through the action of a knife in the context of severe depression. This is a rare case that implicates a depressive woman and stabbing directly to the neurocranium.

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550. Bendiouri, R., et al. (2021). "Internal jugular vein thrombosis by sewing needle ingestion." International journal of surgery case reports 83: 105988.

INTRODUCTION: The internal jugular vein thrombosis is usually due to intravenous drug abuse, prolonged central venous catheterization or deep head-neck infections or trauma. Related malignancies, or inflammatory etiologies are described. Our case is interesting by the ingestion of a sewing needle that passes from the pharynx to the internal jugular vein via migration, leading to life-threatening complications: deep neck space infection and internal jugular vein thrombosis., CASE REPORT: We report a case of a 40 years old patient, for acute cervical cellulitis in a context of odynophagia and fever, a CT scan revealed a jugular vein thrombosis, penetrated by a metal density foreign body. The diagnosis of ingested foreign body complicated by cervical cellulitis and thrombosis of the internal jugular vein was made. The patient underwent neck surgery with intravenous antibiotics. The postoperative course was uneventful, after one year of follow-up, no complications have been observed., DISCUSSION: no consensus has been reached concerning the management of postoperative and post traumatic vein thrombosis. Taking into account the risk of extension of the thrombus and the hemorrhagic risk each case should involve discussions among a multidisciplinary team., CONCLUSION: The internal jugular vein thrombosis is a rare complication of ingested foreign bodies which may lead to life threat. The early diagnosis and adequate treatment of its life-threatening complications may result in excellent prognosis.

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551. Benech, A., et al. (1997). "[Fracture of the glenoid fossa without condylar dislocation and with intact mandibular condyle. Report of a case]." Frattura della fossa glenoidea senza dislocazione condilare e con condilo mandibolare integro. Presentazione di un caso clinico. 46(10): 541-546.

The osteomuscular structure of the cranium presents peculiar anatomic characteristics that aim to preserve the noble organs that are housed inside or are adjacent to them. This is also true of the condylar region which protects the cranial cavity from forces transmitted to the glenoid cavity by the condyle in traumatism to the facial region and above all the genial symphysis. These factors act as "force breakers"

to prevent the condyle penetrating the middle cranial fossa. Of these the most important is the presence of a line of minor resistance at the level of the condyle neck which is often the site of a protective fracture. However, the dislocation of the condyle in the middle cranial fossa is an occurrence that is reported in the literature, albeit very rarely; the fracture of the glenoid fossa with an intact mandibular condyle and without evident dislocation of the latter is even more rare. The paper reports the case of a 22-year-old male patient who was injured in the submental area leading to loss of conscience. CT revealed that the left mandibular condyle was intact whereas there was a comminuted fracture of the roof of the glenoid fossa and two fractures at the mandibular level. The patient also presented left otoliquorrhea. The glenoid fracture was not complete and therefore the mandibular condyle did not show evident dislocation nor was it necessary to resort to surgical or non-surgical treatment. After the reduction and restraint of the two mandibular fractures, occlusion was correct and the position of the left condyle was appropriate following X-ray control, even if the glenoid cavity was partially fractured. Otoliquorrhea resolved spontaneously after about three days and did not require any treatment. The case described here, which was recontrolled after some time, presented excellent functional results demonstrating that conservative treatment of the glenoid cavity fracture was the correct therapeutic choice.

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552. Bener, A., et al. (1998). "Injury mortality and morbidity among children in the United Arab Emirates." European journal of epidemiology 14(2): 175-178.

UNLABELLED: The objective of this study was to identify the major causes of accident mortality and morbidity among children (0-14 years) in Al-Ain, United Arab Emirates (UAE). A retrospective descriptive study was set in the Al-Ain Hospital and Preventive Medicine Department, Ministry of Health, Al-Ain. Subjects were all patients aged 0-14 years who were seen at Al-Ain Hospital for injury during the 12-month period January to December 1995, and all recorded deaths aged 0-14 years in Preventive Medicine Department from 1980 to 1995., RESULTS: Mortality: 301 children (69.4% males, 30.6% females) died after accidents from 1980 to 1995. UAE citizens and other Arabs represented the majority of deaths. Most mortality (28.6%) occurred in the 1-4 year age group. Head and neck injury was the major type of injury causing death (57.5%). The most common cause of accidental death was road traffic accidents (boys 67.1%, girls 60.4%), followed by drowning and burns (8%). Morbidity: Pediatric trauma cases seen during 1995 totaled 17,498, representing one third of all patients attending the Hospital Emergency Room. About 70% of encountered injuries occurred among boys; 44.6% of cases were UAE citizens. The most common trauma type was contusion (40.2% boys; 40.6% girls), the most common type of trauma in boys and girls (30.4% and 36%, respectively). In the age group <5 years, the most common causes of trauma were fall (41.1%), blunt trauma (38.7%) and burns or scalds (64%), while in 5-9 year olds, the most common cause was road traffic accidents (40%). Finally, in 10-14 year olds, the most frequent causes were traffic accidents (32.8%) sharp objects injuries (38.3%), and fights and sporting (28.9%)., CONCLUSION: More boys than girls presented with injury and the majority were nationals. Road traffic accidents mainly occurred in children over 10 years.

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553. Ben-Moshe, H., et al. (2020). "ApoE4 Exacerbates Hippocampal Pathology Following Acute Brain Penetration Injury in Female Mice." Journal of molecular neuroscience : MN 70(1): 32-44.

The e4 allele of apolipoprotein E (apoE4) is the most prevalent genetic risk factor for Alzheimer's disease. ApoE4 is also associated with poor recovery and functional outcome following traumatic brain injury. This study examined the effects of the apoE genotype on brain pathology following acute injury, induced by penetration of a needle through the cortex and hippocampus, at 3 and 14 days following the injury in female apoE3 and apoE4 alpha-synuclein-deficient targeted replacement (TR) mice. The results obtained revealed a marked inflammatory, synaptic and vascular response following the needle penetration injury (NPI). These results were found to be affected by the apoE genotype such that the inflammatory response, as measured utilizing the astrocytic marker GFAP and the microglial marker iba1, was faster and more prolonged in the apoE4 than in the apoE3 mice. The

synaptic changes following the injury included a transient increase in synaptophysin levels in the apoE3 and not in the apoE4 mice, which was associated with a subsequent decrease in glutamatergic synapses, as measured utilizing VGluT1, in apoE4 and not in the apoE3 mice. Unlike these effects, measurements of the vasculature utilizing collagen IV as a marker revealed a significant increase which was similar in both apoE3 and apoE4 mice. Taken together, these results show that following acute brain injury, there is an apoE4-specific inflammatory and neuronal response to the injury. The NPI model provides a useful tool for studying the mechanism underlying the effects of apoE4 following acute brain injury and for the development of a corresponding anti-apoE4-targeted treatment.

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554. Benndorf, G., et al. (2011). "Acute endovascular management of gun shot injuries to arteries supplying the head & neck and the brain in civilian patients." Journal of neurointerventional surgery 3: A12-A13.

Purpose To report the use of endovascular techniques for management of gun shot injuries to arteries in the head and neck requiring emergency intervention. Material and Methods Between January 2009 and March 2011, 46 patients, admitted to a Level 1 Trauma Center with suspected gun shot injuries of the extracranial or intracranial circulation (Age range: 17-54, gender distribution: 35 males/11 females), were referred for four vessel angiograms. Four vessel angiograms were performed within 24 h after admission to confirm potential injuries to the external carotid, internal carotid and vertebral arteries (ECA, ICA or VA) and if necessary with the intent to treat by endovascular techniques. Results In 13/46 patients, major vessel injuries, requiring immediate surgical or endovascular intervention were documented. In one patient, an internal carotid dissection causing thrombembolic stroke was successfully treated by stent placement. Two patients presenting with ruptured cervical VAs without angiographically visible active extravasation were treated by endovascular coil occlusions (1) and a combination of coils and NBCA (1). In six patients with life threatening blood loss, significant active extravasations were documented arising from the internal maxillary (4), occipital (1) or superficial temporal (1) arteries. In all cases, immediate transarterial occlusions were performed using NBCA (5) or Onyx (1). Complete occlusion of the rupture site was achieved in all patients. In two patients, arteriovenous fistulas between the common carotid artery and internal jugular vein, and the subclavian artery and vein respectively, were found. Both lesions were surgically corrected. All but two patients recovered partially or completely from their injuries. In 2 cases, intracranial vessel occlusions and extravasations were documented; no treatment was initiated due to elevated intracranial pressure causing restricted cerebral perfusion. Conclusions Minor damages to the vessel wall are often manageable with conservative management and low dose anticoagulation or antiplatelet therapy and short-term angiographic follow-up. Major vessel injuries leading to severe extracranial dissection or angiographic occlusion, may require stent placement or complete endovascular vessel blockage. In cases with significant active extravasations and critical blood loss, immediate transarterial embolization becomes life saving measure. The use of adhesive liquids such as acrylic glue appears more efficient compared to coils or Onyx to achieve the most rapid vessel occlusion in these cases.(figure presented).

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555. Benndorf, G., et al. (2013). "Endovascular management of traumatic injuries to supraaortic arteries." RoFo Fortschritte auf dem Gebiet der Rontgenstrahlen und der Bildgebenden Verfahren 185.

Ziele: Demonstration of important aspects in the current endovascular management of acute injuries involving arteries of the face and head&neck area. Methode: EVT was performed in 14 patients (10 male/4 female, 17 - 62 yo) suffering from acute injuries to supraaortic arteries who presented with uncontrollable blood loss or neurologic deficit between February 2009 and October 2012. One patient presented with acute and delayed injuries and underwent EVT 4 weeks after initial admission. 11 Patients suffered from gunshot wounds (GSW), 2 patients from stab wounds and 1 one from blunt trauma during a motorcycle accident. Five patients presented with multiple vascular injuries. Ergebnis: EVT was successfully performed in all patients. Five transections of the vertebral (4) and carotid (1) arteries were embolized with coils and/or liquid embolic agent (NBCA, Onyx). Ten penetrated external

carotid artery branches and one inferior thyroid artery were occluded with liquid embolic agents or PVA particles. One severe dissection of the internal carotid artery with a subsequent thromboembolic event was treated with stenting. In 2 patients the circle of Willis was used to approach the bleeding site. 12 patients survived with minor or no residual deficits; two patients had a fatal outcome due to critical blood loss prior to admission. Schlussfolgerung: Management of penetrating injuries to the face, head and neck may involve all aspects of current methods in EVT. Understanding the full spectrum of neuroendovascular techniques and being capable of rapid, appropriate decision making in the setting of acute injuries to supraaortic arteries can be a life saving measure and greatly benefit the patient's outcome.

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556. Bennett, M. H., et al. "Hyperbaric oxygen therapy for the adjunctive treatment of traumatic brain injury." (12).

Background, Traumatic brain injury is a common health problem with significant effect on quality of life. Each year in the USA approximately 0.56% of the population suffer a head injury, with a case fatality rate of about 40% for severe injuries. These account for a high proportion of deaths in young adults. In the USA, 2% of the population live with long-term disabilities following head injuries. The major causes are motor vehicle crashes, falls, and violence (including attempted suicide). Hyperbaric oxygen therapy (HBOT) is the therapeutic administration of 100% oxygen at environmental pressures greater than 1 atmosphere absolute (ATA). This involves placing the patient in an airtight vessel, increasing the pressure within that vessel, and administering 100% oxygen for respiration. In this way, it is possible to deliver a greatly increased partial pressure of oxygen to the tissues. HBOT can improve oxygen supply to the injured brain, reduce the swelling associated with low oxygen levels and reduce the volume of brain that will ultimately perish. It is, therefore, possible that adding HBOT to the standard intensive care regimen may reduce patient death and disability. However, a concern for patients and families is that using HBOT may result in preventing a patient from dying only to leave them in a vegetative state, entirely dependent on medical care. There are also some potential adverse effects of the therapy, including damage to the ears, sinuses and lungs from the effects of the pressure and oxygen poisoning, so the benefits and risks of the therapy need to be carefully evaluated., Objectives, To assess the effects of adjunctive HBOT for traumatic brain injury., Search methods, We searched CENTRAL, MEDLINE, EMBASE, CINAHL and DORCTHIM electronic databases. We also searched the reference lists of eligible articles, handsearched relevant journals and contacted researchers. All searches were updated to March 2012., Selection criteria, Randomised studies comparing the effect of therapeutic regimens which included HBOT with those that did not, for people with traumatic brain injury., Data collection and analysis, Three authors independently evaluated trial quality and extracted data., Main results, Seven studies are included in this review, involving 571 people (285 receiving HBOT and 286 in the control group). The results of two studies indicate use of HBOT results in a statistically significant decrease in the proportion of people with an unfavourable outcome one month after treatment using the Glasgow Outcome Scale (GOS) (relative risk (RR) for unfavourable outcome with HBOT 0.74, 95% CI 0.61 to 0.88, P = 0.001). This five-point scale rates the outcome from one (dead) to five (good recovery); an 'unfavourable' outcome was considered as a score of one, two or three. Pooled data from final follow-up showed a significant reduction in the risk of dying when HBOT was used (RR 0.69, 95% CI 0.54 to 0.88, P = 0.003) and suggests we would have to treat seven patients to avoid one extra death (number needed to treat (NNT) 7, 95% CI 4 to 22). Two trials suggested favourably lower intracranial pressure in people receiving HBOT and in whom myringotomies had been performed. The results from one study suggested a mean difference (MD) with myringotomy of -8.2 mmHg (95% CI -14.7 to -1.7 mmHg, P = 0.01). The Glasgow Coma Scale (GCS) has a total of 15 points, and two small trials reported a significant improvement in GCS for patients treated with HBOT (MD 2.68 points, 95%CI 1.84 to 3.52, P < 0.0001), although these two trials showed considerable heterogeneity (I(superscript 2) = 83%). Two studies reported an incidence of 13% for significant pulmonary impairment in the HBOT group versus 0% in the non-HBOT group (P = 0.007)., Authors' conclusions, In people with traumatic brain injury, while the addition of HBOT may reduce the risk of death and improve the final GCS, there is little

evidence that the survivors have a good outcome. The improvement of 2.68 points in GCS is difficult to interpret. This scale runs from three (deeply co atose and unresponsive) to 15 (fully conscious), and the clinical importance of an improvement of approximately three points will vary dramatically with the starting value (for example an improvement from 12 to 15 would represent an important clinical benefit, but an improvement from three to six would leave the patient with severe and highly dependent impairment). The routine application of HBOT to these patients cannot be justified from this review. Given the modest number of patients, methodological shortcomings of included trials and poor reporting, the results should be interpreted cautiously. An appropriately powered trial of high methodological rigour is required to define which patients, if any, can be expected to benefit most from HBOT.

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557. Bensalem-Owen, M., et al. (2009). "SPECT imaging in four patients with stimulus-induced rhythmic, periodic, or ictal discharges (SIRPIDs)." Epilepsia 50: 17.

Rationale: The electrographic and clinical significance of stimulusinduced rhythmic, periodic or ictal discharges (SIRPIDs) remains unclear and the debate of its ictal origin remains open. We report the findings of single photon emission computed tomography (SPECT) in 4 patients with SIRPIDs. Methods: Four consecutive patients with SIRPIDs were identified prospectively during continuous video-EEG (cVideo-EEG) monitoring. SPECT with 25-31.3 mci 99 mTC-ED injection was performed at the bedside immediately after sensory stimulation was applied and SIRPIDs were noted. Results: Patient 1-A76 year old man with terminal myelodysplastic disorder, was admitted for a self inflicted gun shot wound to the head. He had a complicated hospital course. He was evaluated with 3 days of cVideo-EEG) monitoring after he was found to be in non-convulsive status epilepticus (NCSE). After receiving fosphenytoin, SIRPIDs were identified. SPECT injection was obtained on the second day of monitoring. The study showed diffuse mild increase of tracer uptake in the left occipital cortex. His anti-epileptic drug (AED) regimen was optimized. Patient 2-A 52 year old woman with history of traumatic brain injury, epilepsy and chronic renal failure on hemodialysis was evaluated for mental status changes with 5 days of cVideo-EEG monitoring. She was initially taking phenytoin and eventually levetiracetam was added. Due to logistical reasons, the injection of the radionuclear tracer was done on the fifth day of monitoring. The study showed a localized site of increased uptake in the left parietal cortex. It was unclear however if this finding represented motor activation or an ictal focus. Because of this ambiguous finding and improvement in her mental no change in her AEDs was made. Patient 3-A 79 year old lady with multiple medical problems and an acute right frontal stroke was found to be in NCSE. Fosphenytoin was initiated and was followed by levetiracetam. She underwent monitoring with 3 day cVideo-EEG which showed SIRPIDs. SPECT injection was obtained on the third day of monitoring and did not show any abnormal uptake of the tracer. No changes were made to her AEDS. Patient 4-A 77 year old women with multiple medical problems, including kidney transplant was found to be in NCSE. Intravenous valproic acid was administered. She underwent 4 day cVideo-EEG monitoring. After SIRPIDs were identified a SPECT injection was obtained. The study did not show any abnormal uptake of the tracer. No changes were made to her AED regimen. Conclusions: Our results indicate that SPECT imaging is feasible despite technical aspects such as logistical issues encountered in the critically ill. SPECT imaging with injection of the radionuclear tracer at the time of SIRPIDs is a useful tool in guiding treatment with AEDs.

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558. Bentivoglio, M., et al. (1986). "Structural mechanisms of postlesional remodelling in the central nervous system." Italian journal of neurological sciences Suppl 5: 29-36.

Numerous recent experimental studies have evidenced that considerable remodelling takes place in the central nervous system following an injury. The postlesional reorganization is particularly active in the central circuits when the injury occurs during development. The basic structural postlesional mechanisms, such as axonal sprouting and synaptic rearrangement, are here briefly outlined.

Experimental evidence of postlesional structural reorganization of central neurons is provided, with special reference to the remodelling that follows cerebellar lesions.

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559. Bento, R. F. and R. V. de Brito (2004). "Gunshot wounds to the facial nerve." Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology 25(6): 1009-1013.

OBJECTIVE: This paper presents our experience with gunshot wounds to the temporal bone and discusses facial nerve lesions, surgical indication, surgical timing, and other findings., STUDY DESIGN: We performed a retrospective review of patients treated for facial nerve lesion after gunshot injury to the temporal bone., SETTING: The study was performed in the Otolaryngology Department of the University of Sao Paulo Medical School, Sao Paulo, Brazil., PATIENTS: Ninety-eight patients treated between 1988 and 1999 were analyzed., INTERVENTION: Facial nerve lesions, bullet locations, and surgical techniques were analyzed. Patients were monitored for 2 years., RESULTS: Gunshot trauma to the temporal bone presented considerable tissue loss resulting from the abrasion effect and severity of the impact. The third segment of the facial nerve was most affected, and the bullet was typically found lodged in the mastoid tip. Postoperative infection was common. Such cases required revision surgery, resulting in worse cosmetic outcomes than in cases of closed trauma., CONCLUSIONS: Surgical exploration of the facial nerve should be performed as soon as possible, since long delays increase the chance of traumatic neuroma and more pronounced scarring around the facial nerve. Open mastoidectomy with meatoplasty is the surgical technique recommended for repairing the mastoid and the facial nerve. In the majority of cases, a cable graft is necessary. Since nerve lesion in proximity to the stylomastoid foramen and extratemporal facial nerve is common, these areas must be explored carefully.

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560. Benzel, E. C., et al. (1991). "Civilian craniocerebral gunshot wounds." Neurosurgery 29(1): 67-62.

Experience with 120 patients who incurred a gunshot wound to the head with dural penetration is presented. All of the patients were managed by a standard resuscitation protocol and assigned a clinical grade based on their level of consciousness both at the time of presentation and at 2 to 4 months after injury. Fifty patients (42%) underwent surgery. Twenty-eight patients (23%) had a good recovery, 19 (16%) were moderately disabled, 6 (5%) were severely disabled, and 67 (56%) died. All patients who were alert and awake with a normal or near normal neurological examination at the time of admission survived with a good outcome. All but 4 patients who were comatose at the time of admission died. Nine patients, however, who were not comatose at the time of admission died from potentially preventable causes. In 3 of these patients, a more aggressive diagnostic approach (including cerebral angiography) may have altered their ultimate outcome. An expeditious approach to the trauma victim with a comprehensive management scheme after injury may have altered the course in the remainder of these patients.

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561. Berenguer, C. M., et al. (2010). "Brain death confirmation: comparison of computed tomographic angiography with nuclear medicine perfusion scan." The Journal of trauma 68(3): 553-559.

INTRODUCTION: : Brain death is a difficult diagnosis to make, relying primarily on clinical examination. Ancillary tests are used when confounders exist. Nuclear medicine perfusion test (NMPT) is currently the preferred test for confirming brain death. Computed tomographic angiography (CTA) may be an alternative test to confirm brain death. It is readily available 24 hours a day at most level I trauma centers and is easy to perform., METHODS: : Patients with a clinical examination consistent with brain death were selected from the intensive care unit at a 550-bed teaching hospital. The patients underwent NMPT followed immediately by CTA. Both studies were read by radiologists blinded to the results of the alternative study. Absence of brain perfusion confirmed brain death. Multiple independent variables were collected on each patient including demographics, core body temperature, apnea

challenge, mechanism of injury, timelines, renal function pre- and posttesting, organ donation, and time to procurement., RESULTS: : There were 25 patients enrolled in the study with multiple injury patterns. No false negative exams were identified on CTA when compared with NMPT. Three patients without flow on NMPT showed minimal flow on CTA. Each of these had open skull defects. Sensitivity of CTA was 0.86 and specificity was 1. There was no induced morbidity with regards to renal failure and organ donation., CONCLUSION: : CTA is a quick and efficient test for brain death confirmation. CTA demonstrated no false negative studies. The resolution of CTA seems to have an increased sensitivity for cerebral blood flow. Further studies with larger sample sizes need to be performed.

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562. Berg, J. and J. G. Johansen (1997). "[Penetrating head and neck gunshot injuries. A 10-year neurological material]." Penetrerende skuddskader i hode og hals. Et neurokirurgisk tiarsmateriale. 117(2): 236-240.

37 patients with penetrating injuries of the head or upper neck caused by gunshot wounds were admitted to the neurosurgical department during the ten-year period 1986 to 1995. There was a marked preponderance of males. 29 of the cases were attempted or successful suicides, four were homicides, and four were presumed to be accidents. The most common weapons used were pistol and rifle. Nine patients were under the influence of alcohol or drugs. There were eight survivors, seven of whom were operated on. Four of the patients suffered reduced vision, two of whom became blind. Two had hemiparesis, one had moderate mental dysfunction, and one recovered completely. None of the patients who were unconscious upon admission to hospital and had bilateral brain injury survived.

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563. Berg, P., et al. (1986). "[Iatrogenic eye perforation in para- and retrobulbar injections]." Iatrogene Bulbusperforation bei para- und retrobulbaren Injektionen. 189(2): 170-172.

The authors report on 5 cases of inadvertent iatrogenic perforation of the globe in the course of retrobulbar and parabulbar injections. Perforation occurred twice by injection of the drug into the eyeball itself (subretinally or intravitreally), while in 3 cases a double perforation occurred, as a result of which the drug penetrated behind the eye. The prognosis is better in the latter case. Even though perforation of the globe during parabulbar and retrobulbar injections is extremely rare, it must always be considered if there is a sudden deterioration in vision and/or severe pain immediately after the injection; depending on the situation, retinal and/or vitreous surgery must then be performed at once.

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564. Berg, R. A. and G. B. Jacobs (1971). "Tangential missile wounds of the skull: a summary of the radiographic features in nineteen cases." Military medicine 136(2): 134-136.

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565. Berg, R. W. V., et al. (2019). "Brain tissue saving effects by single-dose intralesional administration of Neuroprotectin D1 on experimental focal penetrating brain injury in rats." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia 64: 227-233.

Traumatic brain injury (TBI) is followed by a secondary inflammation in the brain. Neuroprotectin D1 (NPD1) is synthesized from docosahexaenoic acid (DHA) and has anti-inflammatory and antiapoptotic effects in experimental models of neurodegenerative disease and brain ischemia-reperfusion. It is not known whether intralesional administration of NPD1 ameliorates inflammation and cell death after severe TBI. We therefore investigated the effects of NPD1 following a severe form of focal penetrating TBI. A total of 30 male Sprague-Dawley rats weighing between 350 and 450g were exposed to focal penetrating TBI or sham surgery. The rats were randomized to NPD1 treatment (50ng intralesionally, immediately following TBI) or no treatment. The rats were sacrificed at 24 or 72h. All subgroups consisted of 5 rats. Brains were removed, fresh frozen, cut in 14-microm coronal sections and subjected to Fluoro-Jade, TUNEL, MnSOD, 3-NT, COX-2, Ox-42 and NF-kappaB immuno-staining and lesion size analyses. NPD1 decreased the lesion area at 72h compared to no treatment with a mean

change 42% (NPD1 14.1mm2; no treatment 24.5mm2) (p<0.01). No difference was detected in markers for neuronal degeneration, apoptosis, anti-inflammatory or antioxidative enzymes, or immune cells. In conclusion, single-dose intralesional administration of NPD1 had brain tissue sparing effects after focal penetrating TBI, which may be beneficial in preventing brain tissue damage, making NPD1 a potential candidate for further clinical applications. Exact mechanisms of action could not be determined and it is possible that continuous or multiple administration regimens may increase efficacy in sequential preclinical studies.

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566. Berger, F., et al. (2018). "Retained bullets in the head on computed tomography - Get the most out of iterative metal artifact reduction." European journal of radiology 103: 124-130.

BACKGROUND: Metal artifacts from retained bullets impair the image quality on computed tomography (CT) and may compromise the detection of critical lesions or the bullet path. To reduce metallic artifacts from medical implants on CT, special algorithms have been developed, e.g., iterative metal artifact reduction (iMAR). The aim of this prospective study was to evaluate the application of iMAR in cases of retained bullets., MATERIALS AND METHODS: In this study, nine different types of projectiles (n=9) were selected to evaluate the effect of iMAR. The study consisted of two settings. In the first setting, each projectile was fixed on a thin thread and placed in the middle of a water-filled container to demonstrate the effect of iMAR in a homogenous medium. In the second setting, each projectile was placed in the severed head of a pig cadaver as a substitute for human tissue to evaluate iMAR in cases of retained bullets. The raw data from CT scans of both settings were reconstructed with and without iMAR (standard filtered back-projection). The reconstructions with iMAR were calculated using eight different presets provided by the software, namely, neuro-coils, dental fillings, spine implants, shoulder implants, pacemaker, thoracic-coils, hip implants and extremity implants. For each setting, nine reconstructions (n=9; iMAR: n=8; without iMAR: n=1) for each projectile were subjectively evaluated for the image quality and extent of streak artifacts by ten independent and blinded raters (residents: n=5; radiologists: n=5). The reconstructions of the second setting were evaluated in a soft tissue window and bone window. A 5-point Likert scale was used for the evaluation of image quality based on the extent of streaks as follows: 1=severe; 2=considerable; 3=moderate; 4=minimal; and 5=not apparent. Kendall's W was used for assessing agreement among the ten raters. The Wilcoxon test was used to reveal whether there was a difference in the subjective evaluations between residents and radiologists. Nonparametric Friedman and post hoc tests were used to analyze the Likert scores. The mean difference was considered significant at the 0.05 level., RESULTS: The agreement among the raters was reasonably high for all projectiles in both settings. In the phantom setting, the iMAR presets neuro-coils and dental fillings yielded the best results. In the pig's head setting regarding the soft tissue window, the presets neuro-coils and extremity implants were preferred. Regarding the bone window, the presets extremity implants and hip implants had the best results. Statistical significance (p<0.01) between reconstructions without iMAR and neuro-coils or extremity implants was calculated. The iMAR preset spine implants had poor values comparable to reconstructions without iMAR., CONCLUSION: The applied iMAR presets revealed different effects on the image quality. Selecting an inappropriate preset (e.g., spine implants) may result in unsatisfactory artifact reduction. The results of this study indicate that the neuro-coils preset is the most appropriate preset for soft tissue, and the preset extremity implants is favorable for bones in cases of retained bullets.

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567. Bergman, C. and M. Galicia-Castillo (2015). "Failed gun-inflicted suicide attempt in the older adult." Journal of the American Geriatrics Society 63: S236-S237.

Background: Suicide in the older adult remains a top mental health concern. Studies are limited but data suggests high suicide completion rates with white men over the age of 75. The method of suicide can vary greatly from firearms to hanging to intentional overdose. We present a suicide attempt with a gun resulting in a complicated hospitalization with tragic consequences. Case Study: An 80 year

old white male with a history of diabetes, hypertension, and persistent pain presented to the trauma service following a self-inflicted gunshot wound. Following a quick assessment, the patient was found to have an entry wound at his left temple and an exit wound at the right temple with a ruptured left globe. He was combative and complaining of a headache with neck pain and severely reduced vision. Remarkably, his neurological exam was normal except for disturbances related to his ocular injuries. His head CT was equally impressive for the lack of brain injury. Due to the severity of damage to his intraocular muscles, ophthalmology completed a left eye globe enucleation but was unable to complete facial reconstruction due to consent issues. His hospital course was complicated by agitation, confusion, and hallucinations requiring admission to the geriatric psychiatry unit. The patient acknowledged he "shot himself" because "it was all becoming too much." The patient described deteriorating physical health with ambulatory limitations, persistent pain, and financial problems leading to the suicide attempt. After a three week stay in the inpatient geriatric psychiatry unit, it was determined the patient was safe to discharge without suicidal ideations but with a new physical disability. Discussion: This case illustrates the potential for suicide of a violent nature even in the older adult. Older white males are in the highest risk category for more violent methods of suicide. The patient's hospital course was complicated by his own struggles with depression, worsening physical limitations and new psychiatric symptoms. Mental, physical, and social stressors are factors that need to considered potential "triggers" for gun-inflicted attempts to commit suicide. It is important to enquire about the presence of a gun in the home of our older patients who demonstrate high risk.

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568. Berlin, C. I., et al. (1972). "Central auditory deficits after temporal lobectomy." Archives of otolaryngology (Chicago, Ill. : 1960) 96(1): 4-10.

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569. Berlit, P., et al. (1987). "[Gunshot injuries of the skull. Computerized tomography findings and clinical course]." Schussverletzungen des Schadels. Computertomographischer Befund und klinischer Verlauf. 58(5): 300-304.

The clinical and computed tomographic findings in 22 civilian cases of craniocerebral gunshot injury are reported. Fifteen out of the 19 male cases were suicidal attempts; the 3 women were shot by their husbands. In 2 cases the injuries resulted from use of a slaughterer's gun. The level of consciousness is a valuable predictor of outcome from the clinical point of view. CT findings such as bihemispheric injury and detection of intraventricular blood or air were associated with a poor outcome. Surgical intervention appears to be justified only in patients with extensive subdural or epidural hematoma. The mortality rate in this study was 45%.

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570. Bernardo Fernandez, H., et al. (2006). "[Posttraumatic pseudoaneurysm of the posterior cerebral artery]." Seudoaneurisma postraumatico de la arteria cerebral posterior. 48(6): 398-400.

We present the case of a traumatic posterior cerebral artery pseudoaneurysm of a 29-year-old man due to a penetrating stab wound to the brain. The patient was brought to the emergency room in coma. The neurological examination revealed a Glasgow Coma Scale Score of 8 and left hemiplegy. The initial CT scan showed right temporal lobe haemorrhage with penetration in the lateral ventricle and subarachnoid haemorrhage. The cerebral angiography performed after three weeks, revealed a high PCA pseudoaneurysm. After surgery, a pseudoaneurysm was demonstrated in the histological study.

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571. Bernet, W. (2011). "Ridiculous statements by mental health experts." Child and adolescent psychiatric clinics of North America 20(3): 557-564.

When mental health experts express their opinions in testimony, reports, and articles in professional literature, it is expected that their statements will accurately reflect the current state of knowledge. Experts may disagree about the data that they collected. In some cases, however,

disagreement occurs because an expert has employed a methodology that is far outside usual procedures or simply disregarded objective facts. When that occurs, the expert's opinions may be considered ridiculous. The author presents examples of ridiculous statements by mental health experts and provides suggestions for how a forensic practitioner might address ridiculous statements by mental health experts.

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572. Berrington, T., et al. (2015). "Removal of a penetrating orbital and anterior fossa foreign body using an eyebrow incision." British journal of neurosurgery 29(2): 306-307.

In this case, we present an underutilised eyebrow approach for removing penetrating foreign bodies of the orbit extending into the anterior fossa floor. Excellent visualisation of the sub-frontal region is achieved and a large trauma craniotomy is avoided, but care must be taken to preserve the supra-orbital and fronto-temporal nerves.

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573. Berryman, H. E. (2019). "A systematic approach to the interpretation of gunshot wound trauma to the cranium." Forensic science international 301: 306-317.

This chapter employs the fracture assessment triad, a systematic analytical approach, as a vehicle to explore the components used to interpret gunshot trauma to the cranium. First, a list of pertinent observations associated with gunshot trauma to the cranium is presented with a brief description of each. These features include entrance and exit wound defect morphology, keyhole defect, gutter defect, radiating fractures, concentric fractures, bone plugs, and associated foreign material, debris and residue. Second, the intrinsic factors that govern the way bone responds to trauma can be surmised through a direct examination or knowledge of the skeletal case. Intrinsic factors rest primarily in bone being a viscoelastic material with anisotropic properties, but include other elements that affect fracture production, such as buttressing, bone architecture, sutures, and influences of age, sex and health. These influences may be discoverable and factored into the analysis. With direct observation of the defect/fracture pattern and an understanding of the intrinsic influences involved, the extrinsic factors can be deduced. Bullet velocity, mass, design and cavitation represent the major extrinsic factors involved in wound production. The interplay of each of these factors imparts varying amounts of kinetic energy to soft and hard tissues. The greater amount of kinetic energy conveyed, the larger the temporary cavity and the greater the potential for destruction. When interpreting gunshot trauma, precision is enhanced by the analyst's familiarity with firearms and ammunition, facilitating determination of firearm type (rifle/handgun or shotgun), bullet direction, range, sequence of fire, and potentially, speculations as to bullet velocity, mass and design. Neither caliber nor gauge can be determined from the entrance defect size, but elimination of certain calibers or gauges may be possible.

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574. Berryman, H. E., et al. (1995). "Diameter of cranial gunshot wounds as a function of bullet caliber." Journal of forensic sciences 40(5): 751-754.

Determination of bullet caliber becomes increasingly important in homicides where the bullet is missing. In cases with entrance wounds to bone that are circular and well defined it may be tempting to measure the defect and offer suggestions about bullet caliber. For this reason, the relationship between wound diameter and bullet caliber was examined using cranial bones from autopsy cases. The minimum diameter of 35 cranial wounds produced by .22, .25, and .38-caliber bullet was measured. The relationship of minimum wound diameter to bullet caliber was examined using a one way analysis of variance. Fisher's least significant difference test revealed no significant difference between .22-caliber and .25-caliber wounds, while the .38-caliber wounds were significantly different ($P < .001$) from .22-caliber and .25-caliber wounds. Variation in wound size resulting from such factors as bullet shape, surface treatment, strength characteristics, loss of gyroscopic stability, intermediate targets, tangential impacts, and existing fractures are discussed. Also, the large variety of calibers available are noted as

complicating the prediction of caliber from wound size. In view of these factors caution is recommended in any attempt to determine precise bullet caliber from the minimum dimensions of the cranial gunshot entrance wound.

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575. Bert, F., et al. (1995). "Brain abscess due to Bacillus macerans following a penetrating periorbital injury." Journal of clinical microbiology 33(7): 1950-1953.

We report a case of a brain abscess due to Bacillus macerans and Clostridium sp. following a penetrating periorbital injury by a wooden branch. Intracranial penetration by and retention of a foreign body were not suspected initially, and neurological symptoms developed only 2.5 months later. Previously reported cases of brain abscesses due to Bacillus species are reviewed.

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576. Bertani, R., et al. (2019). "Neuronavigation as a minimally invasive tool in the treatment of intracranial gunshot injuries." International Journal of Burns and Trauma 9(1): 19-22.

Gunshot injury is the most common cause of penetrating brain injury. The in-hospital mortality for civilians with penetrating craniocerebral injury is 52-95%. There are many surgical techniques suitable for the treatment of survivors. We report a surgical technique consisting of neuronavigation guidance for wound treatment with smaller incisions and craniotomies, followed by bullet removal if feasible. We report case of a 15 year old male patient who sustained an accidental firearm injury to the occipital region, submitted to surgical treatment that consisted in a minimally invasive approach guided by neuronavigation. Immediate neurological examination showed inferior homonymous quadrantanopsia alone as a clinical finding. Patient was discharged after one week, and no complications arised in follow-up. We conclude that using neuronavigation as a tool was effective in the reported case and that minimally invasive neurosurgical techniques may be a safe and efficient option for the treatment of traumatic brain injuries caused by firearm projectiles.

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577. Bertenyi, A. (1976). "Localization of intracular and intraorbital foreign bodies by means of A-scan ultrasonography." Ultrasonics 14(4): 183-185.

This paper discusses the use of ultrasonography in ophthalmology for foreign body localization and detection. The problems and advantages of using A-scann methods to verify and improve upon x-ray diagnosis are considered.

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578. Bertisch, H., et al. (2017). "Characteristics of Firearm Brain Injury Survivors in the Traumatic Brain Injury Model Systems (TBIMS) National Database: A Comparison of Assault and Self-Inflicted Injury Survivors." Archives of physical medicine and rehabilitation 98(11): 2288-2294.

OBJECTIVE: To characterize and compare subgroups of survivors with assault-related versus self-inflicted traumatic brain injuries (TBIs) via firearms at the time of inpatient rehabilitation and at 1-, 2-, and 5-year follow-up., DESIGN: Secondary analysis of data from the Traumatic Brain Injury Model Systems National Database (TBIMS NDB), a multicenter, longitudinal cohort study., SETTING: Retrospective analyses of a subset of individuals enrolled in the TBIMS NDB., PARTICIPANTS: Individuals 16 years and older (N=399; 310 via assault, 89 via self-inflicted injury) with a primary diagnosis of TBI caused by firearm injury enrolled in the TBIMS NDB., INTERVENTIONS: Not applicable., MAIN OUTCOME MEASURES: Disability Rating Scale, Glasgow Outcome Scale-Extended, sociodemographic variables (sex, age, race, marital status), injury-related/acute care information (posttraumatic amnesia, loss of consciousness, time from injury to acute hospital discharge), and mental health variables (substance use history, psychiatric hospitalizations, suicide history, incarcerations)., RESULTS: Individuals who survived TBI secondary to a firearm injury differed by injury mechanism (assault vs self-inflicted) on critical demographic, injury-related/acute care, and mental health variables at inpatient rehabilitation and across long-term recovery. Groups differed in

terms of geographic area, age, ethnicity, education, marital status, admission Glasgow Coma Scale score, and alcohol abuse, suicide attempts, and psychiatric hospitalizations at various time points., CONCLUSIONS: These findings have implications for prevention (eg, mental health programming and access to firearms in targeted areas) and for rehabilitation planning (eg, by incorporating training with coping strategies and implementation of addictions-related services) for firearm-related TBI, based on subtype of injury.

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579. Bertoni, E., et al. (1996). "Abnormalities in cadaveric organ donation rhythms and characteristics." Transplantation proceedings 28(1): 228-229.

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580. Bertrand, J. C., et al. (1987). "[Cervicofacial arterial lesions. An unusual case and a review of the literature]." Lesions arterielles cervico-faciales. Une observation particuliere, revue de la litterature. 88(2): 125-132.

A patient with a bullet wound developed an initially unrecognized vascular lesion revealed after five weeks by a cataclysmic hemorrhagic complication during drainage attempts. Literature on cervicofacial ballistic injuries is reviewed and the practical attitude to adopt with these lesions discussed.

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581. Besenski, N. (2002). "Traumatic injuries: imaging of head injuries." European radiology 12(6): 1237-1252.

Due to the forces of acceleration, linear translation, as well as rotational and angular acceleration, the brain undergoes deformation and distortion depending on the site of impact of traumatizing force direction, severity of the traumatizing force, and tissue resistance of the brain. Linear translation of accereration in a closed-head injury can run along the shorter diameter of the skull in latero-lateral direction causing mostly extra-axial lesions (subdural hematoma,epidural hematoma, subarachnoidal hemorrhage) or quite pronounced coup and countercoup contusions. Contusions are considerably less frequently present in medial or paramedial centroaxial blows (fronto-occipital or occipito-frontal). The centroaxial blows produce a different pattern of lesions mostly in the deep structures, causing in some cases a special category of the brain injury, the diffuse axonal injury (DAI). The brain stem can also be damaged, but it is damaged more often in patients who have suffered centroaxial traumatic force direction. Computed tomography and MRI are the most common techniques in patients who have suffered brain injury. Computed tomography is currently the first imaging technique to be used after head injury, in those settings where CT is available. Using CT, scalp, bone, extra-axial hematomas, and parenchymal injury can be demonstrated. Computed tomography is rapid and easily performed also in monitored patients. It is the most relevant imaging procedure for surgical lesions. Computed tomography is a suitable method to follow the dynamics of lesion development giving an insight into the corresponding pathological development of the brain injury. Magnetic resonance imaging is more sensitive for all posttraumatic lesions except skull fractures and subarachnoidal hemorrhage, but scanning time is longer, and the problem with the monitoring of patients outside the MRI field is present. If CT does not demonstrate pathology as can adequately be explained to account for clinical state, MRI is warranted. Follow-up is best done with MRI as it is more sensitive to parenchymal changes. In routine MR protocol gradient-recalled-echo sequences should be included at any other time after a traumatic event since they are very sensitive in detection of hemosiderin as well as former hematoma without hemosiderin. The MR signal intensity varies depending on sequences and time scanning after trauma.

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582. Besenski, N., et al. (1995). "CT analysis of missile head injury." Neuroradiology 37(3): 207-211.

Between August 1991 and December 1992, CT was performed on 154 patients who had suffered missile head injury during the war in the Republic of Croatia. In 54% CT was performed 1-24 h after injury, and in 27% follow-up CT was also obtained. The wounds were penetrating, tangential or perforating (45%, 34% and 21%, respectively). Haemorrhage was the most frequent lesion in the brain (84%). Follow-up CT evolution of haemorrhage, oedema, cerebritis, abscess, secondary vascular lesions, necrosis, encephalomalacia and hydrocephalus. The most dynamic changes occurred 7-14 days after injury. In 14% of cases, deep cerebral lesions were found in the corpus callosum, septum pellucidum periventricular region and pons, although bone and shell fragments were in a different part of the brain parenchyma. Such lesions were found in penetrating injuries only. CT proved very useful for assessing the extent and type of lesions. Although different mechanisms of brain damage in missile head injury are known, here they are, to the best of our knowledge, shown for the first time by CT.

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583. Beshay, N., et al. (2017). "The epidemiology of Open Globe Injuries presenting to a tertiary referral eye hospital in Australia." Injury 48(7): 1348-1354.

BACKGROUND: Open globe injuries (OGIs) account for 44% of the cost of ocular trauma within Australia. It is estimated that 90% of ocular trauma is preventable. However, there have been few epidemiological studies within Australia that have identified groups at risk of OGIs specifically. The aim of our study was to review the epidemiology of OGIs presenting to a tertiary referral eye hospital in Australia., METHODS: The Birmingham Eye Trauma Terminology (BETT) system was used to classify injuries as globe ruptures, penetrating eye injuries (PEIs), intraocular foreign bodies (IOFBs) or perforating injuries. Demographic data, past ocular history, mechanism of trauma, ocular injuries, and best-corrected visual acuity (BCVA) before and after treatment were recorded., RESULTS: The 205 OGIs included 80 globe ruptures, 71 PEIs, 48 IOFBs and six perforating injuries. Falls predominated in older age groups compared to the other mechanisms of injury ($p<0.0001$). A fall was responsible for 33 globe ruptures and 82% of these had a history of previous intraocular surgery. Globe rupture and perforating injuries had poorer visual outcomes ($p<0.05$), consistent with previous studies. Alcohol was implicated in 20 cases of OGI, with 11 of these due to assault. PEIs and IOFBs commonly occurred while working with metal. BCVA was significantly worse following removal of an intraocular foreign body. We found presenting BCVA to be a good predictor of BCVA at the time of discharge., CONCLUSIONS: The causes of OGI varied in association with age, with older people mostly incurring their OGI through falls and younger adults through assault and working with metal. Globe ruptures occurring after a fall often had a history of intraocular surgery. The initial BCVA is useful for non-ophthalmologists who are unfamiliar with the ocular trauma score to help predict the BCVA following treatment.

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584. Besra, S. K., et al. (2018). "An Interesting Case of Penetrating Brain Injury by a Self-Hammered Nail." Indian Journal of Neurotrauma 15(2-3): 62-66.

Penetrating brain injuries by nails are rare. These usually have been reported as work-related accidents such as from falls or nail gun misfires and in cases of assault. The authors present a case of a 38-year-old psychiatric patient who attempted suicide by self-impalement of nail in the vertex near the midline of the head. Surprisingly, he was asymptomatic after a brief loss of consciousness, and with a Glasgow Coma Scale of 15. There was no history of vomiting or seizures. Intraoperative and postoperative periods were uneventful. Many unusual intracranial foreign bodies have been reported in medical literature, but one of a self-inflicted intracranial injury by hammering a nail is rare. In this article, the authors describe their case report and discuss the challenges encountered in the management of a patient with intracranial injuries by nail, along with a brief review of literature.

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585. Bessho, M., et al. (2012). "A case in which a bone fragment caused by a bullet made a second channel in addition to the bullet channel." Legal medicine (Tokyo, Japan) 14(4): 188-190.

A 64-year-old male was found dead in his house with his face covered with blood and a 38-caliber revolver between his legs. He had been suffering from type 2 diabetes mellitus and aftereffects of cerebral infarction. Autopsy revealed a normal round contact wound in the left lateral cervical region. A bullet from the firearm had entered through the left lateral cervical region and traveled to the outer right sternocleidomastoid muscle. This also triggered another wound from the fifth cervical vertebra to the muscle tissue near the right cartilage thyroid. At the end of this channel, there were three bone fragments. Here, we report this interesting case with two channels caused by a bullet and by a resulting bone fragment. We also discuss the characteristics of an ear lobe injury found on the victim and show how this injury and blood and skin on the revolver were used as clues to determine the posture at the time of the shot.

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586. Betz, P., et al. (1995). ""Tentative" injuries in a homicide." The American journal of forensic medicine and pathology 16(3): 246-248.

A homicide caused by blunt trauma to the neck and head is reported. On the left side of the victim's neck were multiple superficial cuts that ran parallel to deeper ones that appeared to be the typical pattern of tentative or hesitation injuries. Further information on the perpetration of the crime could not be obtained from the offender, but it must be assumed that the cuts were made after the victim had already been knocked unconscious by blows or kicks. The considerable blood alcohol concentration of the perpetrator and the rather reduced sharpness of the serrated kitchen knife used probably contributed to the development of these injuries.

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587. Betz, P., et al. (1994). "[Penetrating injuries of the orbital roof caused by the point of an umbrella]." Perforationsverletzungen des Orbitadachs durch Regenschirmspitze. 91(1): 46-48.

Two lethal cases of penetration injury of the orbita are reported. The injuries were caused directly by the point of an umbrella (accident or homicide), leading to canalicular destruction of the frontal lobe of the cerebrum. The mechanism of injury with cerebral involvement was not determinable except by autopsy, and the importance of a thorough clinical examination is therefore emphasized.

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588. Bevivino, J. R., et al. (1994). "Reconstruction of traumatic orbital floor defects using irradiated cartilage homografts." Annals of plastic surgery 33(1): 32-37.

The important role of orbital shape and volume reconstruction has been studied by many investigators. There is, however, no consensus on the material that should be used in the reconstruction of the orbit. Both biologic and alloplastic materials have been used, each with its advantages and disadvantages. Here we report our experience with irradiated costal cartilage homograft in the reconstruction of the orbital floor. Irradiated cartilage grafts were used in 31 patients with significant traumatic defects in the orbital floor. Long-term follow-up in 21 patients up to 48 months revealed no incidence of graft infections, extrusions, or clinically detectable graft distortion or resorption. Irradiated cartilage homograft appears to be an excellent material for reconstruction of the orbital floor.

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589. Bhaskaran, C. S., et al. (1969). "Carotid artery thrombosis in non-penetrating injuries of the head and neck." Neurology India 17(2): 64-67.

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590. Bhat, R., et al. (2012). "Non-metallic and metallic craniocerebral missile injuries in civilian Kashmir - Varied outcome." Brain injury 26(4-5): 404.

Objective: To seek comparative results of nonmetallic and metallic craniocerebal missile injuries after aggresive treatment. Methods: Prospective and retrospective study of 694 craniocerebral missile injuries over a period of 21 years from September 1988 to March 2o1o in Sher - i- Kashmir Institute of

Medical Sciences, Kashmir India. Results: The study revealed an overall mortality of 32.70% (227 out of 694). A total of 664 adults and 30 children (mostly teenagers) were studied. The 79.1% (549 out of 694) patients were metallic missile (metal bullets, grenade, bomb and improvised ex-plosive device (IED) blasts, shrapnels, bolts, splinters and pellets used by shotgun etc) inju-ries whereas 20.8% (145 out of 694) patients were non-metallic missile injuries. The non-metallic missile injury group mostly (72.4% i.e.; 105 out of 145) had low GCS (Glasgow Coma Scale) score and overall worse prognosis with zero good-recovery, 47.5% disabilities and 52.4% mortality as compared to the metallic missile injury group. The nonmetallic group comprised of 60% (18 out of 30) children which resulted in only one death. The metallic missile injury deaths amounted to 21.75% (151 out of 694 patients) and non-metallic missile injuries accounted for 10.95% (76 out of 694 patients) of total deaths. Most complications i.e. 287 complications in only 145 patients, mostly infective were found in non-metallic missile injuries with worst outcome. The common non-metallic missiles used were stone balls (stone-bullets) and spherical glass balls (lo-cally Buanta) fired by Gulail (modified catapult) or slingshot, red rubber bullets, plastic tear gas shells and cartridges, wooden (pulped mulberry stem) and card-board wads used in shotguns (pellet-guns). Results: Predictors of poor outcome were low admission GCS score, non-metallic penetrating injury due to tear-gas cartridges, rubber bullets and stonebullets, perforating metallic missile injuries and delayed and maltransportation. The stone pelting, throwing stone projectiles (stone-bullets and glassbullets) by Gulail and manually has become a common way to inflict head and eye injuries in Kashmir. The non-metallic missiles are not lesslethal and have high disabling, killing and infective.

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591. Bhatia, K. D., et al. (2020). "Cavernous sinus embolisation prior to removal of penetrating foreign body in a 6-year-old child." BMJ case reports 13(12).

Transorbital penetrating foreign bodies are extremely rare in children and may penetrate the cavernous sinus or the underlying internal carotid artery. Parent vessel sacrifice and temporary balloon occlusion are feasible options for managing arterial injury during removal of the foreign body. Even in the absence of arterial injury, the ophthalmologist may encounter significant bleeding from the cavernous sinus deep in their operative field that is difficult to control. We present a case of a 6-year-old child with a stick penetrating the left superior orbit to enter the cavernous sinus but sparing the internal carotid artery. We describe the first reported experience of prophylactic coil embolisation of the cavernous sinus to minimise intraoperative bleeding during transorbital removal of a foreign body with an excellent clinical outcome.

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592. Bhatia, R., et al. (2012). "Craniocervical stab injury: the importance of neurovascular and ligamentous imaging." Emergency radiology 19(1): 83-85.

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593. Bhatjiwale, M. G., et al. (2001). "Transnasal intracranial entry of a flying wire fragment." British journal of neurosurgery 15(3): 256-258.

A 7-year-old boy was playfully revolving a partly insulated electric wire which accidentally struck a bamboo pole in its path. He soon found that his left nostril was hit and blood trickled from the site. Unsuspected on investigation, a small fragment of the wire was found within the brain. The sequence of events is reported.

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594. Bhatoe, H. S. (2001). "Retained intracranial splinters : a follow up study in survivors of low intensity military conflicts." Neurology India 49(1): 29-32.

With improvements in the ballistic physics, patient evacuation, imaging, neurosurgical management and intensive care facilities, there has been overall improvement in the survival of patients

with missile injuries of the brain. Patients with retained intracranial fragments have been followed up and the sequelae of such fragments were analysed. We present our observations in 43 such patients who had survived low velocity missile injuries of the brain during military conflicts and had retained intracranial fragments. Over a follow up period of 2 to 7 years, suppurative sequelae (brain abscess, recurrent meningitis) were seen in 6 patients, two of these progressing to formation of brain abscess. Three patients developed hydrocephalus and one seizures. Patients with orbitocranial or faciocranial wound of entry had a higher incidence of suppurative complications (3 out of 4), while those with skull vault entry had a lower incidence of such sequelae (7 out of 30). Nine patients were lost to follow up. Other determinants of suppurative complications were postoperative CSF leak and intraventricular lodgement of the fragment.

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595. Bhatoe, H. S. (2004). "Missile injuries of the anterior skull base." Skull Base 14(1): 1-8.

Missile injuries of the anterior skull base usually occur during war or warlike situations. These injuries may be isolated or associated with multiple traumatic injuries. We report 23 such cases managed during military conflicts and peacekeeping operations. All were adult males. Four of these patients sustained bullet injuries; the rest were injured from shrapnel. Eighteen patients had injury to the visual apparatus with permanent blindness. Proptosis was seen in 16, cerebrospinal fluid (CSF) leak from the wound in seven, and CSF orbitorrhea in three patients. Sixteen had irreparable injury to the eye necessitating evisceration/enucleation, and two had retrobulbar optic nerve injury. Three patients were comatose [Glasgow Coma Scale (GCS) 3/15], and 14 had altered sensorium. Six patients were fully conscious. All were investigated by computed tomography (CT), which revealed injury to the eyeball and skull base, orbital fracture, frontal hematoma, contusion, and pneumocephalus. Seventeen patients underwent emergency surgery, and six patients were initially managed conservatively. Neurosurgical management consisted of making bifrontal flaps, craniotomy/craniectomy, debridement, and repair of the base with fascia lata. Reconstruction of the orbital rim was required in three cases. All were managed postoperatively with cerebral decongestants and antibiotics in antimeningitic dosages. There was one death in the postoperative period; outcome was good in 16 and moderate in four patients. Twelve patients had retained intracranial splinters; three of these developed recurrent suppurative meningitis. Of the six patients initially managed conservatively, three were subsequently operated for CSF rhinorrhea. Gross communition, dural loss, and injury to the frontal scalp often preclude the use of pericranial repair of the skull base. Fascia lata is extremely useful for reconstruction and repair. Anterior cranial fossa injury probably carries a better prognosis; however, there is increased risk of suppurative complications due to breach of air-filled sinuses by the missile and contamination of the intradural compartment, as compared with supratentorial vault injuries not involving the orbit or paranasal sinuses. Three patients who underwent no operative procedure and remain asymptomatic are under follow-up.

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596. Bhatoe, H. S. (2018). "Operative management of gunshot wounds of the brain." Journal of neurotrauma 35(16): A56-A57.

While managing a patient (often a soldier) with gunshot injury to the brain, the paramedics and surgeons/neurosurgeons are often racing the biological clock, in effort to salvage a rapidly perishable entity. Thus, it has to be clear to all paramedics in field and the surgeons who may be called to treat these patients in austere environments, the scope and limits of surgical intervention in a given situation. In a mass casualty situation, rapid triage is the precursor to optimizing management and evacuation. In a peripheral setup, all that can be done is hemostasis from cranial wounds, administration of cerebral decongestants (hyperosmolar agents and osmotic diuretics), and rapid evacuation. Computed tomography of the cranium provides the information about the extent and severity of injury, prognostication and helps chalk out the surgical plan. Under anesthesia, dressings are opened, and after preliminary debridement and raising the scalp flap, damage is assessed. Unless bone is grossly communited and contaminated, craniotomy flap can be planned. Normal dura is defined and radial

incisions given with insertion of stay sutures. Grossly communited bone, pulped brain and foreign bodies are removed with copious irrigation. A brain conserving attitude is advocated and radical debridement is avoided. Hemostasis should be perfect, which can be achieved by tamponade and bipolar coagulation. No attempt should be made to dissect the brain tissue to remove bullets and shrapnel if they are not visible after debridement. Dura is reconstituted with autologous pericranium, temporalis fascia or fascia lata to achieve water-tight closure. Large bone flaps can be washed with iodinated antiseptic solutions and replaced. Scalp is closed water-tight. Delayed consequences of such injuries (delayed cerebrospinal fluid leaks, and problems related to retained intracranial fragments) can be planned after due assessment with imaging. CSF leaks require repair of the dural and skull base defect, and retained intracranial fragments can be removed if they are accessible and their removal will not enhance neurological deficits. Suppurative sequelae (recurrent pyogenic meningitis, brain abscess) need appropriate antibiotic therapy and removal of the offending shrapnel. Other sequelae like hydrocephalus and migration of the bullet/shrapnel will need appropriate planning and their removal.

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597. Bhiansha, A. L. D. and T. Selvaraj (2019). "Postmortem study of pattern of ligature mark and injuries to the neck structures in case of suicidal hanging." Indian Journal of Forensic Medicine and Toxicology 13(3): 130-134.

The death due to suicide are highly incidental in the morden way of life. The present study was conducted in Department of Forensic Medicine, Madurai Medical College, Madurai during January 2014 to December 2014 to find out the various patterns of ligature and the neck injuries during the autopsy examinations in deaths due to hanging. Total 210 cases of autopsy were studied irrespective of age, gender, religion, casteetc., who has died due to hanging. All the data is related to ligature pattern, internal injuries in neck, marital status etc are recorded with detailed autopsy examination subsequently analysed statistically. We conclude that majority of victims were male of 21-30 years age involved in hanging, due to love, financial factor, work related issues and other motivational factors.

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598. Bhimani, A. A., et al. (2006). "Complex motor function in humans: validating and extending the postulates of Alexandr R. Luria." Cognitive and behavioral neurology : official journal of the Society for Behavioral and Cognitive Neurology 19(1): 11-20.

OBJECTIVE: We used functional brain imaging to reevaluate Luria's postulates and to elaborate the neural circuitry underlying performance of complex motor tasks., BACKGROUND: The anatomic organization and physiologic functioning of the normal human motor system have great significance for understanding motor dysfunction and remediation in neurology. Working with victims of penetrating head injuries, noted Russian neuropsychologist Aleksandr R. Luria designed several tests of fine motor control to understand their difficulties with complex voluntary movements. This led to his postulates that such function involves the premotor cortices and their interaction with the parietal lobe., METHOD: Six healthy young adults performed the hand imitation, fist-scissors-gun, and piano key tasks during blood oxygen level-dependent functional magnetic resonance imaging at 3 T., RESULTS: All 3 tasks revealed activation of both premotor and parietal cortices. Furthermore, while hand Imitation relied more on the ventral premotor area and right parietal lobe, fist-scissors-gun and piano key relied more on the supplementary motor cortex., CONCLUSIONS: We postulate that differences in task-dependent activations across these tasks relate to degrees of sequential movement, pacing, and imitation. These results uphold Luria's original hypotheses, and extend that work by providing a further characterization of the motor areas involved in complex motor behaviors.

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599. Bhoil, R., et al. (2020). "Mount Fuji Sign." Internal and emergency medicine 15(4): 715-716.

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600. Bhoopat, T. (1995). "A case of internal beveling with an exit gunshot wound to the skull." Forensic science international 71(2): 97-101.

Exit gunshot wounds of the skull generally have external beveling while entrance wounds show internal beveling. With rare exceptions, entrance gunshot wounds show external beveling, usually of two types: the asymmetric 'keyhole' type and the symmetric 'non-keyhole' type. In exit gunshot wounds of the skull, only the keyhole type has been reported. This report shows that symmetric internal beveling from an exit gunshot wound to the skull may confuse medical personnel.

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601. Bhootra, B. K. (1985). "An unusual penetrating head wound by a yard broom and its medicolegal aspects." Journal of forensic sciences 30(2): 567-571.

A fatal case of a homicidal penetrating head injury by a blunt object (yard broom) is described. A piece of wood penetrated the skull and remained in the intracranial cavity resulting in infection. The need of careful examination of the head injury is emphasized.

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602. Bhootra, B. L. (2007). "Retained intra cranial blade - medicolegal perspectives." Journal of forensic and legal medicine 14(1): 31-34.

A fatal case of a homicidal penetrating head injury by retained blade of knife is reported. The blade of knife penetrated the skull bone after breaking from a knife handle and remained lodged in the intracranial cavity for 5 days resulting in death from intracranial bleeding and brain oedema. The need of proper and complete examination of the head injury and its medico-legal importance is emphasized.

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603. Bhootra, B. L. and B. D. Bhana (2004). "An unusual missile-type head injury caused by a stone: case report and medicolegal perspectives." The American journal of forensic medicine and pathology 25(4): 355-357.

Missile head injury is predominantly caused by firearms; however, small blunt objects such as a stone can be propelled into the air and cause a low-velocity-type missile injury, as described in this case report. Since the cerebral damage in low-velocity missile injuries is usually focal, there might not be disturbance of consciousness until secondary brain damage occurs; therefore, adequate medical supervision is necessary to prevent and treat potentially fatal complications in a timely manner. This is a rare case of a penetrating missile wound of the head, most likely caused by the use of a stone propelled by a slingshot that penetrated the skull and lacerated the brain with the stone embedded within the substance of the brain. The deceased died at home 2 days later from focal suppurative meningitis with cerebral abscess formation and a subdural hemorrhage.

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604. Bibb, J., et al. (2014). "Neuroprotection from traumatic brain injury by targeting intracellular neuronal signal transduction mechanisms." Brain injury 28(5-6): 521.

TBI is a major health problem associated with poor prognosis, acute and latent effects and long-term disability. Severity varies across a broad spectrum. Mild TBI is under-diagnosed, with many episodes going unreported. Severe TBI with or without cranial penetration is better documented and includes neuronal injury in response to blast exposure, particularly in the military combat setting. Immediate brain damage involves massive neuronal depolarization and influx of ions. In response to activation of voltage-gated Ca2+ channels, extremely high levels of the excitatory neurotransmitter glutamate are released, triggering excitotoxicity. Cerebral oedema and metabolic disturbances quickly follow. Swelling of neurons, oxidative stress and free radical production all contribute acutely to neuronal death. Following initial trauma, a delayed and spreading process of injury occurs. White matter fibre degenerates as axonal damage results from axolemmmal or cytoskeletal destabilization and collapse. Injured brains also exhibit increased sensitivity to secondary ischaemic insult, changes in cerebral blood flow and persistent excitotoxicity. Neuroinflammation may also contribute to lesion

spread. To better understand the mechanisms mediating TBI, this study assessed the histopathological, neurophysiological, biochemical and behavioural effects of both cortical controlled impact (CCI) and blast-induced traumatic brain injury in rodent models. It was found that the deleterious effects of injury closely correlate with excitotoxic activation of calpain, aberrant activation of the neuronal protein kinase, Cdk5, and hyperphosphorylation of the microtubule associated protein tau. Conditional knockout of Cdk5 in adult mice dramatically reduced in vivo imaged TBI lesions and deleterious neurophysiological, histopathological and behavioural effects. These results implicate aberrant Cdk5 activity as a critical contributor to excitotoxic TBI and suggest that acute therapies targeting its acute activation or the mechanisms by which it causes neuronal injury and death may serve as effective therapies to mitigate TBI and improve recovery.

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605. Bichler, E. and F. Daxecker (1986). "[Surgical treatment of traumatic amaurosis]." Ein Beitrag zur operativen Behandlung der traumatischen Amaurose. 189(4): 334-335.

Exploration of the optic canal was performed in 5 patients with traumatic amaurosis. Fractures of the optical canal were found in 4 cases. One case in which the canal was intact was interpreted as evulsion of the optic nerve. Vision improved in one of the cases with a fractured optical canal. Exploration of the optic nerve is recommended in cases of traumatic amaurosis, always provided that the indication is correct.

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606. Bieniek, K. F., et al. (2019). "Pathological epidemiology of chronic traumatic encephalopathy in Southeastern Minnesota, U.S.A." Brain Pathology 29: 134.

Introduction: Traumatic brain injury (TBI) is a strong environmental risk factor for the development of dementia. TBI-dementia risk has been reported to be dose-dependent based on TBI severity and number of TBI. Pathologically, single-incident TBI can lead to hypoxic-ischemic injury, inflammation, and axonal injury whereas repetitive TBI can result in a progressive neurodegenerative disorder known as chronic traumatic encephalopathy (CTE). CTE is defined by focal deposits of hyperphosphorylated tau in neurons and astroglia at the depths of cerebral sulci and surrounding penetrating blood vessels. The frequency of CTE pathology in the general population, especially former amateur contact sports athletes, is unknown. Methods: The goal of this study is to identify the known pathognomonic CTE lesions in cortical autopsied tissue from Mayo Clinic Tissue Registry cases (N = 2,651) and clinically characterize individuals with and without CTE pathology to establish the relevance of contact sports participation as risk factors of CTE. Using historical obituary and yearbook records, 308 former athletes and 454 non-athletes were identified. Phospho-tau immunohistochemistry was performed on three unique neocortical sections (frontal, temporal, and parietal) from these athlete and non-athlete cases. Results: Of the 283 cases screened to date, 15 (5.3%) have pathology consistent with CTE. All 15 cases were male and 9/15 had a documented history of contact sports participation (12.2% of known male athletes with CTE). Conclusion: While additional case screening and clinical characterization remains ongoing, this preliminary data suggests CTE pathology is a common neuropathological finding, especially in individuals with prior documented participation in a contact sport.

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607. Biesterveld, B. E., et al. (2020). "Valproic acid treatment rescues injured tissues after traumatic brain injury." The journal of trauma and acute care surgery 89(6): 1156-1165.

BACKGROUND: No agents that are specifically neuroprotective are currently approved to emergently treat patients with traumatic brain injury (TBI). The histone deacetylase inhibitor, high-dose valproic acid (VPA) has been shown to have cytoprotective potential in models of combined TBI and hemorrhagic shock, but it has not been tested in an isolated TBI model. We hypothesized that VPA, administered after isolated TBI, will penetrate the injured brain, attenuate the lesion size, and activate prosurvival pathways., METHODS: Yorkshire swine were subjected to severe TBI by cortical impact.

One hour later, animals were randomized to VPA treatment (150 mg/kg delivered intravenously for 1 hour; n = 4) or control (saline vehicle; n = 4) groups. Seven hours after injury, animals were sacrificed, and brain lesion size was measured. Mass spectrometry imaging was used to visualize and quantitate brain tissue distribution of VPA. Sequential serum samples were assayed for key biomarkers and subjected to proteomic and pathway analysis., RESULTS: Brain lesion size was 50% smaller (p = 0.01) in the VPA-treated animals (3,837 +/- 948 mm) compared with the controls (1,900 +/- 614 mm). Endothelial regions had eightfold higher VPA concentrations than perivascular regions by mass spectrometry imaging, and it readily penetrated the injured brain tissues. Serum glial fibrillary acid protein was significantly lower in the VPA-treated compared with the control animals (p < 0.05). More than 500 proteins were differentially expressed in the brain, and pathway analysis revealed that VPA affected critical modulators of TBI response including calcium signaling pathways, mitochondria metabolism, and biosynthetic machinery., CONCLUSION: Valproic acid penetrates injured brain tissues and exerts neuroprotective and prosurvival effects that resulted in a significant reduction in brain lesion size after isolated TBI. Levels of serum biomarkers reflect these changes, which could be useful for monitoring the response of TBI patients during clinical studies.

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608. Biffl, W. L., et al. (2005). "The evolution of trauma care at a level I trauma center." Journal of the American College of Surgeons 200(6): 922-929.

BACKGROUND: My colleagues and I compared trauma patient demographics and outcomes between two time periods in the last 10 years in our Level I trauma center to evaluate the impact of the marked evolution in trauma care and determine additional opportunities for improvement., METHODS: Our trauma registry was queried for adult trauma patients admitted from 1991 to 1993 (EARLY) and 1999 to 2001 (LATE). The EARLY period predated creation and maturation of a dedicated trauma service and Level I trauma center verification. Continuous data were compared using Student's t-test, and categorical data using chi-square., RESULTS: Increased transfers of severely injured patients from regional hospitals, combined with fewer admissions for "observation," resulted in fewer, but sicker, patients admitted in the LATE period. Patients were considerably older in the LATE period and mortality was higher. Despite higher acuity of patients, hospital and ICU lengths of stay were shorter in the LATE period. Nonoperative management of solid organ injuries was more common in the LATE period, but the overall operative volume was similar. Nonsurvivors in the LATE period had higher Injury Severity Scores and were older compared with the EARLY period. Mortality attributable to blunt CNS injury was higher, and that attributed to late sepsis and multiple organ failure was lower in the LATE period., CONCLUSIONS: Over the past decade, more older, severely injured patients have been admitted to our Level I trauma center. Overall mortality among these higher acuity patients has increased, with a marked shift in attributable mortality to CNS injury and away from late sepsis and multiple organ failure. This highlights the need for continued efforts to identify optimal management strategies for severe brain injury. Additional areas for improvement include enhancement of our regional trauma network and injury prevention initiatives.

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609. Biggs, A. T., et al. (2021). "Effect sizes for symptomatic and cognitive improvements in traumatic brain injury following hyperbaric oxygen therapy." Journal of applied physiology (Bethesda, Md. : 1985) 130(5): 1594-1603.

Hyperbaric oxygen therapy has been proposed as a method to treat traumatic brain injuries. The combination of pressure and increased oxygen concentration produces a higher content of dissolved oxygen in the bloodstream, which could generate a therapeutic benefit for brain injuries. This dissolved oxygen penetrates deeper into damaged brain tissue than otherwise possible and promotes healing. The result includes improved cognitive functioning and an alleviation of symptoms. However, randomized controlled trials have failed to produce consistent conclusions across multiple studies. There are numerous explanations that might account for the mixed evidence, although one possibility is that prior evidence focuses primarily on statistical significance. The current analyses explored existing evidence

by calculating an effect size from each active treatment group and each control group among previous studies. An effect size measure offers several advantages when comparing across studies, as it can be used to directly contrast evidence from different scales, and it provides a proximal measure of clinical significance. When exploring the therapeutic benefit through effect sizes, there was a robust and consistent benefit to individuals who underwent hyperbaric oxygen therapy. Placebo effects from the control condition could account for approximately one-third of the observed benefits, but there appeared to be a clinically significant benefit to using hyperbaric oxygen therapy as a treatment intervention for traumatic brain injuries. This evidence highlights the need for design improvements when exploring interventions for traumatic brain injury and the importance of focusing on clinical significance in addition to statistical significance.

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610. Biggs, A. T., et al. (2022). "Head Wounds Received During Force-on-Force Training With Non-lethal Ammunition." Military medicine 187(5-6): e787-e791.

Close quarters combat training is designed to replicate the mental and physiological stressors of firing upon an adversary while in close proximity. One method to replicate combat stressors is to use non-lethal training ammunition specifically designed for force-on-force exercises. These rounds can be fired from slightly modified service-issued weapons and provide a pain sensation upon striking the opponent. The current investigation presents a case study of several injuries when these rounds impacted the head directly, which is a primary area of concern for safety issues. Most impacts produced initial swelling that reduced substantially within the first few hours. Approximately 24 hours later, the swelling disappeared entirely with a visible contusion near the impact center. Bruising would typically clear within a few days. However, another example produced sufficient bleeding to require intervention before continuing with the training exercises and sanguineous crust or scabbing rather than the typical contusion. Pain was minimal for all wounds after only several days, which aligns with previous research on pain from non-lethal training ammunition wounds. Based on the head wounds observed here, loss of eyesight is a realistic possibility. Eye protection should be a requisite across all force-on-force training exercises without exception. This case study documents some potential hazards of force-on-force training, but more importantly, it further highlights the need for medically informed training standards about engagement distances and personal protective equipment. Copyright Published by Oxford University Press on behalf of the Association of Military Surgeons of the United States 2021. This work is written by (a) US Government employee(s) and is in the public domain in the US.

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611. Bigler, E. D. (2001). "Frontal lobe pathology and antisocial personality disorder." Archives of general psychiatry 58(6): 609-611.

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612. Bilal, S., et al. (2021). "Cross-sectional survey of treatments and outcomes among injured adult patients in Kigali, Rwanda." African Journal of Emergency Medicine 11(2): 299-302.

Introduction: Traumatic injuries and their resulting mortality and disability impose a disproportionate burden on sub-Saharan countries like Rwanda. An important facet of addressing injury burdens is to comprehend injury patterns and aetiologies of trauma. This study is a cross-sectional analysis of injuries, treatments and outcomes at the University Teaching Hospital-Kigali (CHUK). Methods: A random sample of Emergency Centre (EC) injury patients presenting during August 2015 through July 2016 was accrued. Patients were excluded if they had non-traumatic illness. Data included demographics, clinical presentation, injury type(s), mechanism of injury, and EC disposition. Descriptive statics were utilised to explore characteristics of the population. Results: A random sample of 786 trauma patients met inclusion criteria and were analysed. The median age was 28 (IQR 6–50) years and 69.4% were male. Of all trauma patients 49.4% presented secondary to road traffic injuries (RTIs), 23.9% due to falls, 10.9% due to penetrating trauma. Craniofacial trauma was the most frequent traumatic injury location at 36.3%. Lower limb trauma and upper limb trauma constituted 35.8% and

27.1% of all injuries. Admission was required in 68.2% of cases, 23.3% were admitted to the orthopaedic service with the second highest admission to the surgical service (19.2%). Of those admitted to the hospital, the median LOS was 6 days (IQR 3–14), in the subset of patients requiring operative intervention, the median LOS was also 6 days (IQR 3–16). Death occurred in 5.5% of admitted patients in the hospital. Conclusion: The traumatic injury burden is borne more proportionally by young males in Kigali, Rwanda. Blunt trauma accounts for a majority of trauma patient presentations; of these RTIs constitute nearly half the injury mechanisms. These findings suggest that this population has substantial injury burdens and prevention and care interventions focused in this demographic group could provide positive impacts in the study setting.

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613. Biler, E. D., et al. (2017). "Unusual route of a bullet: From scapula to eye." Indian journal of ophthalmology 65(1): 52-54.

Herein, an awkward case of globe perforation with a bullet-entering from the right posterior scapular region and leaving the body from the right orbit through the eye - is reported. Route of the bullet could be devastating - as it passed through the neck and the maxillofacial region-however by chance no vital damage occurred. Its path was assessed by plain radiography and computed tomography scans. Sometimes prediction of the trajectory is very difficult without additional radiological investigations. Especially, in the case of any high velocity projectile wounding, physician must be aware of the fact that the bullet's course will not be a linear but most probably a complicated one. Prognosis of the injury depends on the path of the bullet or shrapnel fragment, close clinical observation, an open-minded approach, and the multidisciplinary care. Moreover, even the crime investigation might be needed.

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614. Bilge, Y., et al. (2003). "The identification of a dismembered human body: a multidisciplinary approach." Forensic science international 137(2-3): 141-146.

A criminal case was directed to a multidisciplinary forensic team for identification, concerning a victim whose head, having two gunshot wounds, had been separated by a sharp instrument and was recovered 6 months later. The purpose of this research was to determine the sex and age of the victim for human identification. Primarily, macroscopic examination of the skull, tooth, and DNA analysis was conducted for sex determination. A rough assessment of age was made from the skull based on anthropological findings, however a more definitive result of age estimation was determined utilizing dental morphology. The dental data showed an age range of 32-37 from the mineral examination and the formulation of microscopic measurements. The results obtained from the skull and dental analysis matched with the physical characteristics of the victim's body, the known personal data of this person, and with the superposition of the photos gathered by a formal request. Besides, the result of DNA profiling of the victim showed male gender and direct relationship with the victim's presumed wife and daughter. Generally, research on human identification consists of sex and age determination. The sex characteristics can be precisely proved from DNA tests. However, age can be estimated by skeletal, and dental analysis. In this case the performed sex and age analysis lead the research to the selective matching of the missing person's identity.

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615. Bilkay, U., et al. (2008). "Free-tissue transfers for reconstruction of oromandibular area in children." Microsurgery 28(2): 91-98.

INTRODUCTION: Currently, free-tissue transfers are commonly used for various reconstructive purposes in adults. However, there is a lack of large series of free flap reconstruction in children, especially for reconstruction of oromandibular defects. Our study aims to share our experience in free-flap reconstruction of some challenging pediatric cases., MATERIALS AND METHODS: Pediatric free-flap interventions (<18-year-old) that were performed between 2000 and 2006 in our clinic were retrospectively evaluated. Eighteen free-tissue transfers were performed in 17 pediatric cases.

Epidemiologic data, etiology, defects, preferred free flaps, and results have been compared and analyzed., RESULTS: A total of 17 patients (18 free flaps) were analyzed. Mean age was 10.4 years. The etiology was tumor in 11 cases, traffic accident in 5 cases, and gunshot in 1 case. Double-flap transfer was performed to one patient with a devastating shotgun wound and single flap transfers to others. A total of 8 osseous flaps, 7 osteocutaneous flaps, and 3 septocutaneous flaps were transferred. Total superficial flap necrosis was encountered in one flap (5.8%) while partial superficial necrosis was seen on two flaps (11.7%). Sixteen of the 17 cases reconstructed, including the three cases with complications, resulted in good functional and cosmetic outcome. One case was lost in the sixth postoperative month due to septisemia during chemotherapy. All the surviving 16 cases acquired bony fusion, mastication, and speech in addition to good cosmetic results., CONCLUSION: Pediatric free-tissue transfers are increasing due to the development of better equipment, finer surgical technique, and a better understanding of the unique characteristics of pediatric cases. In our opinion, high success rates with good cosmetic and functional results can be obtained if the specific requirements of the pediatric procedures are met. Copyright 2008 Wiley-Liss, Inc. Microsurgery, 2008.

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616. Binder, P. S. (1978). "Evaluation of the eye following periorbital trauma." Head & neck surgery 1(2): 139-147.

Periorbital trauma is usually associated with ocular complications. When confronted with a traumatized patient, one should therefore evaluate the eyes to determine the extent of injury. First, a noncontact examination should be conducted to assess the degree of ocular integrity. Once it is established that the eye is not damaged, further diagnostic work-up and evaluation can be performed. Although most ocular complications are treated by ophthalmologists, eyelid lacerations, orbital hemorrhage, blowout fractures, and brain injuries may be treated by other subspecialists. Before orbital and ocular adnexal reconstructive surgery is performed, however, one must establish the patient's ocular status so that ocular damage will not be increased during surgery.

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617. Birbilis, T. and V. Bockermann (1998). "A new forceps for the safe and easier insertion of subdural catheter: technical note." Acta neurochirurgica 140(7): 721-722.

A new forceps suitable for the safe and easier insertion of a silicon catheter into the subdural space is described. The use of this new tool has two advantages: Firstly, the insertion of the silicon subdural catheter is parallel to the brain surface and secondly, the movement of the catheter's end in the subdural space is controlled with greater accuracy. Thus, the surgeon has the opportunity to direct the catheter to the right position avoiding penetration or injury of the brain.

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618. Bird, C. E. and J. M. Fleischman (2015). "A Rare Case of an Intact Bone Plug Associated with a Gunshot Exit Wound." Journal of forensic sciences 60(4): 1074-1077.

This case study presents an unusual manifestation of gunshot trauma in skeletal tissue from a post-World War II human rights abuse sample uncovered in Vilnius, Lithuania. After briefly reviewing the typical wound appearance of projectile trauma in the cranium, we discuss the presence of an intact bone plug associated with a gunshot exit wound in an individual from the Tuskulenai Case. While this individual demonstrated typical gunshot entry and exit wounds to the cranium consistent with high-velocity trauma, the bone plug indicates that the projectile likely lost much of its kinetic energy while traveling through the cranium resulting in a low-velocity impact at the exit site. This study reviews a similar instance of a bone plug recovered from a bioarcheological sample in Peru and emphasizes the importance of thorough archeological excavations of mass graves. Copyright © 2015 American Academy of Forensic Sciences.

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619. Birk, D. M., et al. (2015). "Improvement in venous outflow following superior sagittal sinus decompression after a gunshot wound to the head: case report." Journal of neurosurgery 123(1): 81-85.

The most commonly described indications for surgical management of closed depressed skull fractures are hematoma evacuation and repair of extensive cosmetic deformity. Venous sinus injury, which occurs in a subset of depressed skull fractures, is not typically listed as an indication for surgical treatment due to the potential for major venous hemorrhage associated with surgery near these structures. However, if patients exhibit signs and symptoms of intracranial hypertension and radiographic findings demonstrate sinus compromise, surgical elevation of the depressed skull fragments is indicated. The authors present the case of a 25-year-old woman with a depressed skull fracture secondary to a gunshot wound with symptomatic compromise in venous outflow of the posterior one-third of the superior sagittal sinus. The patient was treated with surgical decompression via bilateral craniectomy along with intracranial pressure-lowering medical therapy and had almost full resolution of her presenting symptoms with documented improvement in flow through the superior sagittal sinus. While the use of surgical treatment for these types of injuries is highly debated, the authors demonstrate here that safe, effective surgical management of these patients is possible and that surgical decompression should always be considered in the case of symptomatic venous sinus flow obstruction.

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620. Birnmeyer, G. (1963). "[ON LATE SEQUELAE OF METALLIC FOREIGN BODIES IN THE REGION OF THE PARANASAL SINUSES]." UBER SPAETFOLGEN METALLISCHER FREMDKOERPER IM BEREICH DER NASENNEBENHOEHLEN. 42: 778-785.

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621. Biros, M. H. and R. Nordness (1996). "Effects of chemical pretreatment on posttraumatic cortical edema in the rat." The American journal of emergency medicine 14(1): 27-32.

The purpose of this study was to evaluate the effects of mannitol (Man), dexamethasone (DM), dichloroacetic acid (DCA) and 1,3-butanediol (BD) in reduction of posttraumatic cortical edema following brain deformation injury to rats. Ten minutes prior to fluid percussion injury, each animal received one of four pretreatments or placebo: Man, 1 g/kg intravenously, DM 3.0 mg/kg intravenously, DCA 25 mg/kg intraperitoneally BD 0.5 mg/kg intraperitoneally (n = 12 per treatment group), or equivolume saline (n = 8 per corresponding trauma group). Six hours after trauma, cortical tissue was harvested. Using a benzene-kerosene gradient column calibrated with potassium sulfate standards, the specific gravity (SpG) of cortical tissue from each group was measured and compared (ANOVA, $P < .05$). The measured cortical SpG from traumatized animals receiving Man (mean 1.037 +/- SEM .001), DCA (1.038 +/- .001), and BD (1.039 +/- .001) were equal to SpG from untraumitized cortex (1.041 +/- .001), and were significantly greater than SpG from traumatized cortex for animals receiving DM (1.035 +/- .001) or placebo (1.033 +/- .002). Pretreatment with DCA, Man, and BD appears to protect against development of posttraumatic cortical edema when measured 6 hours after blunt head trauma in the rat. Each of these chemical treatments appears effective in preventing or reducing posttraumatic cortical edema.

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622. Birt, B. D. and A. Smitheringale (1980). "A bizarre pharyngeal injury." The Journal of otolaryngology 9(4): 364-366.

A youth impaled his neck when thrown from a car. No major vessels were damaged but the pharyngeal wall was so extensively disrupted that no repair was possible on the left side. Skin closure was effected and a large drain withdrawn slowly over several days during which he was hyperalimented. He made a rapid and complete recovery from this injury which also included mandibular damage and penetration of the brain.

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623. Bitar, G. and P. Touska (2020). "Imaging in trauma of the facial skeleton and soft tissues of the neck." British journal of hospital medicine (London, England : 2005) 81(6): 1-15.

Trauma to the face and neck is a frequent reason for emergency department attendance. Imaging is invaluable in the characterisation of such injuries, enabling delineation of fracture patterns as well as identification of vascular and other soft tissue injuries. It may also be used to prevent long-term mortality and morbidity and provide a roadmap for surgical intervention so that form and function may be restored. This article gives a pictorial review of the imaging of craniofacial trauma, stratified according to the thirds of the face, followed by a review of blunt and penetrating trauma of the neck. It discusses appropriate imaging modalities for each trauma category, describes major patterns of craniofacial trauma on cross-sectional imaging and identifies clinically relevant imaging features that should trigger subspecialist review or be of relevance to pre-surgical planning. It starts with the upper third comprising frontal sinus fractures before describing the component fractures of the middle third (including nasal, zygomaticomaxillary and orbital fractures) and then focusing on the lower third (specifically mandibular and dentoalveolar fractures). The article concludes with a review of soft tissue injuries of the neck, particularly penetrating, blunt and laryngeal trauma.

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624. Bitseff, E. L. and R. B. Adkins, Jr. (1984). "Splenic trauma: a trial at selective management." Southern medical journal 77(10): 1286-1290.

The experience with splenic trauma at the Metropolitan Nashville General Hospital and at Vanderbilt University Hospital between 1972 and 1983 is the subject of this report. Of 154 emergency cases involving splenic injury, 134 were due to blunt trauma, with 20 cases resulting from penetrating injury. In 124 patients, exploratory laparotomy was done immediately after resuscitation and evaluation. Splenectomy was done in 113 (92%) cases, and in ten cases the spleen was repaired. Thirty patients (19.4%) were initially managed by observation of vital signs, serial hematocrit determinations, and serial physical examination. Of these 30 patients, 21 (70%) required exploratory laparotomy for continued bleeding after observation of 12 hours to six days. Eighteen of this group had splenectomy, and three had splenorrhaphy. Nine (5.8% of the total and 30% of the observed group) were successfully managed nonoperatively. Complications were encountered in 53 of the total 154 cases. There were 19 deaths (12.3%), 11 of them from head injuries. Splenectomy should be done promptly in cases of concomitant splenic and cerebral injury and in patients with injury of multiple organ systems. Nonoperative management of suspected splenic injury should be reserved for patients in stable condition and with few if any associated injuries.

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625. Bjørk, M. H. (2021). "Post-traumatic epilepsy-current treatment." European Journal of Neurology 28(SUPPL 1): 8.

Post-traumatic epilepsy is defined as seizures occurring more than seven days after traumatic brain injury. Seizures occurring within seven days of injury are classified as early post-traumatic seizures. Approximately 4% of all epilepsy cases are post-traumatic, and it's the most important cause of symptomatic epilepsy in young people. After traumatic brain injury, the 10-year incidence is 2-4% and increases with injury severity. In severe brain injury, more than 10% of patients develop epilepsy. Other risk factors are early post-traumatic seizures, impressed skull fractures, penetrating brain injuries, intracranial hemorrhage, temporal/frontal cortical damage, chronic alcohol consumption, psychiatric disease, a family history of epilepsy, and repeated head injuries, as well as abusive head trauma in children. Post-traumatic epilepsy may develop several years after the injury, but more than 50% of patients experience their first seizure within the following year. The cascade of events leading to post-traumatic epilepsy include excitotoxicity, neuroinflammation, oxidative stress, and neurodegeneration. Many patients develop hippocampal sclerosis. Anti-seizure medication prevents early posttraumatic seizures and is recommended in high-risk patients to avoid further brain injury and status epilepticus. Metaanalyses have shown that levetiracetam and phenytoin/ fosphenytoin are equally effective, but levetiracetam is easier to administer and better tolerated. Anti-seizure prophylaxis does not reduce the

risk of post-traumatic epilepsy and should be tapered down after hospital discharge. Several agents have had promising antiepileptogenic effects in animal studies but have not been tested in humans. Post-traumatic epilepsy is treated with anti-seizure medication recommended for focal epilepsy. Surgery can be considered for select patients.

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626. Bjornsson, C. S., et al. (2006). "Effects of insertion conditions on tissue strain and vascular damage during neuroprosthetic device insertion." Journal of neural engineering 3(3): 196-207.

Long-term integration of neuroprosthetic devices is challenged by reactive responses that compromise the brain-device interface. The contribution of physical insertion parameters to immediate damage is not well described. We have developed an ex vivo preparation to capture real-time images of tissue deformation during device insertion using thick tissue slices from rat brains prepared with fluorescently labeled vasculature. Qualitative and quantitative assessments of damage were made for insertions using devices with different tip shapes inserted at different speeds. Direct damage to the vasculature included severing, rupturing and dragging, and was often observed several hundred micrometers from the insertion site. Slower insertions generally resulted in more vascular damage. Cortical surface features greatly affected insertion success; insertions attempted through pial blood vessels resulted in severe tissue compression. Automated image analysis techniques were developed to quantify tissue deformation and calculate mean effective strain. Quantitative measures demonstrated that, within the range of experimental conditions studied, faster insertion of sharp devices resulted in lower mean effective strain. Variability within each insertion condition indicates that multiple biological factors may influence insertion success. Multiple biological factors may contribute to tissue distortion, thus a wide variability was observed among insertions made under the same conditions.

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627. Bjugstad, K. B., et al. (2013). "Changes in neurocan and hyaluronic acid as a function of TBI, down syndrome, and aging: Potential for changing our approach to neural transplantation." Cell Transplantation 22(5): 895-896.

Transplantation of neural cells into the brain to repair neurodegenerative disorders itself creates traumatic brain injury (TBI). TBI, along with Down syndrome (DS), is one of the biggest risk factors for developing Alzheimer's disease (AD). By attempting to repair one neurological disorder by transplantation, it is possible that we are putting the brain at risk for developing AD. The aggregation of tau and amyloid into the classic plaques and tangles of AD occurs only in the presence of sulfated proteoglycans, the primary components of the extracellular matrix (ECM). By understanding the changes that occur to the ECM as a function of TBI or DS, we might be able to develop better transplantation approaches that minimize the risk for AD. Hyaluronic acid (HA), a nonsulfated proteoglycan, is the foundation of the brain's ECM. Neurocan (NCN) is expressed in juvenile brain tissue and during times of neurogenesis. Using DS modeling and control mice, we measured changes in the brain HA and NCN 4 and 12 months after a neonatal penetrationtype TBI. In the hippocampus and the septum, NCN changed primarily as a function of injury and time postinjury. In the septum, NCN greatly increased in mice 12 months postinjury compared to mice 4 months postinjury. CA1 and dentate gyrus (DG) had an age-associated increase in NCN from 4 to 12 months, which was amplified by TBI. CA3 was the only area with a karyotype effect in NCN expression. While age (12 months) and injury increased neurocan, the increase was greater in DS-modeling mice especially in the pyramidal cell layer. In the septum, HA expression decreased as a function of age with no effects of injury or DS modeling. In contrast, age significantly increased HA expression in CA1, especially in the oriens and lacunosum moleculare, and in the DG. These age effects were primarily expressed in the DS-modeling mice. CA3 again revealed both aging, injury, and DS effects. Injury increased HA expression more so in control mice than in DS-modeling mice. This effect was mostly found in mice 12 months postinjury. Thus, enhanced NCN expression is mostly associated with TBI and time postinjury, whereas HA expression is more consistently altered by DS modeling. By understanding the differences in ECM component in two models at risk for developing AD, we might be able to approach neural transplantation in a way that

limits subsequent brain damage. For example, by adding certain growth factors to the transplants, which regulate ECM activities or by developing biomaterials based on ECM components, which do not promote tau/amyloid aggregation.

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628. Black, F. W. (1973). "Cognitive and memory performance in subjects with brain damage secondary to penetrating missile wounds and closed head injury." Journal of clinical psychology 29(4): 441-442.

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629. Black, F. W. (1974). "Cognitive effects of unilateral brain lesions secondary to penetrating missile wounds." Perceptual and motor skills 38(2): 387-391.

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630. Black, F. W. (1974). "The utility of the Memory For Designs Test with patients with penetrating missile wounds of the brain." Journal of clinical psychology 30(1): 75-77.

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631. Black, F. W. and R. L. Strub (1976). "Constructional apraxia in patients with discrete missile wounds of the brain." Cortex; a journal devoted to the study of the nervous system and behavior 12(3): 212-220.

Sixty patients with missile wounds confined to one of the four quadrants of the brain were investigated. All patients had neurosurgical verification of the limits of their lesions. The incidence and severity of constructional apraxia was studied using the WAIS Block Design and Object Assembly subtests, and the Bender Gestalt Test. A uniformly significant caudality effect was obtained with more posteriorly localized lesions resulting in more severe constructional apraxia. A significant laterality effect was obtained on two of three criterion measures with uniformly inferior performance by patients with right hemisphere lesions. The magnitude of the laterality effect, however, was less than that of the caudality effect for all criterion variables. The degree of severity of constructional apraxia in patients with right posterior lesions was uniformly greater than that of patients with other quadrant loci. The incidence of constructional apraxia in the four quadrants varied as expected with the left anterior lesion sample showing very little evidence of constructional apraxia, while the right posterior sample showed a high incidence of such deficits. The absolute incidence of significant constructional apraxia in all samples was suprisingly low. This finding might be partially accounted for by the age and general good health of the subjects studied, the relative absence of general cognitive impairment in the majority of subjects, and the discrete nature of the lesions.

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632. Black, K. L., et al. (2002). "Blunt versus penetrating violent traumatic brain injury: frequency and factors associated with secondary conditions and complications." The Journal of head trauma rehabilitation 17(6): 489-496.

OBJECTIVE: To compare types and frequency of medical complications and comorbidities associated with violence-related penetrating traumatic brain injury (TBI) as compared to violence-related blunt TBI., METHOD: Data were collected prospectively at four medical centers participating in the TBI Model Systems (TBIMS) of Care project. A total of 317 individuals met the inclusion criteria for the TBIMS (i.e., showed evidence of a TBI, were age 16 or older, presented to the TBIMS emergency department within 24 hours of injury, and received acute and rehabilitation services within the model system)., MAIN OUTCOME MEASURES: Frequency of medical complications and comorbid diseases., RESULTS: Patients with penetrating injuries suffered significantly higher rates of respiratory failure (P =.004), pneumonitis/pneumonia, (P =.002), skull fracture (P =.001), cerebrospinal fluid leak (P =.0005), and hypotonia (P =.001) than did patients with blunt injuries. Prediction of complications and comorbidities via multiple regression revealed that a penetrating violent injury and the severity of injury were independent predictors of a higher rate of medical complications, whereas

age and gender did not account for unique variance in the equation., CONCLUSIONS: Penetrating injuries are associated with higher rates of certain medical complications, especially to the pulmonary and central nervous systems. Acute care physicians and physiatrists must be prepared to treat these complications more often in patients with penetrating injuries.

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633. Black, S. P. (1978). "Reconstruction of the supraorbital ridge using aluminum." Surgical neurology 9(2): 121-128.

Aluminum was used to reconstruct the supraorbital ridge and adjacent frontal bone in six patients. Its malleability makes it particularly useful for this purpose. Each cranioplasty was done several months after injury. The longest follow-up is 19 years and the shortest three years. There were no complications. The results are satisfactory.

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634. Blackmon, D. M., et al. (2000). "Bacillus cereus endophthalmitis secondary to self-inflicted periocular injection." Archives of ophthalmology (Chicago, Ill. : 1960) 118(11): 1585-1586.

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635. Blackshear, K., et al. (2018). "Exogenous progesterone is neuroprotective following injury to the male zebra finch brain." Journal of neuroscience research 96(4): 545-555.

The use of progesterone following brain injury has a controversial history. On one hand, some lab-based models have showed progesterone as being neuroprotective, but on the other, clinical trials have showed quite the opposite. One of many complaints that arose from this discrepancy was the lack of a diverse pool of animal models and paradigms employed during the preclinical phase. However, over the past decade, the zebra finch has emerged as an optimal organism for the study of steroid-mediated neuroprotection. Following an injury, steroid hormones and receptors are upregulated, serving to decrease neuroinflammation and overall damage to the brain. As compared to other vertebrate models, zebra finches can upregulate expression of both estrogens and androgens at a faster and more robust response, suggesting that vertebrates differ in their neuroprotective mechanisms and timing following injury. Therefore, to expand the types organisms studied in pre-clinical trials, we chose to use zebra finches. While the majority of work in the zebra finch brain has focused on estrogens and androgens, we sought to clarify the role of progesterone following injury. Adult male zebra finches were given daily injections of progesterone following a penetrating injury and then were assessed for the size of injury and expression of various genes associated with neuroinflammation and cell survival. Treatment with progesterone decreased the injury size in zebra finches over controls and increased expression of various genes associated with cell survival and neuroinflammation. These data suggest that progesterone does mediate neuroprotection, most likely through the alteration of neuroinflammatory and cell survival pathways.

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636. Blackwood, B. P., et al. (2016). "Observation for isolated traumatic skull fractures in the pediatric population: unnecessary and costly." Journal of pediatric surgery 51(4): 654-658.

BACKGROUND: Blunt head trauma accounts for a majority of pediatric trauma admissions. There is a growing subset of these patients with isolated skull fractures, but little evidence guiding their management. We hypothesized that inpatient neurological observation for pediatric patients with isolated skull fractures and normal neurological examinations is unnecessary and costly., METHODS: We performed a single center 10year retrospective review of all head traumas with isolated traumatic skull fractures and normal neurological examination. Exclusion criteria included: penetrating head trauma, depressed fractures, intracranial hemorrhage, skull base fracture, pneumocephalus, and poly-trauma. In each patient, we analyzed: age, fracture location, loss of consciousness, injury mechanism, Emergency Department (ED) disposition, need for repeat imaging, hospital costs, intracranial hemorrhage, and surgical intervention., RESULTS: Seventy-one patients presented to our ED with acute

isolated skull fractures, 56% were male and 44% were female. Their ages ranged from 1week to 12.4years old. The minority (22.5%) of patients were discharged from the ED following evaluation, whereas 77.5% were admitted for neurological observation. None of the patients required neurosurgical intervention. Age was not associated with repeat imaging or inpatient observation (p=0.7474, p=0.9670). No patients underwent repeat head imaging during their index admission. Repeat imaging was obtained in three previously admitted patients who returned to the ED. Cost analysis revealed a significant difference in total hospital costs between the groups, with an average increase in charges of $4,291.50 for admitted patients (p<0.0001)., CONCLUSION: Pediatric isolated skull fractures are low risk conditions with a low likelihood of complications. Further studies are necessary to change clinical practice, but our research indicates that these patients can be discharged safely from the ED without inpatient observation. This change in practice, additionally, would allow for huge health care dollar savings.

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637. Blake, D. P. (1994). "The use of synthetics in cranioplasty: a clinical review." Military medicine 159(6): 466-469.

Materials used to repair cranial defects have evolved tremendously over the past several decades. Advances in metallurgy, the development of acrylics, and the advent of modern imaging and histologic techniques all have played a role in improving cranioplastic materials. Discussed here is a case report depicting the use of synthetics in cranioplasty, followed by a review of the historical development of these materials.

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638. Blakeslee, S. (1987). "Baby without brain kept alive to give heart." The New York times on the Web: A1-B9.

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639. Blank-Reid, C. and P. C. Reid (2000). "Penetrating trauma to the head." Critical care nursing clinics of North America 12(4): 477-487.

Penetrating trauma to the brain is not as common as blunt trauma; however, the incidence is becoming a frequent occurrence in our society. Rapid transport to trauma centers where definitive care can be rendered is essential. Outcome depends on the site of the missile tract, the presenting neurologic status, and the extent of neurologic tissue destruction. Neurologic deterioration occurs rapidly, and outcome results seem to depend on the patient's neurologic status at the time of surgery. CT scanning is the diagnostic procedure of choice and should be performed if the patient's condition is stable (see Fig. 3). Aggressive removal of missile and bone fragments needs to be balanced by the knowledge that it is preferable to leave behind a few hard-to-reach fragments than to increase the patient's neurologic deficit. CT scanning in the postoperative period is very helpful in identifying abscess formation as well as new or recurrent hematomas, edema, and areas of tissue injury not evident at the time of initial scanning. Antibiotic therapy should be initiated preoperatively. Control of elevated ICP plays a significant role in decreasing mortality and morbidity. Judicious debridement of injured brain combined with medical management of increased ICP will maximize the quality of recovery and increase survivability. Although great strides have been made in reducing mortality and morbidity for trauma patients, the sad issue is that the majority of traumas are preventable. Until society is willing to understand that it needs to make firearm safety a priority, there will always be patients to care for who have sustained a penetrating injury.

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640. Blennow, K., et al. (2016). "Traumatic brain injuries." Nature reviews. Disease primers 2: 16084.

Traumatic brain injuries (TBIs) are clinically grouped by severity: mild, moderate and severe. Mild TBI (the least severe form) is synonymous with concussion and is typically caused by blunt non-penetrating head trauma. The trauma causes stretching and tearing of axons, which leads to diffuse

axonal injury - the best-studied pathogenetic mechanism of this disorder. However, mild TBI is defined on clinical grounds and no well-validated imaging or fluid biomarkers to determine the presence of neuronal damage in patients with mild TBI is available. Most patients with mild TBI will recover quickly, but others report persistent symptoms, called post-concussive syndrome, the underlying pathophysiology of which is largely unknown. Repeated concussive and subconcussive head injuries have been linked to the neurodegenerative condition chronic traumatic encephalopathy (CTE), which has been reported post-mortem in contact sports athletes and soldiers exposed to blasts. Insights from severe injuries and CTE plausibly shed light on the underlying cellular and molecular processes involved in mild TBI. MRI techniques and blood tests for axonal proteins to identify and grade axonal injury, in addition to PET for tau pathology, show promise as tools to explore CTE pathophysiology in longitudinal clinical studies, and might be developed into diagnostic tools for CTE. Given that CTE is attributed to repeated head trauma, prevention might be possible through rule changes by sports organizations and legislators.

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641. Blissitt, P. A. (2006). "Care of the critically ill patient with penetrating head injury." Critical care nursing clinics of North America 18(3): 321-332.

Patients who have penetrating head injury all too often present with some of the most devastating and challenging intracranial injuries. The mechanisms of injury and associated neuropathology affect every body system and require a multidisciplinary approach. Evidence-based guidelines have been developed to offer some direction to clinicians involved in their care. Much remains scientifically unsubstantiated, however. Optimal management of critically ill patients who have penetrating head injury requires clinical expertise and care of the highest quality.

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642. Bloch-Boguslawska, E., et al. (2008). "[Using X-ray results in head gunshot wounds]." Wykorzystanie badan radiologicznych w ranach postrzalowych glowy. 58(4): 221-223.

The authors draw attention to the importance of X-ray examinations in craniocerebral gunshot injuries. A life-saving neurosurgical operation of a victim resulted in changes occurring not only in the soft tissue, but also in the bony structures of the cranium, which practically rendered impossible any assessment of and differentiation between the location of entrance and exit wounds during autopsy. The assessment of preoperative head X-ray demonstrated the presence of characteristic crater-like bone defects, what allowed for determining the location of the entrance and exit wounds. The medico-legal examination of bone defects indicated that the entrance wound was situated on the left side, contrary to information provided by hospital medical records.

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643. Blois, M., et al. (2019). "Prototyping for the treatment of a comminuted mandibular fracture by gunshot." International journal of oral and maxillofacial surgery 48: 195.

Background: It is difficult to accurately reconstruct a large defect in the mandible when not enough mandibular reference blueprints remain. Objectives: This case report describes a large comminuted mandibular defect after a gunshot. Methods: Before surgery, spiral computed tomography scanning of the whole skull of the patient was performed. Using three-dimensional reconstruction and mirror imaging coupled with laser stereolithographic technique, a complete mandibular biomodel with idealized shape was fabricated. A titanium reconstruction plate was made using the biomodel as a guide. Findings: The large mandibular defect was then reconstructed with the precontoured titanium plate. Conclusion: The complex defect in the mandible was thus repaired with satisfactory functioning and esthetic result. We suggest that with the help of mirror imaging coupled with laser stereolithographic technique, a precontoured titanium plate can be made for the reconstruction of large mandibular defects. Reference: [1]Fowell, C., et al. Rapid prototyping and patient-specific pre-contoured reconstruction plate for comminuted fractures of the mandible. British Journal of Oral and Maxillofacial Surgery 53(10):1035–1037.

644. Blount, P. J., et al. (2002). "Clinical use of cholinomimetic agents: a review." The Journal of head trauma rehabilitation 17(4): 314-321.

BACKGROUND: There are many agents in clinical use that manipulate central nervous system levels of epinephrine, dopamine, and serotonin. However, development of pharmacological options to manipulate central acetylcholine systems has lagged behind because of poor penetration of the blood-brain barrier and significant peripheral nervous system side effects. Newer agents have demonstrated some efficacy in the management of behavioral and cognitive side effects in Alzheimer's disease, and preliminary data in traumatic brain injury suggest acetylcholine esterase inhibitors may play a significant role in the treatment of this patient population as well., CONCLUSIONS: In this article, the basic neuroanatomy and pharmacology of the central acetylcholine system are reviewed, along with agents currently available for clinical use.

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645. Blumenthal, R. (2007). "Suicidal gunshot wounds to the head: a retrospective review of 406 cases." The American journal of forensic medicine and pathology 28(4): 288-291.

A retrospective review of 406 suicidal gunshot wounds to the head, investigated at the Medico-Legal Laboratory of Pretoria, between 1997 and 2000 was performed. Fifty-seven percent of fatal suicidal firearm injury to the head occurred in the 21- to 40-year age range in both male and female victims. Eighty-two percent of all these victims of suicidal firearm fatalities to the head were male. Of the 406 cases, 63% were white, 31% were black, and 6% were of mixed ethnic and/or Asian decent. There was a slight increase in incidence around spring and autumn. Handguns were used in the majority of cases with shoulder weapons being used in 18 of the 406 cases. Ninety-two percent of the suicidal gunshot wounds to the head occurred indoors. A positive blood alcohol concentration was seen in 40% of cases. Of those examined, 81% were contact gunshot wounds. The trajectory was upward in 51% of cases and horizontal in 24% of cases. The right temple was the most common entrance gunshot wound site. Findings are in keeping with previously published literature.

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646. Boahene, K. O., et al. (2004). "Craniofacial metal bolt injury: an unusual mechanism." The Journal of trauma 56(3): 716-719.

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647. Bobrov, B. M. (2005). "[Domestic and gunshot foreign bodies of the soft tissues of the ear and nose]." Vestnik otorinolaringologii(3): 71-72.

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648. Bock, H., et al. (2002). "Unusual craniocerebral injury caused by a pneumatic nail gun." International journal of legal medicine 116(5): 279-281.

A man was found unconscious near a ladder in a house. After resuscitation he was brought to a hospital and X-rays of the skull showed that two 12-cm long nails had completely penetrated the cranial cavity. The nails were operatively removed and after treatment for 5 weeks, the patient was transferred to a rehabilitation centre with a decreasing hemiparesis on the left side and general deterioration and then, after an attempted suicide to a psychiatric hospital. The perforating cranio-cerebral injury from a pneumatic nail gun known to reach only low muzzle velocities is a very unusual finding.

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649. Bockenheimer, S., et al. (1978). "[Radiological-densitographic examinations of the skull injuries of the pharoah Seqenenre (author's trasl)]." Radiologish-aquidensitographische Untersuchungen der Kalottenverletzungen des Pharao Seqenenre. 128(6): 691-694.

Skull radiographs of the pharaoh Seqenenre-Ta'a II with special densitographic techniques have shown that he survived a perforating skull injury. The technique is described and its use in medical history and archaeology is discussed.

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650. Bodanapally, U. K., et al. (2014). "Predicting arterial injuries after penetrating brain trauma based on scoring signs from emergency CT studies." The neuroradiology journal 27(2): 138-145.

The objective of this study was to determine the accuracy of individual radiologists in detection of vascular injury in patients after penetrating brain injury (PBI) based on head CT findings at admission. We retrospectively evaluated 54 PBI patients who underwent admission head CT and digital subtraction angiography (DSA), used here as a reference standard. Two readers reviewed the CT images to determine the presence or absence of the 29 CT variables of injury profile and quantified selected variables. Four experienced trauma radiologists and one neuroradiologist assigned their own specific scores for each CT variable, a high score indicative of a high probability of artery injury. A sixth set consisted of the average score obtained from the five sets, generated by five experts. Receiver operating characteristic (ROC) curves were constructed for each set to assess the diagnostic performance of an individual radiologist in predicting an underlying vascular injury. The area under ROC curve (AUC) was higher for CT scores obtained from the sixth set (average of five sets of scores) of variable rank score 0.75 (95% CI 0.62-0.88) and for the rest of the data sets, the value ranged from 0.70 (95% CI 0.56-0.84) to 0.74 (95% CI 0.6-0.88). In conclusion, radiologists may be able to recommend DSA with a fair accuracy rate in selected patients, deemed 'high-risk' for developing intracranial vascular injuries after PBI based on admission CT studies. A better approach needs to be developed to reduce the false positive rate to avoid unnecessary emergency DSA.

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651. Bodanapally, U. K., et al. (2015). "Arterial injuries after penetrating brain injury in civilians: risk factors on admission head computed tomography." Journal of neurosurgery 122(1): 219-226.

OBJECT: The object of this study was to determine the specific CT findings of the injury profile in penetrating brain injury (PBI) that are risk factors related to intracranial arterial injuries., METHODS: The authors retrospectively evaluated admission head CTs and accompanying digital subtraction angiography (DSA) studies from patients with penetrating trauma to the head in the period between January 2005 and December 2012. Two authors reviewed the CT images to determine the presence or absence of 30 injury profile variables and quantified selected variables. The CT characteristics in patients with and without arterial injuries were compared using univariate analysis, multivariate analysis, and receiver operating characteristic (ROC) curve analysis to determine the respective risk factors, independent predictors, and optimal threshold values for the continuous variables., RESULTS: Fifty-five patients were eligible for study inclusion. The risk factors for an intracranial arterial injury on univariate analysis were an entry wound over the frontobasal-temporal regions, a bihemispheric wound trajectory, a wound trajectory in proximity to the circle of Willis (COW), a subarachnoid hemorrhage (SAH), a higher SAH score, an intraventricular hemorrhage (IVH), and a higher IVH score. A trajectory in proximity to the COW was the best predictor of injury (OR 6.8 and $p = 0.005$ for all penetrating brain injuries [PBIs]; OR 13.3 and $p = 0.001$ for gunshot wounds [GSWs]). Significant quantitative variables were higher SAH and IVH scores. An SAH score of 3 (area under the ROC curve [AUC] for all PBIs 0.72; AUC for GSWs 0.71) and an IVH score of 3 (AUC for all PBIs 0.65; AUC for GSWs 0.65) could be used as threshold values to suggest an arterial injury., CONCLUSIONS: The risk factors identified may help radiologists suggest the possibility of arterial injury and prioritize neurointerventional consultation and potential DSA studies.

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652. Bodanapally, U. K., et al. (2014). "Vascular complications of penetrating brain injury: comparison of helical CT angiography and conventional angiography." Journal of neurosurgery 121(5): 1275-1283.

OBJECT: The authors conducted a study to compare the sensitivity and specificity of helical CT angiography (CTA) and digital subtraction angiography (DSA) in detecting intracranial arterial injuries after penetrating traumatic brain injury (PTBI)., METHODS: In a retrospective evaluation of 48 sets of angiograms from 45 consecutive patients with PTBI, 3 readers unaware of the DSA findings reviewed the CTA images to determine the presence or absence of arterial injuries. A fourth reader reviewed all the disagreements and decided among the 3 interpretations. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of CTA were calculated on a per-injury basis and in a subpopulation of patients with traumatic intracranial aneurysms (TICAs)., RESULTS: Sensitivity of CTA for detecting arterial injuries was 72.7% (95% CI 49.8%-89.3%); specificity, 93.5% (95% CI 78.6%-99.2%); PPV, 88.9% (95% CI 65.3%-98.6%); and NPV, 82.9% (95% CI 66.4%-93.4%). All 7 TICAs were correctly identified by CTA. Sensitivity, specificity, PPV, and NPV of CTA in detecting TICAs were 100%. To compare agreement with DSA, the standard of reference, confidence scores categorized as low, intermediate, and high probability yielded an overall effectiveness of 77.8% (95% CI 71.8%-82.9%)., CONCLUSIONS: Computed tomography angiography had limited overall sensitivity in detecting arterial injuries in patients with PTBI. However, it was accurate in identifying TICAs, a subgroup of injuries usually managed by either surgical or endovascular approaches, and non-TICA injuries involving the first-order branches of intracranial arteries.

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653. Bodanapally, U. K. and C. W. Sliker (2016). "Imaging of Blunt and Penetrating Craniocervical Arterial Injuries." Seminars in roentgenology 51(3): 152-164.

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654. Bodhit, A., et al. (2014). "How much does a traumatic brain injury cost?" Neurology 82(10).

OBJECTIVE: To determine the predictors of hospital costs associated with traumatic brain injury. BACKGROUND:DESIGN/METHODS: These data are derived from the Florida Brain and Spinal Cord injury prospective registry from our institution, a level I trauma center. In order to be eligible for the BSCIP, the patient must be a legal resident of the state of Florida, have suffered a moderate to severe brain injury, medically stable, and there should be a reasonable expectation that with the provision of appropriate services and supports, the person can return to a community-based setting, rather than reside in a skilled nursing facility. Data are limited to TBIs from January 1st, 2012 to June 30th, 2013. Costs information was obtained from total hospital charges, vs. actual collections. Statistical analyses were performed in JMP 10 for the Macintosh. RESULTS: A total of 170 TBIs were identified during the study period. The median age of the cohort was 42 years(IQR=24-60).78% were male.The mechanism was 31% MVC, 18% fall, 23% recreational vehicles, 11% assault, 14% pedestrian struck, 2% gun shot wound, and 1% self inflicted. The median length of hospitalization was 16 days(IQR=8-25,Range=1-60).The median hospitalization cost per TBI patient including emergency services, was $162,523. Individual factors associated with increased hospitalization cost of TBI included:reduced probability of survival($p<0.0001$),increased hospital length of days($p<0.0001$),mechanism of injuries(pedestrian struck by vehiclep=0.0001,recreational vehicle injuryp=0.005,motor vehicle accidentp=0.006,assaultp=0.05;all compared to fall),and non-transferred patients(p=0.0003). On multivariate analysis, the factors that remained predictive for increased cost were a lower probability of survival (p=0.0006), a longer hospital length of stay ($p<0.0001$), and patients whose mechanism of injury was not a fall (p=0.039),when controlling for GCS score (p=0.0014). CONCLUSIONS:The cost of hospitalization for TBI is significantly increased by longer hospital stay, lower survival chance, and higher GCS score, while cost is significantly lower for patients who sustain a TBI due fall,vs. motor vehicle collision.

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655. Bodwal, J., et al. (2013). "Intracranial penetrating injury by screw driver: a case report and review of literature." Journal of forensic and legal medicine 20(8): 972-975.

Penetrating injury to the head, with the exception of missile injuries is rare owing to thick calvarium. Orbital and temporal areas are comparatively vulnerable to penetrating injuries, due to their relative thinness. A case is presented in which a man killed his wife by forcefully thrusting a screw driver into her cranial cavity. The deceased presented to the hospital with the screw driver embedded in her head. She was declared as 'brought dead on arrival' at the emergency of the hospital. Pre-autopsy plain radiography and Computed Tomography (CT) of the head were done to assess the extent of brain damage. The peculiarity of this case lies in the fact that screw driver as a stabbing weapon in the head is very rarely used. In such cases, there is a need to perform radiography and CT with the weapon in-situ for better interpretation on injuries. In this paper role of radiography and CT in intra cranial penetration is discussed with review of literature.

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656. Boehm, T. M. and A. M. Salazar (1986). "Hypothalamic pituitary function in severely head injured Vietnam veterans." Military medicine 151(10): 535-538.

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657. Bogaerts, M., et al. (2014). "Treatment of traumatic stapediovestibular luxation: case report with the introduction of a new technique and review of literature." Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology 35(4): 582-588.

OBJECTIVE: Stapediovestibular luxations are rare lesions that are most commonly caused by direct, penetrating trauma to the external ear canal. In this type of ossicular dislocation, disruption of the annular ligament or footplate fracture may lead to a perilymphatic fistula (PLF) presenting with cochleovestibular symptoms including (progressive) sensorineural hearing loss, tinnitus, and vestibular symptoms. The objective of this article is to define the optimal treatment of stapediovestibular luxations and review the literature on this topic., PATIENT: We present a case of internal stapediovestibular dislocation and pneumolabyrinth after penetrating trauma with predominantly conductive hearing loss and incapacitating vertigo., INTERVENTION: Middle ear inspection with removal of the luxated incus, repositioning of the stapes with a "stapedial strut" and closure of the tympanic membrane., MAIN OUTCOME MEASURES: Hearing outcome and vestibular symptoms of this patient are presented, and all comparable cases in the literature are reviewed., RESULTS: Complete resolution of the vestibular symptoms and stabilization of the bone conduction thresholds., CONCLUSION: In patients with pneumolabyrinth after middle ear trauma with mild symptoms, we recommend initial conservative treatment with close monitoring of hearing. In patients with severe, persisting, or progressive vestibulocochlear symptoms, exploratory tympanotomy should be performed to check for and treat PLF. Oval window fistula repair is reported to have variable hearing outcomes but offers complete resolution of vestibular symptoms in most cases. The stapedial strut is one of the possible surgical techniques in case of an internally luxated stapes.

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658. Bogdanovic, M., et al. (2019). "Gunshot Suicide: Cherry-Red Discoloration of the Temporal Muscle Beneath the Exit Wound." The American journal of forensic medicine and pathology 40(2): 147-149.

The article describes a case of gunshot suicide to the head in a 51-year-old man. The entrance wound was located in the left temple and exit wound in the right temple. The entrance wound had the characteristics of a hard-contact gunshot wound. The most interesting finding in this case was cherry-red discoloration of the right temporal muscle surrounding the exit wound. This finding could make the determination of the entrance versus exit gunshot wound challenging, especially if the wounds are of atypical appearance. In addition, the finding described in the presented case could be the proof that carbon monoxide may follow the missile through the body and may be prominent in the soft tissue at the exit.

659. Bogdanovic, M., et al. (2019). "The use of gasoline in a complex suicide." Forensic science, medicine, and pathology 15(1): 106-109.

This case represents a planned complex suicide in which the victim shot himself in the head after dousing his living quarters with gasoline. The spark induced ignition of gasoline vapors and led to an explosion. Liquid gasoline is not flammable, but the vapor/mixture of gases above the surface of the liquid is. In this case the victim might have counted on the resulting fire and/or explosion, but we are not able to tell that with certainty. We have assumed that the plan was for the gunshot to the head to lead to instantaneous death, and for the flame and/or explosion to lead to the destruction of the body. The explosion launched the body out of the apartment, meaning it did not get charred. It is also our assumption that the victim did not expect that the explosion would eject his body from the flames and lead to less severe burns than he had calculated, making this complex suicide "less successful" than he had planned.

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660. Bogdanovic, M., et al. (2019). "Late Occurrence of Raccoon Eyes: The Role of the Ligature." The American journal of forensic medicine and pathology 40(2): 165-167.

This case represents a planned complex suicide in which the victim combined gunshot to the head and hanging. The most interesting finding in the presented case was pale face, but without any visible injury to it at the time the body was found (more than 24 hours after death), whereas at autopsy (20 hours later), black eyes were prominent. The removal of the ligature led to the decompression of the neck and its blood vessels with consequential blood redistribution, which, alongside the liquid state of blood, resulted in the aforementioned finding. Considering the described postponed appearance of periorbital ecchymosis, this kind of finding suggests that great caution is necessary when interpreting hematomas in terms of their vitality.

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661. Boggs, H. K., et al. (2021). "Analysis of Traumatic Carotid Artery Injuries: Clinical Predictors of Management and Outcomes." Journal of vascular surgery 74(3): e197-e198.

Objective: Optimal management of traumatic carotid artery injury (CAI) to preserve neurologic function remains undefined. We sought to evaluate the factors that influence management, stroke, and brain death outcomes of traumatic CAI. Methods: A search of a prospectively maintained institutional trauma registry of patients older than 18 years with a diagnosis of CAI was performed at a Level 1 Trauma Center from 2013 to 2019. Injuries limited to the external carotid artery were excluded. Patient demographics, type of injury, the timing of presentation, Biffl Classification of Cerebrovascular Injury Grade, Injury Severity Score (ISS), and Abbreviated Injury Scale (AIS) were documented. Ultimate treatments (medical management, procedural interventions) and brain-related outcomes (stroke and brain death) were recorded. Results: Carotid artery injuries were identified in 30 patients. There were 25 (83.3%) blunt and 5 (16.7%) penetrating carotid injuries. The internal carotid was affected in 27 patients (90%) and the common carotid artery in 3 patients (10%). Whereas a higher Biffl grade was predictive of vascular intervention over medical management (3.6 vs 2.4; P =.03, respectively), the ISS and AIS scores were not. A higher ISS score was a predictor of stroke (33.33 vs 22.86; P =.012), whereas Biffle grade or AIS scores were not. All stroke patients (50%) declared their neurological change on average within 11.7 hours (standard deviation, ±12.7) of presentation. In addition, a higher ISS score was predictive of brain death (38.6 vs 23.6; P =.004), but Biffl grade and AIS scores were not. There was a trend of eventual brain death seen in blunt trauma over penetrating trauma (36% vs 0%; P =.11). Conclusions: Analysis of carotid artery injuries revealed certain predictors of management and clinical outcomes. A higher Biffl grade can help predict vascular intervention, whereas a higher ISS score can help predict stroke and brain death.

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662. Bogle, J. M., et al. (2015). "Labyrinthine concussion following gunshot injury: A case report." International journal of audiology 55(7): 425-428.

OBJECTIVE: Labyrinthine concussion due to a postauricular gunshot wound has not been well reported., DESIGN: Retrospective chart review., STUDY SAMPLE: We describe an otherwise healthy 22-year-old male who received a gunshot wound to the left mastoid and subsequently reported hearing loss and rotational vertigo., RESULTS: Audiometric testing demonstrated significant inverted scoop shaped sensorineural hearing loss. Vestibular diagnostic testing indicated a significant uncompensated left peripheral vestibulopathy. Imaging demonstrated no structural changes to the middle ear or labyrinth, suggesting that the auditory and vestibular losses noted on diagnostic examination were likely due to labyrinthine concussion., CONCLUSIONS: Labyrinthine concussion may lead to reduced vestibular reflex pathway following gunshot wounds to the temporal bone. Clinical presentation is likely to vary significantly among cases.

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663. Bohatyrewicz, R., et al. (2007). "Unusual movements, "spontaneous" breathing, and unclear cerebral vessels sonography in a brain-dead patient: a case report." Transplantation proceedings 39(9): 2707-2708.

A patient with a brain injury fulfilled all clinical criteria for brainstem death diagnosis. Two standard sets of tests were performed; according to Polish regulations, the patient could be declared brain dead. However, shortly after the completion of the tests and before the final brain death declaration, 6 triggered "assisted" breaths/min were noticed. After careful analysis of the ventilator settings, it was concluded that low trigger sensitivity and airway pressure oscillations during heart contractions were the reasons. Additionally, a few minutes later, spontaneous jerking movements of lower limbs and clonic movements of neck muscles secondary to painful stimuli were noticed. The situation became confusing; therefore, cerebral Doppler sonography was performed, showing circulatory arrest in both of the internal carotid, middle cerebral, and left vertebral arteries. The basilar artery was not visualized. Forward flow with increased pulsatility was recorded in extracranial and intracranial segments of the right vertebral artery. Cerebral circulatory arrest was still uncertain; therefore, the diagnostic procedures were completed with conventional cerebral angiography, which showed a lack of cerebral blood flow. Finally, the patient was declared brain dead; kidneys and bones were harvested. Cardiogenic oscillations associated with incorrect low ventilator trigger settings may falsely suggest persistence of breathing efforts in a brain-dead patient. In the case of any unusual events during brain death diagnosis, cerebral perfusion tests should be performed with cerebral angiography as the "gold standard."

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664. Bohm, E. (1972). "[Studies on the head hair in the area of short-range shots with the scanning electron microscope]." Untersuchungen an Kopfhaaren im Nahschussbereich mit dem Rasterelektronenmikroskop. 149(3): 65-76.

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665. Bohnert, M. and S. Pollak (2004). "[Complex suicides--a review of the literature]." Kombinierte Suizide--eine Literaturubersicht. 213(5-6): 138-153.

The term "complex suicide" stands for suicides committed by using more than one method. A distinction can be made between planned and unplanned complex suicides (primary/secondary combinations). In planned complex suicides 2 or more methods are applied simultaneously in order to make sure that death will occur even if one method fails. In unplanned complex suicides the mode of performance is changed after the first method chosen failed or was working too slow or proved to be too painful. In planned complex suicides typically two of the generally common methods of suicide (e.g. ingestion of medicines, hanging, use of firearms, drowning, fall from a height) are combined. But also unusual combinations have been described such as the simultaneous firing of two guns, self-immolation in combination with other suicide methods or shooting oneself while driving a car. In unplanned

complex suicides self-inflicted injuries by sharp force, especially cuts of the wrists, are often found as the primary act of suicide. In some cases the suicide switches from cuts to stabs (mostly to the heart region). Other methods often used after the first phase of suicide are hanging and jump from a height. In the literature the use of up to 5 suicidal methods applied one after the other have been described.

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666. Boker, D. K., et al. (1991). "[Craniocerebral trauma and glioma]." Schadel-Hirn-Trauma und Gliom. 59(12): 488-492.

There are only a few well documented cases in the literature which allow for the assumption of traumatic origin of some intracranial tumors. Four cases are presented in whom the authors have accepted the traumatic origin of gliomas because of it's evidence, but--from their scientific understanding of tumor development--without being convinced of such a correlation. It is stressed that scientific points of view and argumentation in social insurance affairs may differ and that they should be carefully distinguished.

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667. Bolatkale, M. and A. C. Acara (2019). "The intracranial number of foreign bodies as a predictor of mortality after penetrating brain injury." The American journal of emergency medicine 37(3): 433-438.

INTRODUCTION: Penetrating brain injury (PBI) is the most lethal form of traumatic brain injury, which is a leading cause of mortality. PBI has a mortality rate of 23%-93% and 87%-100% with poor neurological status. Despite the use of various prognostic factors there is still a need for a specific prognostic factor for early prediction of mortality in PBI to reduce mortality and provide good outcomes with cost-effective surgical treatments. The aim of this study was to investigate the predictive value of the number of intracranial foreign bodies (FBs) on mortality in PBI in the Emergency Department., METHODS: The study included 95 patients admitted with PBI caused by barrel bomb explosion. The intracranial number of FB was examined by brain computed tomography. Logistic regression was used to assess the association of the intracranial number of FB on mortality. Correlation analyses were performed to investigate the association of Glasgow Coma Scale (GCS) with intracranial number of FB., RESULTS: The optimal cut-off value of the intracranial number of FB calculated for mortality was 2, which was effective for predicting mortality ($p<.001$). In patients with >2 intracranial FB, the mortality rate was statistically significantly 51-fold higher than those with <=2 ($p<.001$). A statistically significant negative correlation was determined between GCS and number FB ($r=-0.697$; $p<.001$)., CONCLUSION: When the intracranial number of FB was >2, mortality significantly increased in patients with PBI. The intracranial number of FBs may be considered as a novel prognostic factor for the prediction of mortality in PBI.

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668. Boller, F. and G. P. Jacobson (1980). "Unilateral gunshot wound of the pons: clinical, electrophysiologic, and neuroradiologic correlates." Archives of neurology 37(5): 278-281.

Following a gunshot wound to the face, a 17-year-old male patient experienced a right trigeminal and abducens paralysis, dysarthria, right-sided ataxia, left-sided weakness of the lower part of the face and limbs, and left-sided sensory loss from his neck down. Brainstem auditory evoked potentials showed a decreased P5/P1 amplitude ratio for left ear presentation, and inconsistent replication of P2 and P3 on the right and, to a lesser extent, on left ear click presentations. A computerized tomography scan showed right pontine atrophy. These findings point to a unilateral lesion of the right pons.

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669. Bolliger, S. A., et al. (2019). "Penetration Depths of Conducted Electrical Weapon Probes Into Human Skull Phantoms." The American journal of forensic medicine and pathology 40(2): 102-107.

Occasional case reports have described isolated cases of conducted electrical weapon (CEW) probes piercing the human skull. In an experimental setting, we examined whether these cases were just unfortunate incidents, how deeply such probes can pierce the skull, and whether firing distance and

CEW probe type play a role in the skull-piercing capability. We fired 5 different CEW cartridges (XP 10.6 m, XP 7.6 m, smart 10.6 m, smart 7.6 m, and smart probe 7.6 m) from 4 different distances (0.5, 1, 2, and 4 m) at head phantoms made of either 5- or 7-mm-thick polyurethane spheres covered with a thin layer of gelatine and buckskin. The piercing depths were recorded by computed tomographic scanning.All tested cartridges managed to pierce the head phantoms. Piercing depths of up to 6.6 mm in the 5-mm heads and depths of almost 5 mm in the 7-mm heads were recorded. Deepest piercing depths were attained with firing distances of 2 m or less.Our results showed that all tested CEW probes are capable of piercing the skull and that shorter firing distances tend to lead to deeper piercing depths.

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670. Bolliger, S. A., et al. (2017). "Movement of steel-jacketed projectiles in biological tissue in the magnetic field of a 3-T magnetic resonance unit." International journal of legal medicine 131(5): 1363-1368.

PURPOSE: The fact that ferromagnetic bullets can move in air or gelatine when subjected to magnetic resonance (MR) units is well known. A previous study showed that the movement of 7.5-mm GP 11 Suisse bullets also depends on their orientation toward the gantry. In order to compare the movement in gelatine to that in real tissue, we decided to measure the movement of these bullets, as well as 9-mm Luger bullets, in the brain and liver., METHODS: The GP 11 and 9-mm Luger bullets were inserted into the fresh calf brain or pig liver either vertically or horizontally in the x- or z-axis to the gantry. Before and after exposure to a 3-T MR unit, their position was documented by CT., RESULTS: GP 11 bullets rotated more readily and in general proved to be more mobile than the 9-mm Luger. All GP 11 bullets and a large amount of the 9-mm Luger bullets exited the brain. Sliding toward the gantry was easier for 9-mm Luger bullets in the brain than in the liver., CONCLUSIONS: The orientation of a ferromagnetic object influences its mobility in a strong magnetic field. Tipping is easier than sliding for longish ferromagnetic projectiles, probably due to the lesser tissue resistance. The bullets moved more readily in biological tissue, especially brain tissue, compared to gelatine, thus implying that gelatine is not a suitable substitute for soft tissues when examining the movement of ferromagnetic objects in MR units.

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671. Boltz, M. M., et al. (2015). "Injuries and outcomes associated with traumatic falls in the elderly population on oral anticoagulant therapy." Injury 46(9): 1765-1771.

INTRODUCTION: Fall risk for older adults is a multi-factorial public health problem as 90% of geriatric injuries are caused by traumatic falls. The CDC estimated 33% of adults >65 years incurred a fall in 2011, with 30% resulting in moderate injury. While much has been written about overall risk to trauma patients on oral anticoagulant (OAC) therapy, less has been reported on outcomes in the elderly trauma population. We used data from the National Trauma Data Bank (NTDB) to identify the types of injury and complications incurred, length of stay, and mortality associated with OACs in elderly patients sustaining a fall., METHODS: Using standard NTDB practices, data were collected on elderly patients (>=65 years) on OACs with diagnosis of fall as the primary mechanism of injury from 2007 to 2010. Univariate analysis was used to determine patient variables influencing risk of fall on OACs. Odds ratios were calculated for types of injury sustained and post-trauma complications. Logistic regression was used to determine mortality associated with type of injury incurred., RESULTS: Of 118,467 elderly patients sampled, OAC use was observed in 444. Predisposing risk factors for fall on OACs were >1 comorbidity ($p<0.0001$). Patients on OACs were 188% and 370% more likely to develop 2 and >3 complications ($p<0.0001$); the most significant being ARDS and ARF ($p<0.0001$). The mortality rate on OACs was 16%. Injuries to the GI tract, liver, spleen, and kidney ($p<0.0002$) were more likely to occur. However, if patients suffered a mortality, the most significant injuries were skull fractures and intracranial haemorrhage ($p<0.0001$)., CONCLUSIONS: Risks of anticoagulation in elderly trauma patients are complex. While OAC use is a predictor of 30-day mortality after fall, the injuries sustained are markedly different between the elderly who die and those who do not. As a result there is a greater

need for healthcare providers to identify preventable and non-preventable risks factors indicative of falls in the anti-coagulated elderly patient.

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672. Bonan, C., et al. (1998). "[Microsurgery and ballistic traumatology of the face]." Microchirurgie et traumatologie balistique faciale. 43(2): 149-161.

The use of free flaps to fill and repair facial defects due to suicidal gunshot wounds has considerably extended and refined the possibilities available to reconstructive surgeon. The objective is no longer to close the defect at any cost, or "fill a hole", but to replace missing tissue by an identical tissue, able to restore an identical cosmetic appearance, support equivalent constraints, and restore analogous function. Retrospective analysis of 56 cases of large facial defects due to gunshot wounds revealed a total of 66 free flaps for 32 cases. The vascular quality of the flaps allowed better integration in a sometimes hostile recipient site and markedly reduced the treatment time. Although the objective results obtained in the treatment of these severe defects remain poor, the first-line use of these multiple flaps, exclusively reserved for deep repair, as the basis for reconstruction, has modified our behaviour. A real medium-term treatment strategy, based on a decision flow-chart, can be proposed which, despite several inevitable failures, leaves less room for improvisation and piecemeal surgery. Free flaps are only the hidden part of the reconstruction, as surface cover uses local flaps and other conventional reconstructive surgery techniques. However, this humble, hidden role is nevertheless fundamental, in the strict sense of the term, and guides the general approach to this surgery.

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673. Bonfield, C. M., et al. (2014). "Traumatic intracranial aneurysm after penetrating brain trauma." BMJ case reports 2014.

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674. Bonne, R. and G. Engwanda (1972). "[Traumatogenesis of mandibular fractures. A propos of 50 personal cases]." Reflexions sur la traumatogenese de la fracture de la mandibule. A propos de 50 cas personnels. 69(1): 73-95.

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675. Bonney, H. E. (2015). "Richard III: skeletal evidence of perimortem trauma." Lancet (London, England) 385(9964): 210.

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676. Bonsignore, A., et al. (2013). "Suicide due to four speargun shots: a case report." The American journal of forensic medicine and pathology 34(3): 201-204.

In the literature, only a few cases of deaths related to the use of atypical firearms are present and even more rare are cases of suicide due to multiple lesions. In the present case, the authors report a rare occurrence of suicide due to 4 speargun shots, 3 to the chest and 1 to the head.A complete forensic approach led to attribute the death to acute cardiac failure due to hemopericardium after the injury of the left coronary artery.Scene investigation and autoptic findings allowed authors to hypothesize that injury to the head was a last attempt of suicide, elapsed during the progression of cardiac tamponade.With this report, the authors would like to share knowledge with the forensic community about speargun-related lesions distinguishing them from the very similar ones produced by cold steels.It also shows how it is possible to survive for some time after being shot by such a weapon.

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677. Bontke, C. F., et al. (1993). "Medical complications and associated injuries of persons treated in the traumatic brain injury model systems programs." Journal of Head Trauma Rehabilitation 8(2): 34-46.

This study documents the medical complications and associated injuries that occurred in persons admitted for rehabilitation in the five Traumatic Brain Injury (TBI) Model System projects, The

incidence of specific intracranial hemorrhages, medical complications, and associated injuries are discussed. Two thirds of these individuals had one or more intracranial hemorrhages, the most common being subdural (32%) and subarachnoid (27%) hemorrhages. Persons with one or two intracranial hemorrhages were found to have significantly longer lengths of stay (LOS) in acute care compared to those with no hemorrhages. One or more intracranial hemorrhages were found in persons injured by a fall (84%), while riding a bicycle (81%), while walking (76%), and by assault (73%). Of the nonhemorrhagic cerebral complications/problems investigated, seizures, cerebrospinal fluid (CSF) leak, and hydrocephalus were found to be related to extended LOS in acute care. Seizures were reported in 17% of patients, with 10% of all patients exhibiting a seizure within the first 24 hours postinjury. The extracerebral complications associated with longer LOS in acute care were respiratory failure, pneumonia, urinary tract infection, soft-tissue infection (STI), coagulopathy, renal failure, and septic shock. Persons injured in all-terrain vehicles, pedestrian/auto encounters, gunshot wounds to the head, and automobile crashes were more likely to have extracerebral complications than those injured by other causes. Fractures and cranial nerve injuries were the most common associated injuries. A larger proportion of persons injured in motor vehicle crashes, pedestrian/auto encounters, and bicycle accidents had associated injuries than those injured by other mechanisms.

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678. Boodhoo, H., et al. (2001). "Longstanding retained foreign bodies in the cranium: a short case report." The Central African journal of medicine 47(7): 182-184.

Two cases of longstanding retained cranial foreign bodies treated surgically are reported. Patients with longstanding retained foreign bodies may remain clinically well until complications arise. This report emphasizes the importance of maintaining clinical suspicion in mild head injured patients presenting with open scalp wounds, and the value of skull radiographs.

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679. Book, R. G. and J. B. Botha (1994). "Zulu zip-guns and an unusual murder." The American journal of forensic medicine and pathology 15(4): 319-324.

Primitive ballistic weapons are used in great numbers in Zululand, South Africa. Their manufacture reflects various degrees of skill. A case with a bullet and a cartridge in the victim is discussed, and a representative pictorial exhibition of weapons is presented.

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680. Bootz, F. (1993). "[Immediate management of rupture and soft tissue injuries in the area of the head-neck]." Sofortversorgung von Abriss- und Weichteilverletzungen im Kopf-Hals-Bereich. 41(11): 542-552.

Most injuries to the head and neck region are accompanied by trauma to the soft tissue. The management of the wound depends on whether it is a superficial or a penetrating trauma. Penetrating traumas may injure bloodvessels, nerve structures and the upper aerodigestive tract. The initial evaluation of a patient with a neck wound should proceed with the basic rules of trauma management (Airway, Bleeding, Circulation). It is suggested, that all wounds deep to the platysma should be explored. Penetrating injuries through the airway should be considered in cases of hoarsness, dyspnea or direct visualization of the airway. In case of dyspnoe the patient should be intubated. In an unstable airway a tracheotomy must be considered. Injuries to the airway demand special care and immediate reconstruction since otherwise it can lead to permanent damage. Hemorrhage and hematoma are the most common symptoms of penetrating neck injuries. Poor initial control of bleeding is the most common cause of death. Uncontrolled clamping of vessels in the neck should be avoided since it can lead to damage of uninvolved structures especially nerves. The neck is divided into 3 zones. Zone I is the area below the sternal notch, Zone II lies between the sternal notch and the angle of the mandible. Zone III is the area above the angle of the mandible. Zone I and III injuries are evaluated with angiography. Zone II injuries are evaluated by surgery. Therapy of Zone I and III is difficult and needs

mandibulotomy or resection of the clavicle to gain exposure to the vessels.(ABSTRACT TRUNCATED AT 250 WORDS)

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681. Bora, M. K., et al. (2003). "A bullet in the parapharyngeal space." Indian Journal of Otolaryngology and Head and Neck Surgery 55(2): 117-119.

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682. Borchardt, B. C., et al. (2018). "Prognostic Impact of Intracranial Pressure Monitoring in Patients with Severe Traumatic Brain Injury." Brazilian Neurosurgery 37(4): 291-296.

Objectives The aim of the present study was to analyze the prognostic impact of intracranial pressure (ICP) monitoring in patients with severe traumatic brain injury (TBI). Methods An observational, retrospective and quantitative study was performed. The sample consisted of 246 patients diagnosed with severe TBI, from January 2009 to August 2017. Results Out of the total sample, 43.56% of the patients were submitted to ICP monitoring. The mean time of use of the catheter was 1.7 days. In both groups, males were the most affected, and the majority of the patients were < 50 years old. Automobile accident was the main etiology of TBI. In the initial clinical evaluation, mydriatic pupils were related to death and normal pupil reaction at hospital discharge. The monitored group performed a larger number of computed tomography (CT) scans, with a mean of 2.6 examinations, with cerebral edema being the most common finding. Regarding the prognosis, those who used a catheter for ICP monitoring had a 47% reduction in the chance of death when compared with those who did not use the catheter. The stay duration both in the hospital and in the intensive care units was higher in patients who underwent ICP monitoring; periods > 30 days were related to meningitis, especially in those who used the catheter. Conclusion Patients who used a catheter for ICP monitoring had a significant improvement in survival.

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683. Bordes, J., et al. (2017). "Coagulopathy and transfusion requirements in war related penetrating traumatic brain injury. A single centre study in a French role 3 medical treatment facility in Afghanistan." Injury 48(5): 1047-1053.

INTRODUCTION: Traumatic brain injury associated coagulopathy is frequent, either in isolated traumatic brain injury in civilian practice and in combat traumatic brain injury. In war zone, it is a matter of concern because head and neck are the second most frequent site of wartime casualty burden. Data focusing on transfusion requirements in patients with war related TBI coagulopathy are limited., MATERIALS AND METHODS: A descriptive analysis was conducted of 77 penetrating traumatic brain injuries referred to a French role 3 medical treatment facility in Kabul, Afghanistan, deployed on the Kabul International Airport (KaIA), over a 30 months period., RESULTS: On 77 patients, 23 died during the prehospital phase and were not included in the study. Severe traumatic brain injury represented 50% of patients. Explosions were the most common injury mechanism. Extracranial injuries were present in 72% of patients. Traumatic brain injury coagulopathy was diagnosed in 67% of patients at role 3 admission. Red blood cell units (RBCu) were transfused in 39 (72%) patients, French lyophilized plasma (FLYP) in 41 (76%), and fresh whole blood (FWB) in 17 (31%)., CONCLUSION: The results of this study support previous observations of coagulopathy as a frequent complication of traumatic brain injury. The majority of patients with war related penetrating traumatic brain injury presented with extracranial lesions. Most of them required a high level of transfusion capacity.

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684. Borg, A., et al. (2012). "An arrow escape-the anatomy of a near miss." Journal of Neurological Surgery, Part B: Skull Base 73.

Background: We report the case of a 20-year-old gentleman who presented with a self-inflicted transorbital extracranial arrow gun injury. On presentation, the projectile was in situ, the entry point

being superomedial to the left orbit and lateral to the superior part of the bony nasal dorsum. Objective: To delineate the anatomical structures involved in this low-velocity gun injury, and to provide technical notes on the surgical retrieval. Method: Sagittal CT sections demonstrated the depth of penetrance of the arrow and the relationship of the foreign body just below the anterior cranial fossa floor. Axial and coronal views delineated the pathway the arrow travelled, missing the globe and ethmoid sinus. Under general anesthesia, the lodged missile was removed through extension of the entry point incision to facilitate removal of the fully submerged shoulder of the arrow and identification of the anterior ethmoid artery. Results: The projectile was removed successfully. No short- or long-term sequelae occurred. Discussion: The arteries most at risk were the anterior and posterior ethmoidal, branches of the ophthalmic artery, as well as branches of the lacrimal artery. Radiological assessment determined the exact location of the missile, which in turn facilitated surgical retrieval. Conclusion: The anatomical structures involved in the trajectory of such an injury need to be correctly determined radiologically before embarking on surgical removal. Potential complications resulting from vascular injury can be disastrous; therefore, minimal tissue damage should be the main aim of the operation.

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685. Borovich, B., et al. (1981). "Intracranial penetration of nasogastric tube." Neurosurgery 8(2): 245-247.

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686. Borrelli, M., et al. (2021). "Crayon in the Orbit and Sinuses in a Pediatric Patient." Ear, nose, & throat journal 100(6_suppl): 856S-858S.

Penetrating transorbital injury with skull base involvement is a rare occurrence from a crayon. We report a case of a 2-year-old male who sustained a penetrating crayon injury through the right orbit and lamina papyracea into the posterior ethmoid sinus complicated by cerebrospinal fluid leak. There have been no other reported cases of this type of injury by a crayon.

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687. Bortoluzzi, M., et al. (1981). "Extracranial bleeding and extravasation of contrast medium after penetrating head injury. Case report." Journal of neurosurgical sciences 25(1): 45-48.

The Authors report a case of extravasation from deep and small cerebral arteries associated with traumatic thrombosis of the left anterior cerebral artery following penetrating head injury. The rareness of this event is asserted. The event related to the hemorrhage extravasation are discussed.

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688. Borzone, M., et al. (1986). "Penetrating cranio-cerebral injury at the vertex. Report of an unusual case." Zentralblatt fur Neurochirurgie 47(2): 155-157.

An unusual case is reported in which a nail was driven into the head with suicidal intention. Neuroradiological examination, surgical treatment and results are discussed.

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689. Bös, M. and J. Bauer (2007). "Epileptic seizures due to penetrating gun-shot injury of the head." Aktuelle Neurologie 34(10): 559-563.

Trauma due to penetrating gun-shot injury of the head in the civilian population is a rare cause for post-traumatic epilepsy. The following report concerns three patients who developed epileptic seizures due to a civilian penetrating gun-shot injury. The shots were fired in the context of a domestic quarrel, an attempted homicide and a domestic misfortune. Two patients suffered late post-trauma tic seizures (more than eight days after trauma), one patient developed early post-traumatic seizures (within seven days). In two of the three patients metal fragments were retained intracerebrally. All three patients became seizure-free with prolonged antiepileptic drug treatment. In contrast to military series, traumatic brain injury caused by penetrating gun-shot injury seems to have a much better prognosis in the civilian population.

690. Boschert, E. N., et al. (2021). "Twenty-two Years of Pediatric Musculoskeletal Firearm Injuries: Adverse Outcomes for the Very Young." Journal of pediatric orthopedics 41(2): e153-e160.

BACKGROUND: Firearm injuries are a significant cause of morbidity and mortality for children in the United States. The purpose of this study is to investigate the 22-year experience of pediatric firearm-related musculoskeletal injuries at a major pediatric level 1 hospital and to analyze the risk of adverse outcomes in children under 10 years of age., METHODS: An institutional review board-approved, retrospective cohort analysis was conducted on pediatric firearm-related musculoskeletal injuries at our institution from 1995 to 2017. A total of 189 children aged 0 to 18 years were identified using International Classification of Diseases, 9th Revision/10th Revision codes, focusing on musculoskeletal injuries by firearms. Exclusion criteria were primary treatment at an outside hospital, isolated nonmusculoskeletal injuries (eg, traumatic brain injury), and death before orthopaedic intervention. Two cohorts were included: age below 10 years and age 10 years and above. Primary outcome measure was a serious adverse outcome (death, growth disturbance, amputation, or impairment). Standard statistical analysis was used for demographic data, along with linear mixed models and multivariable logistic regression for adverse outcome., RESULTS: Of the 189 children, 46 (24.3%) were below 10 years of age and 143 (75.7%) were 10 years and above. Fifty-two (27.5%) of the total group had an adverse outcome, with 19 (41.3%) aged below 10 years and 33 (23.1%) aged 10 years and above (P=0.016). Adverse outcomes were 3 deaths, 17 growth disturbances, 7 amputations, and 44 impairments. For those below 10 years of age, rural location (P=0.024), need for surgical treatment (P=0.041), femur injury (P=0.032), peripheral nerve injury (P=0.006), and number of surgeries (P=0.022) were associated with an adverse outcome., CONCLUSIONS: Over one fourth of survivors of musculoskeletal firearm injuries had an adverse outcome. Children 10 years and above represent the majority of firearm injuries in our population; however, when injured, those below 10 years are more likely to have an adverse outcome., LEVEL OF EVIDENCE: Level III.

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691. Botelho, R. V., et al. (1999). "Carotid artery-sygmoid sinus fistula: a rare complication of gunshot wound on the base of the cranium." Neurosurgical review 22(2-3): 121-123.

Vascular lesions without clinical manifestation may occur in cranial-facial wounds produced by bullets that course the base of the cranium. This work describes a rare kind of vascular complication in cranial-facial gunshot wound. The authors present the case of a patient, the victim of a cranium-maxillary gunshot wound. Carotid angiography revealed a carotid-sygmoid sinus fistula that filled the sygmoid and transverse sinuses, concomitant to the arterial angiographic phase. A direct communication between the external carotid artery and the sygmoid sinus was disclosed. We are not aware of any other description of this vascular complication in cranial gunshot wound. It is important to recognize this kind of complication in cases of cranial-facial gunshot wound, because new factors harmful to the brain perfusion systems are introduced, in addition to the alterations to venous return and intracranial pressure, caused by the primary trauma. The new non-invasive vascular diagnostic methods are proving useful in filling the gap left by arteriography, which is no longer used in these cases.

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692. Bottequin, E., et al. (2012). "Severe traumatic brain injury in a high income country: A population-based prospective cohort study." Brain injury 26(4-5): 523-524.

Introduction: In high income countries only few epidemiological studies on severe traumatic brain injury (TBI) are available, and these few studies have different designs. Severe traumatic brain injury is a high burden for society. Aims of the study: to describe characteristics and the outcome of patients with severe TBI in a national cohort of a high income country. Methods: The study included adults sustaining severe traumatic brain injury (TBI) from blunt or penetrating trauma with an Abbreviated Injury Scale score of the head region (HAIS) of more than 3, admitted to all eleven French

and German speaking trauma centres in Switzerland. The follow-up lasted 1 year. Start of inclusion was May 2007; last followup was in April 2011. Outcome measures were Glasgow Coma Scale (GCS) at 14 days, mortality, and Extended Glasgow Outcome Score (GOSE) at 3, 6 and 12 months. Descriptive statistics were performed. Results: 1012 potential patients were screened for inclusion; 922 patients were included (74.1% men). The incidence rate was 8.9 per 100'000 population. Median age was 55.0 years [inter quartile range 33.0, 71.2] with two peaks (20-29.9, 60-69.9 years). Median GCS at scene was 9 [4, 14] and 5 [3, 14] in the emergency department. Both pupils were reactive in 74.6% at scene and 71.9% in the emergency department. Among all TBI, 95.7% were blunt trauma. Injury Severity Score was 25 [16, 33], and 30.1% of patients had multiple trauma. Falls were the mechanism in 51.9%, road traffic accidents in 32.3% (most were car divers, pedestrians and cyclists). Median arrival time (h:min) to the hospital for direct admission was 00:46 [00:35, 01:01], for indirect admission 3:12 [2:15, 4:20]; 44.1% were intubated on scene. Hematoma evacuation was performed in 23.7%, intraventricular drainage in 8.0% and intracranial monitoring in 19.1%. Median ICU stay was 3 days [1,9], hospital stay was 11 days [6, 21]; SAPS 2 Score 44 [29, 57]. Death rate was 31.4%; median time to death was 2 days [1,6]; most deaths occurred during ICU stay. Median GCS of survivors at 14 days was 15 [13, 15]. Median GOSE of survivors at 3 months was 5 [3, 7], at 6 months 6 [4, 8] and at 12 months 7 [5, 8]. Conclusions: This population-based prospective cohort study included older patients and more falls compared to earlier studies in other European countries. High rates of cyclists and pedestrians with severe TBI were observed in the population with road traffic accidents. Most survivors were conscious at 14 days. GOSE increased slightly over a period of 1 year.

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693. Bouckaert, M. M. (1999). "Fan blade injury." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde 89(8): 837-839.

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694. Bouguetof, H., et al. (2014). "Noninvasive estimation of cerebral perfusion pressure (NICPP) with transcranial doppler ultrasonography (TCD) in pediatric traumatic brain injury (PTBI)." Pediatric Critical Care Medicine 15(4): 70.

Background and aims: The PTBI is an important cause of morbidity and mortality in children with severe neuropsychological sequelae. The therapeutic goal should be to ensure cerebral blood flow (CBF) sufficient to prevent cerebral ischemia. Accurate measurement of DSC is not possible continuous bedside, different brain monitoring techniques proposed to guide the management of TCG therefore monitor the PPC. Aims: To estimate the values of CPP (niCPP) by the study of flow velocities (systolic: sV. Diastolic:dV mean: mV) at the middle cerebral artery (MCA) non- invasively using the TCD. Methods: As part of the national program of health research, 38 children were studied. ICP, MAP and flow velocities in the MCA were followed. CPP was calculated by the standard formula: CPP = MAP-ICP and niCPP by formula Aaslid: MAP x dV / mV + 14. The correlation between non - invasive and invasive values were analyzed. Results: The non-invasive and invasive CPP / niCPP mean values were 54.26 } 11.93 mmHg and 53.9 } 10.69 mmHg respectively. The correlation between non- invasive and invasive measures CPP was highly significant ($p < 0.001$) with a correlation coefficient of Pearson $r = 0.841$. Conclusions: The niCPP measured by TCD is a parameter that can be quickly obtained from the inlet and can be an alternative in the detection of the risk of cerebral ischemia. It allows you to answer a key question to determine in the first minutes following the admission of children considered at risk oligohemie brain and need close monitoring and the need for continuous monitoring of CPP by monitoring invasive ICP.

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695. Bouguetof, H., et al. (2012). "Management of severe paediatric trauma brain injury (PTBI) guided by intracranial pressure (ICP) monitoring in a picu in algeria." Archives of disease in childhood 97: A225.

Background and Aims PTBI is the leading cause of death and long-term morbidity. Current recommendations for the management of severe PTBI (Glasgow Coma [GCS] score ≤8) indicate that ICP monitoring is appropriate in infants and children (Option). The most reliable methods of ICP monitoring are ventricular catheters and intra parenchymal systems. The aim of this study is to evaluate the management of PTBI based on continues monitoring of intraparenchymal ICP in a PICU in Algeria. Methods Between January 2005 and December 2009 we collected 308 PTBI, 57 patients had intraparenchymal ICP monitoring. The consensus is to treat ICP exceeding the 20 mmHg threshold, and to optimize cerebral perfusion pressure (CPP). Results The mean age was 8 years, hypoxia and hypotension were frequent at admission, median GCS after resuscitation = 6, ICP monitoring was set up by the intensivist in the PICU after un average time of 13 hours after trauma. Intracranial hypertension was detected and treated (mannitol, hyerventilation and thiopental) in more than 90% of cases. the average time of ICP monitoring was 5 days. No complications (infection, hemorrhage) with this technique was detected. Conclusion The etiology and the pathophysiology of raised ICP in PTBI is a complex challenge for the intensivist. CPP and ICP were the first brain-specific targets for goal-directed therapies enacted in PTBI. In this study, ICP monitoring allows to detect intracranial hypertension and guide treatment better than when this technique is absent even if it is not a standard of the recommendations.

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696. Bouillon, B., et al. (1996). "High dose corticosteroids in patients with multiple trauma." Shock (Augusta, Ga.) 5 Suppl: 45.

Design: Prospective, double-blind randomized trial Aim: The objective of this study was to analyze plasma levels of Phospholipase-A2 and Interleukin-1 and other related mediators in multiple traumatized patients after high-dose corticosteroid application. Material and Methods: Enclosed were patients with a Trauma-Score ranging between 7 and 12. Exclusion criterion was severe, penetrating head injury. Within 40 minutes after the traumatizing event an initial dose of 500 mg/10ml DEXamethason (DEX) i.v or an equal volume of NaC1 solution i.v. was administered. Three hours later further 200 mg DEX were applied followed by 8 applications of the same dose at 6 hour intervals. Blood samples were generally obtained in the emergency room prior to DEX application at day 3,4,5,10,14,21 and 30. Observation period was 30 days. ELISA-kits were used for measuring plasma levels of Phospholipase-A2 and Interleukin-1 ; Cortisol and DEX levels were measured by HPLC. Results: A total of 12 patients were enrolled in the study. 5 of the patients received DEX. Control and verum group were well matched concerning age (45 years), Injury Severity Score (28 points), Trauma Score (10.4 points) and Glasgow Coma Scale (10 points). Dexamethason plasma levels decreased constantly until day 2. Any changes in Phospholipase-A2 and Interleukin-1 plasma levels were observed in this time interval. Plasma levels of these mediators were generally deceased as compared to the control group: Cortisol:60-110 ng/ml (control) and 16-40 ng/ml (DEX); Interleukin-1: 10-12 ng/ml (control) and 8 ng/ml (DEX); Phospholipase A2: 8 - 78 ng/ml (control) and 19 ng/ml (DEX). It was interesting to note that although cortisol plasma levels were suppressed, the typical circadian rhythm of release was still detectable. The results support the concept that systemic release of certain mediators can be suppressed by corticosteroids. Discussion: The results suggest that high dose application of DEX amethasone results in a suppression of certain immunological mediators as well as cortisol. The feedback mechanism seems unaffected due to the unaltered circadian rhythm of cortison release. The study confirmed a rapid elimination of high dose application of DEXamethasone.

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697. Boukes, R. J., et al. (1987). "Grease-gun injury of the orbit: computed tomography and magnetic resonance imaging in diagnosis and treatment." Documenta ophthalmologica. Advances in ophthalmology 67(3): 273-280.

A 19-year-old male was referred because of a grease-gun injury of the left orbit, resulting in a 25 mm proptosis and marked decrease in vision. The clinical diagnosis of penetration of the retrobulbar fat space by the grease and the subsequent accurate drainage of the grease was made possible on the basis

of high resolution computed tomography (CT) and magnetic resonance imaging (MRI). As a result, lateral orbitotomy could be avoided. Eight months after the injury the visual acuity was fully recovered and the proptosis reduced to 2 mm. The visual field was relatively undisturbed. The specific value of CT and MRI for the management of this unusual trauma is briefly discussed.

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698. Boulanger, B., et al. (2001). "Minimally invasive retrieval of a foreign body after penetrating lung injury." Surgical endoscopy 15(9): 1043.

Minimally invasive techniques are increasingly used in the management of trauma victims. We report the case of a young man in a motor vehicle crash who sustained a penetrating wound to the anterior left chest caused by the automobile stick shift. Subsequent imaging demonstrated a large foreign body in the left lung. The foreign body was removed successfully by videothoracoscopy, and the patient made a full recovery. This case demonstrates the inroads that minimally invasive surgery is making in care of the injured and highlights an excellent technique for dealing with pulmonary foreign bodies.

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699. Bourgeois, A., et al. (2020). "Left ventricular failure after brain death: a room for L-thyroxine?" Minerva anestesiologica 86(1): 95-96.

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700. Bourguignon Filho, A. M., et al. (2006). "Unusual penetrating orbit injury." International journal of oral and maxillofacial surgery 35(1): 92-93.

Penetrating head and face injuries can cause hemorrhages, neurological lesions, visual acuity loss, fractures and facial deformities. This report discusses an injury caused by a knife that penetrated the left orbit and reached the skull base without damaging any important structures. The knife was removed through the entrance wound and no complications were observed either during or after surgery.

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701. Boutte, A., et al. (2016). "Differential abundance of total and phosphorylated tau in brain tissue and biofluids during subacute penetrating brain injury." Journal of neurotrauma 33: A83-A84.

Severe traumatic brain injury (TBI) is a risk factor for tauopathies. The degree to which TBI contributes to tau pathology, and the role of tau or its phosphorylation state as a TBI biomarker remains debated. This preliminary study sought to determine the effect upon total and phosphorylated tau in a rat model of penetrating ballistic-like brain injury (PBBI). Ipsilateral frontal cortex (FC), cerebral spinal fluid (CSF), and serum were collected 1, 2, and 4 weeks (wks) after craniotomy or PBBI. Total and phosphorylated (threonine 231) tau (pTau) were measured using electrochemilluminescent ELISAs. All values are displayed as the fold change (x) vs. craniotomy per time-point. The p-tau to tau ratio (p-tau: tau) is also described. In the FC, tau increased in a stepwise manner after PBBI. Here, tau rose to 1.67x at 2wks, then to1.89x at 4wks. P-tau increased by 1.85x 2wks after PBBI, yet decreased to 0.22x of craniotomy after 4-wks. Total tau was 12x higher in CSF collected 1wk post-PBBI, yet fell to near craniotomy levels at 2-4wks. CSF p-tau mirrored this trend, and was increased by 3.17x 1wk after injury. Serum tau was suppressed by 0.17x after 1wk, normalized to craniotomylevels at 2wks, but was again suppressed to 0.048x 4 wks post-PBBI. Within the same cohorts, the serum p-tau peaked 1 wk after PBBI to 4.21x. In the FC, the p-tau:tau ratio decreased to 0.77x at 1wk, increased by 1.12x after 2 wks, then fell to 0.047x at 4wks. The ratio in CSF rose from 0.093x at 1wk, to 0.22x at 2 wks, then to 0.33x at 4 wks post-PBBI. Tau, pTau, and the ptau: tau ratio, may be indicators of tauopathies in brain tissues driven by TBI. Further, these analytes remain detectable throughout subacute injury in both serum (2wks) and CSF (4wks). Tau, p-tau and the ratio may be useful as diagnostic and theranostic indicators relevant to the longterm effects of TBI.

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702. Boutte, A., et al. (2016). "Brain cathepsin B protein levels and cysteine protease activity are affected by subacute craniotomy and penetrating brain trauma." Journal of neurotrauma 33: A79.

Comprehensive analysis of key mediators involved in subacute traumatic brain injury (TBI) is tantamount to understanding, and mitigating, mechanisms of injury progression. Cathepsin B is a cysteine protease implicated in neurodegeneration and TBI. The purpose of this preliminary study was to determine the extent of cathepsin B up-regulation, and enzymatic activity within proximal and distal brain regions affected by subacute craniotomy or penetrating ballistic-like brain injury (PBBI). Rat ipsilateral frontal cortex (FC) and hippocampal (HC) brain tissues were collected 7 days after craniotomy or PBBI. Mature (25-26kDa) cathepsin B protein levels were determined by western blotting. Enzymatic activity was determined by substrate cleavage to generate a fluorescent product. Craniotomy or PBBI values are expressed as a fold change (x) compared to naïve controls. To determine if activity was specific to cathepsin B, assays were repeated with the addition of CA-074. Changes in activity are expressed as percent (%) of values without inhibitors. PBBI led cathepsin B protein levels to increase by 6-7x in the FC and by 1.3-1.6x in the HC compared to naïve and craniotomy cohorts. FC enzyme activity increased by 1.4x and 2.3x after craniotomy or PBBI, respectfully. In FC extracts, CA-074 nearly ablated enzymatic activity caused by craniotomy, and suppressed the PBBI-induced activity by 60%. Within the HC, craniotomy decreased enzymatic activity to 0.8x of naive levels, while PBBI had no effect. CA-074 suppressed activity in naïve, craniotomy, and PBBI by 40-50%. PBBI led to expected upregulation of cathepsin B protein levels the FC and HC. Craniotomy-induced FC enzyme activity is largely due to cathepsin B. In contrast, PBBI likely leads to activation of several proteases. Protease protein levels and activity may be crucial to the elucidating differential mechanisms within lesioned and non-lesioned brain tissues affected by subacute TBI of varying severities.

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703. Boutte, A., et al. (2017). "Rat brain cathepsin b protein levels and cysteine protease activity after traumatic brain injury." Journal of neurotrauma 34(13): A24.

Cathepsin B is a lysosomal cysteine protease that may be an important therapeutic target and biomarker for traumatic brain injury (TBI). The current study was designed to evaluate the regional and temporal profiles of mature cathepsin B (mCatB) protein levels and cysteine protease activity in the penetrating ballistic-like brain injury (PBBI) model. Rat ipsilateral frontal cortex (FC), hippocampus (HC), and cerebellum (CB) were collected 1-7 d after PBBI or craniotomy alone, compared to unoperated sham controls (baseline for fold change comparison). MCatB increased after 7 d after craniotomy (2.3-fold) and PBBI (11.9-fold) in the FC. HC levels of mCatB were elevated at 3 d (1.6-fold) and 7d (2.5-fold) after PBBI. CB mCatB was suppressed 3 d after craniotomy (0.37-fold) and 1-3 d after PBBI (range: 0.43- 0.55-fold) vs. sham. However, at 7d post-injury CB mCatB levels in PBBI animals exceeded that of sham (1.2-fold). Craniotomy did not have a significant effect on cysteine protease activity in the FC. PBBI resulted in increased FC cysteine protease activity at 3 d (3.4-fold) and 7 d (2.13-fold) post-injury. In the HC, activity increased 7d after craniotomy (1.8-fold). Non-linear dysregulation of mCatB protein levels infer that proteolytic processes within proximal and distal brain regions vary with injury severity and time over the course of TBI progression. Differential increases in cysteine protease activity suggest that TBI elicits a complex proteolytic response, inclusive of cathepsin B, thereby incentivizing the need for spatio-temporally defined therapeutic strategies.

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704. Boutte, A. M., et al. (2016). "Serum Glial Fibrillary Acidic Protein Predicts Tissue Glial Fibrillary Acidic Protein Break-Down Products and Therapeutic Efficacy after Penetrating Ballistic-Like Brain Injury." Journal of neurotrauma 33(1): 147-156.

Acute traumatic brain injury (TBI) is associated with neurological dysfunction, changes in brain proteins, and increased serum biomarkers. However, the relationship between these brain proteins and serum biomarkers, and the ability of these serum biomarkers to indicate a neuroprotective/therapeutic response, remains elusive. Penetrating ballistic-like brain injury (PBBI) was used to systematically analyze several key TBI biomarkers, glial fibrillary acidic protein (GFAP) and its break-down products

(BDPs)-ubiquitin C-terminal hydrolase-L1 (UCH-L1), alpha-II spectrin, and alpha-II spectrin BDPs (SBDPs)-in brain tissues and serum during an extended acute-subacute time-frame. In addition, neurological improvement and serum GFAP theranostic value was evaluated after neuroprotective treatment. In brain tissues, total GFAP increased more than three-fold 2 to 7 d after PBBI. However, this change was primarily due to GFAP-BDPs which increased to 2.7-4.8 arbitrary units (AU). Alpha-II spectrin was nearly ablated 3 d after PBBI, but somewhat recovered after 7 d. In conjunction with alpha-II spectrin loss, SBDP-145/150 increased approximately three-fold 2 to 7 d after PBBI (vs. sham, $p<0.05$). UCH-L1 protein levels were slightly decreased 7 d after PBBI but otherwise were unaffected. Serum GFAP was elevated by 3.2- to 8.8-fold at 2 to 4 h (vs. sham; $p<0.05$) and the 4 h increase was strongly correlated to 3 d GFAP-BDP abundance ($r=0.66$; $p<0.05$). Serum GFAP showed such a strong injury effect that it also was evaluated after therapeutic intervention with cyclosporin A (CsA). Administration of 2.5 mg/kg CsA significantly reduced serum GFAP elevation by 22.4-fold 2 h after PBBI (vs. PBBI+vehicle; $p<0.05$) and improved neurological function 1 d post-injury. Serum biomarkers, particularly GFAP, may be correlative tools of brain protein changes and feasible theranostic markers of TBI progression and recovery.

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705. Boutte, A. M., et al. (2020). "Penetrating Traumatic Brain Injury Triggers Dysregulation of Cathepsin B Protein Levels Independent of Cysteine Protease Activity in Brain and Cerebral Spinal Fluid." Journal of neurotrauma 37(13): 1574-1586.

Cathepsin B (CatB), a lysosomal cysteine protease, is important to brain function and may have dual utility as a peripheral biomarker of moderate-severe traumatic brain injury (TBI). The present study determined levels of pro- and mature (mat) CatB protein as well as cysteine protease activity within the frontal cortex (FC; proximal injury site), hippocampus (HC; distal injury site), and cerebral spinal fluid (CSF) collected 1-7 days after craniotomy and penetrating ballistic-like brain injury (PBBI) in rats. Values were compared with naive controls. Further, the utility of CatB protein as a translational biomarker was determined in CSF derived from patients with severe TBI. Craniotomy increased matCatB levels in the FC and HC, and led to elevation of HC activity at day 7. PBBI caused an even greater elevation in matCatB within the FC and HC within 3-7 days. After PBBI, cysteine protease activity peaked at 3 days in the FC and was elevated at 1 day and 7 days, but not 3 days, in the HC. In rat CSF, proCatB, matCatB, and cysteine protease activity peaked at 3 days after craniotomy and PBBI. Addition of CA-074, a CatB-specific inhibitor, confirmed that protease activity was due to active matCatB in rat brain tissues and CSF at all time-points. In patients, CatB protein was detectable from 6 h through 10 days after TBI. Notably, CatB levels were significantly higher in CSF collected within 3 days after TBI compared with non-TBI controls. Collectively, this work indicates that CatB and its cysteine protease activity may serve as collective molecular signatures of TBI progression that differentially vary within both proximal and distal brain regions. CatB and its protease activity may have utility as a surrogate, translational biomarker of acute-subacute TBI.

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706. Boutté, A. M., et al. (2013). "Time dependant biomarker abundance in brain tissue and serum after acute PBBI." Journal of neurotrauma 30(15): A64-A65.

Introduction When developing protein biomarkers for diagnosis, prognosis, and therapeutic recovery after traumatic brain injury (TBI), one of the most important factors is understanding temporal protein expression. Therefore, we systematically analyzed protein abundance of three key biomarkers in tissues and serum in our rodent model of penetrating ballistic-like brain injury (PBBI). Methods For this study we employed the penetrating ballistic-like brain injury (PBBI) model to study the expression of glial fibrillary acidic protein (GFAP), ubiquitin carboxy terminal hydrolase (UCH)-L1 and spectrin break down products (SBDP) in serum and brain tissue. Anesthetized rats received a 10% unilateral, frontal injury and sham (control) rats received a craniotomy without probe insertion. Ipsilateral, coronal brain tissue sections 6mm from bregma, were collected 2h 4h, 24h 48h, 72h, and 7d after injury and serum was collected via cardiac puncture. Proteins were extracted from brain tissues and protein

abundance was determined by the following methods: full-length proteins were analyzed by semi-quantitative western blotting and/or ELISA; protein fragments were analyzed by western blotting. In serum, full-length proteins were analyzed by ELISA. Results Serum GFAP was increased at 2h and 4h after PBBI and returned to control levels between 24h-7d post injury. Serum UCH-L1 was only increased above sham levels 2h post injury and then returned to control levels for 4h-7d. Alpha-II spectrin and SBDPs have not yet been determined in serum. In brain tissues, GFAP expression was similar in PBBI and shamcontrols 2-4h after injury, butwas greatly increased above sham between 24h - 7d after PBBI with peak expression at 48-72h. Similarly, brain GFAP-BDPs were minimal 2-4h after injury, but demonstrated a sharp increase between 24h-7d in PBBI with levels above sham controls and peak abundance at 48-72h. SBDP-145/150were unchanged at 2-24h, but were increased compared to sham between 48h - 7d after PBBI, with peak abundance at 48h post injury. Simultaneously, there was loss of the full length a-II spectrin starting at 24h through 48h. Full length alpha-II spectrin started to increase after 72h through 7d but did not reach sham levels. UCH-L1 in brain tissues was relatively unchanged in PBBI compared to sham across all time points studied. Conclusions Like human studies, the TBI biomarkers GFAP and UCH-L1 in rodent PBBI are increased in serum shortly after injury. However, these biomarkers were cleared by 24h. Alternatively, “brain tissue” biomarkers demonstrated a different profile where GFAP, GFAP-BDP, and SBDPs, increased 48-72h and remained elevated 7d after injury. These studies suggest that brain proteins released into serum may be an immediate response to the severe PBBI injury where blood-brain barrier disruption predominates. Thus, these serum biomarkers may be appropriate for acute diagnosis, but not for long term assessment or therapeutic response monitoring. In contrast, detection of biomarkers involved in persistent gliosis (GFAP, GFAP-BDPs) and neuronal damage (spectrin and SBDPs) would be useful targets of in vivo brain imaging probes for diagnoses and long-term therapeutic response assessment.

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707. Boutte, A. M., et al. (2012). "Differential protein changes in penetrating and non-penetrating models of TBI." Journal of neurotrauma 29(10): A51-A52.

Introduction Protein biomarkers are being developed for diagnosis of traumatic brain injury (TBI), but their injury specificity is unknown. Rodent models of penetrating and non-penetrating TBI offer distinct models for translational biomarker research. Therefore, we systematically analyzed protein abundance and degradation of multiple protein biomarkers in two models of TBI. Methods Systems biology and immuno-based methods have been used to determine protein biomarker abundance in the penetrating ballistic-like brain injury (PBBI). For this study we employed two distinct cohorts of TBI subjects: (1) PBBI injured rats and (2) repetitive blast overpressure (BOP) injured rats. For PBBI, ipsilateral and contralateral coronal tissue sections 6mm from bregma were collected 24 h after injury. For BOP studies, the prefrontal cortex, cortex, hippocampus and cerebellum were dissected 24 h after the last of three daily, 75 kPa blasts. Proteins extracted from brain tissues were analyzed by semiquantitative western blotting and/or ELISA to determine specific abundance of intact proteins or their degradation fragments. Target proteins were chosen based on informatics data and reported literature. Results Our analyses identified statistically significant increases in GFAP and UCH-L1, but decreases in PSD-95, in ipsilateral tissues 24 h after PBBI. In contrast, GFAP, UCH-L1, and PSD-95 showed no change in BOP. The relative abundance of a-spectrin and different spectrin breakdown products (SBDPs) were differentially expressed in PBBI compared to BOP. In ipsilateral PBBI tissue, there was a loss of full length a-spectrin, with a moderate increase in SBDP- 145/150. BOP exposures lead to a small, albeit non-significant, decrease in alpha-spectrin within the cerebral cortex, hippocampus, and cerebellum, but a moderate increase in SBDP-145/150 in the prefrontal cortex and cerebellum. There was a greater increase of SBDP-120 in the prefrontal cortex, which was not present in the cerebellum. Overall, significantly increased SBDP-145/150 and decreased a-spectrin were detected after PBBI. In contrast, decreased a-spectrin after BOP exposure was not-significant, and there was a larger increase in BOP-induced SBDP-120 compared to SBDP-145/150. Conclusions TBI biomarkers such as GFAP, spectrin and its BDPs, as well as UCH-L1, were increased in PBBI; loss of PSD-95 was also observed. The expression of SBPD-145/150, a product of calpain activity, was greater in PBBI vs.

BOP; whereas SBDP-120, a product of caspase activity, was increased after BOP exposure. Spectrin may be selectively cleaved by different mechanisms of cellular injury. Spatial differences in SBDP abundance may identify the prefrontal cortex as the primary injury site in blast, a region that has been implicated in TBI from BOP due to the unique pattern of symptoms. In addition, the results demonstrated the upregulation of GFAP, UCHL1 and SBDP in the PBBI model similar to the changes seen in human serum. Not only does the study confirm the use of informatics analysis but it also possibly identified different mechanisms and patterns of severe injury that differentiate penetrating from non-penetrating.

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708. Boutte, A. M., et al. (2012). "Proteomic analysis and brain-specific systems biology in a rodent model of penetrating ballistic-like brain injury." Electrophoresis 33(24): 3693-3704.

Proteomics and systems biology have significantly contributed to biomarker discovery in the field of brain injury. This study utilized 2D-DIGE-PMF-MS as a preliminary screen to detect biomarkers in a rat model of penetrating ballistic-like brain injury (PBBI). Brain-specific systems biology analysis of brain tissue identified 386 proteins having a fold change of more than 2, of which 321 proteins were increased and 65 were decreased 24 h after PBBI compared to sham controls. The majority of upregulated proteins were cytoskeletal (10.5%), nucleic acid binding (9.3%), or kinases (8.9%). Most proteins were involved in protein metabolism (22.7%), signal transduction (20.4%), and development (9.6%). Pathway analysis indicated that these proteins were involved in neurite outgrowth and cell differentiation. Semiquantitative Western blotting of 6, 24, 48, and 72 h after PBBI indicated ubiquitin carboxyl-terminal hydrolase isozyme L1 (a proposed traumatic brain injury biomarker in human clinical trials), tyrosine hydroxylase, and syntaxin-6 were found to be consistently elevated in brain tissue and cerebral spinal fluid after PBBI compared to sham controls. Combining proteomics and brain-specific systems biology can define underlying mechanisms of traumatic brain injury and provide valuable information in biomarker discovery that, in turn, may lead to novel therapeutic targets.

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709. Boutte, A. M., et al. (2012). "Systems biology meta-analyses of genomic datasets to identify conserved mechanisms and novel biomarkers of traumatic brain injury." Journal of neurotrauma 29(10): A102-A103.

Introduction High-throughput technologies quantify expression of thousands of genes, but the plethora data hinders unambiguous gene identification associated with the condition of interest. We exploited systems biology to systematically analyze multiple high-throughput genomic studies of traumatic brain injury (TBI) to gain insights into conserved mechanisms and to infer biomarker candidates. Methods We employed systems biology approaches to incorporate multiple gene expression datasets with biological knowledge in the form of pathways and protein-protein interaction (PPI) networks. We selected four datasets from TBI experiments using different animals and TBI models, integrating the data with over 130 non-metabolic canonical pathways in the KEGG database and a PPI network consisting of over 11,000 proteins and 80,000 interactions. We separately overlaid each set of data onto the pathways and the PPI network to identify a set of pathways and PPI modules that are statistically significant for each dataset. We then inferred TBI biomarker candidates from those specific pathways and biologically relevant PPI modules that are conserved in two or more datasets and validated them by protein abundance changes in rat brain subjected to a penetrating ballistic-like brain injury (PBBI). Results Our analyses identified statistically significant pathways and PPI modules that are conserved in two or more datasets. Functional analyses showed that only down-regulated pathways and PPI modules were specifically associated with the nervous system; those that were up-regulated were associated with immune responses. The 19 conserved down-regulated pathways included 7 out of 9 KEGG nervous system pathways, which are all associated with synaptic functions; the 6 conserved down-regulated PPIs formed a subnetwork of synaptic proteins. Thus, we predicted that PSD-95, DISC1, and NOS1 would be down-regulated in the ipsilateral brain tissues which were confirmed in

subsequent in vivo experiments using the PBBI model. We observed a statistically significant decrease (69%, 47%, and 50%, respectively, $p < 0.05$) in protein abundance in the ipsilateral brain tissues compared to sham controls. We also observed a 50% increase for PSD-95, a 46% decrease for NOS1, but no change for DISC1 in contralateral tissues. Conclusions We employed systems biology approaches to integrate molecular evidence from distinct TBI studies with biological pathways and networks to systematically identify conserved and TBI-specific molecular processes and biomarkers. We found that only down-regulated pathways and PPI modules are associated with the nervous system, especially synaptic functions. This effect is likely due to neuronal loss coupled with increased inflammation caused by TBI. The in vivo experimental results confirmed the TBI biomarker candidates hypothesized using our systems biology approach. Our results suggest that systems biology can provide a high-yield approach to generate testable hypotheses that can be experimentally validated to identify potential TBI biomarkers.

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710. Bouwman, D. L., et al. (1983). "Hyperamylasemia: a result of intracranial bleeding." Surgery 94(2): 318-323.

The unexpected finding of hyperamylasemia in a patient with isolated head injury prompted a study of amylase levels in patients with various degrees of cranial trauma. None of seven patients with isolated maxillofacial trauma had hyperamylasemia. This group was studied to discount injury to salivary glands as a source of elevated amylase levels. Only one of ten patients with simple cranial injury without computerized tomographic (CT) scan evidence of intracranial bleeding had hyperamylasemia. Six of ten patients with CT scans positive for intracranial bleeding had hyperamylasemia. Isoamylase analysis showed that the source of the hyperamylasemia was varied. These results suggest a central neural control of serum amylase levels. The reliability of the serum amylase level as an indication of pancreatic trauma in a patient with concomitant head injury is questioned.

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711. Bowden, E., et al. (2017). "Management of complex soft tissue injury." British Journal of Oral and Maxillofacial Surgery 55(10): e130.

Introduction: Complex facial lacerations can affect aesthetic outcomes, compromise function and can be life threatening. The psychological impact can be detrimental to patient quality of life. Findings: In a trauma setting difficulties can arise in the thorough assessment and treatment of injuries. In the accident and emergency department achieving haemorrhage control for example, may be complicated by limited equipment availability, lack of lighting magnification and the experience of the practitioner. Initial management must prioritise primary survey and haemodynamic stability. Furthermore, the extent of the soft tissue injury may impede effective treatment under local anaesthetic. Consideration must be given to the appropriate use of imaging to assess underlying hard tissue injury, brain injury and the depth of penetrating wounds, as well as ruling out any foreign body involvement. Case: We discuss management of complex soft tissue injury including haemorrhage control, facial nerve repair, primary closure and post-operative short and long term considerations. We present a case of a young female involved in a road traffic collision, who sustained a large de-gloving injury to the right forehead and temporal region involving severance of the facial nerve.

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712. Bowen, D. I. and D. M. Magauran (1973). "Ocular injuries caused by airgun pellets: an analysis of 105 cases." British medical journal 1(5849): 333-337.

One hundred and five cases of airgun pellet injuries of the eye have been analysed. The average age was 14 and the male to female ratio 7.5:1. Forty-five patients had final visual acuities of 6/18 or less in the injured eye and 19 of these had the eye removed. The two main causes for poor vision were retinal damage and cataract. One patient became completely blind after sympathetic ophthalmitis arising 11 years after the injury. The pellet lodged in the orbit in 14 cases and three of these, together with one who

had an intraethmoidal pellet, were investigated for abnormal lead levels in blood and urine. The results were normal. The circumstances of the injury were obtained in 12 cases and most involved careless handling of a gun. Instruction of children and parents in schools and on television, rather than stricter legislation, is suggested as a means of prevention.

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713. Bowman, S. and M. Aitken (2009). "Disparities in injury outcomes for people with epilepsy and seizure disorders." Epilepsia 50: 83.

Context: Controlling for injury and patient characteristics, one would expect comparable in-hospital outcomes for patients with and without epilepsy. The historical stigma associated with epilepsy is well-document, yet potential disparities in injury care for people with epilepsy and seizure disorders remain unknown. Objective: To compare in-hospital outcomes of injured patients with epilepsy and seizure disorders with similarly patients without epilepsy/seizures. We tested the hypothesis that people with epilepsy have worse outcomes (i.e., greater in-hospital mortality) than similarly injured people without epilepsy. Design, Setting, and Participants: Analysis of existing data from the Nationwide Inpatient Sample - the largest, longitudinal, all-payer inpatient care database in the United States. Injured patients of all ages were included. Multivariable logistic regression was used to control for patient and hospital characteristics. Main Outcome Measures: In-hospital mortality, stratified by injury mechanism. Results: Controlling for patient and injury characteristics, people with epilepsy were more likely to die in-hospital than people without epilepsy (OR 1.16, $p<0.001$). People with epilepsy were significantly more likely to have a traumatic brain injury diagnosis than similar individuals without epilepsy (OR 2.94, $p<0.001$). By mechanism of injury, significantly increased risk of death was observed for injuries from cuts/pierces (OR 3.24), falls (OR 1.25), motorcycles (OR 1.67), other transport (OR 1.59), struck by/against (OR 1.63), and suffocation (OR 8.0). People with epilepsy/seizures with firearm injuries were less likely to die in-hospital (OR 0.25). Conclusion: Disparities in hospital outcomes for people with epilepsy deserve further attention. Identifying the underlying causes of these disparities is critical.

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714. Bowyer, J. F., et al. (2014). "Systemic administration of fluoro-gold for the histological assessment of vascular structure, integrity and damage." Current neurovascular research 11(1): 31-47.

Fluoro-Gold (F-G) has been used extensively as a fluorescent retrograde neuronal-track tracer in the past. We now report that intraperitoneal administration of 10 to 30 mg/ kg of F-G from 30 min to 7 days prior to sacrifice labels vascular endothelial cells of the brain, choroid plexus and meninges and can be used to assess vascular integrity and damage. F-G vascular labeling co-localized with rat endothelial cell antigen (RECA-1) in the membrane. F-G also intensely labeled the nuclei of the endothelial cells, and co-localized with propidium iodide staining of these nuclei. As well, the administration of F-G during neurotoxic insults produced by amphetamine, kainic acid or "penetrating" wound to the brain can detect where vascular leakage/ hemorrhage has occurred. Histological methods to detect F-G labeled brain vasculature were performed in the same manner as that used for fluorescent visualization of neuronal elements labeled with F-G after perfusion fixation and coronal sectioning (15 to 40 microm) of the brain. This in vivo F-G labeling of endothelial cells and their nuclei yields a clear picture of the integrity of the vasculature and can be used to detect changes in structure. Vascular leaks after "penetrating" wounds through the cortex and striatum, hyperthermic amphetamine exposure or excitotoxic kainate exposure were detected by F-G in the extracellular space and via parenchymal F-G subsequently labeling the terminals and neurons adjacent to the lesioned or damaged vasculature. Further studies are necessary to determine the extent of the leakage necessary to detect vasculature damage. Visualization of the F-G labeling of vasculature structure and leakage is compatible with standard fluorescent immuno-labeling methods used to detect the presence and distribution of a protein in histological sections. This method should be directly applicable to studying brain vascular damage that occurs in the progression of Alzheimer's disease, diabetes and for monitoring the brain vascular changes during development.

715. Boyarchuk, O., et al. (2020). "A report of five child tetanus cases." Journal of Pediatric Infectious Diseases 15(4): 200-205.

We present five cases of generalized tetanus in children 5 to 13 years old, who were admitted to the intensive care unit of Ternopil Regional Children's Hospital (Western Ukraine) during the past 6 years (2012-2017). In our study, four children were unvaccinated and one received the full series of vaccinations. Proper vaccination in cases of infected wound may not prevent the development of the disease but improves the prognosis for recovery. Treatment of tetanus in Ukraine requires standardization of treatment protocols according to the World Health Organization recommendations, including making human tetanus immune globulin available, as specified by evidence-based medicine. Vaccines availability and education of physicians and parents about the benefits of immunization should be priority national health measures to prevent tetanus.

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716. Boyd, M., et al. (2015). "Blood brain barrier disruption after mild traumatic brain injury in a closed skull model." Journal of Investigative Medicine 63(1): 122-123.

Purpose of Study: Traumatic brain injuries (TBI) are rising significantly. Mild TBI (mTBI), or concussions account for 75% of TBI occurrences. Clinically applicable studies are essential for development of treatments and long term prognostic care. The primary model to study TBI uses a controlled cortical impact (CCI) via craniotomy direct to the dura mater. However, the current model is limited in its application to clinical studies because most current cases of mTBI do not involve penetrating injuries to the brain tissue. The study is aimed to develop a very mild impact, closed skull model that yields a subclinical outcome, relative to mTBI, for study of blood brain barrier (BBB) disruption and neuroinflammation. Methods Used: Utilizing the CCI system, without use of the craniotomy, C57BL/6 male mice were anesthetized by isoflourane, heads shaved and positioned on the stereotaxic frame. Impacts were delivered directly to the skull, posterior to the bregma and recovery followed. BBB permeability was measured by injection of 14C-labeled sucrose followed by washout and beta counts of the samples. Simultaneously, changes in aquaporin-4 (AQP4) and HIF-1a were analyzed by standard western blot procedures. Summary of Results: Standard parameters of 6 impacts, spaced 2 minutes apart at 1.0 m/s and a depth of 0.2mm were used to obtain mTBI. BBB permeability had significant increase with severe impact and a trending increase in the subclinical subjects, compared to the controlmice. Western blot analysis conveyed the same trend; further evidencing the fact that mTBI does impact the chemistry and functionality of the BBB and associated proteins. The use of the CCI to inflict mTBI is validated and repeatable, by control of both depth and velocity. Conclusions: This study demonstrates that a subclinical outcome is possible with a closed skull model. Changes in BBB permeability and edema associated factors, such as AQP4 support the continued use of the model in future studies. Potential targets include factors involved in neurodegeneration, given the increasing rate of mTBI in the population. Continued focus will be on optimizing parameters, determination of peak edema and evaluation of experimental treatment methods.

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717. Boyd, N. A. (1975). "A military surgical team in Belfast." Annals of the Royal College of Surgeons of England 56(1): 15-25.

This paper details the experiences of a military surgical team in Belfast from 1972 to early 1974. The overall picture of the problem is given and the current management of 'war' injuries discussed. Up to February 1974 over 1000 servicemen have been injured in Northern Ireland as a result of the vivil disturbance. Over 200 have died. Because of the close proximity of the hospital to many battle areas, casualties may arrive with massive injuries, requiring major resuscitation. Limb wounds have predominated. There is no short cut to adequate wound debridement, especially in the surgery of high-velocity missile injury. Missile wounds of the large bowel require a colostomy. Formal thoracotomy is increasingly used for the through-and-through gunshot wounds of the chest. Controlled ventilation is

playing an increasingly important role in the management of some missile wounds of the head. Mine and bomb explosions frequently cause multiple injuries, requiring extensive surgery on any one patient.

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718. Boyd, N. A., et al. (1971). "British surgical aid to Jordan." Annals of the Royal College of Surgeons of England 49(5): 291-309.

The surgical commitment of No. 2 Field Hospital, R.A.M.C., during its stay in Jordan is presented. The majority of patients that were admitted had sustained war wounds, many of which were infected due to the delay in treatment. The difficulties encountered in their subsequent management are discussed. Special reference is made to the use of ketamine (Ketalar) and mafenide acetate (Sulphamylon) in the treatment of those burns cases under our care. It is the first time for many years that a British field hospital has been employed in an active role.

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719. Boyko, O. B., et al. (1986). "Application of SPECT scanning with I-123 HIPDM to forensic medicine." Journal of computer assisted tomography 10(5): 885-887.

The use of I-123 HIPDM, a cerebral perfusion agent, in the demonstration of an intracranial bullet track is described. Visualization of the bullet track was dependent on the use of single photon emission CT.

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720. Boyle, J., et al. (2018). "A Case Study of a 12-Week Pregnancy With a Single Live Decapitated Fetus." Journal of ultrasound in medicine : official journal of the American Institute of Ultrasound in Medicine 37(3): 806-809.

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721. Bozan, O., et al. (2019). "Comparison of PECARN and CATCH clinical decision rules in children with minor blunt head trauma." European journal of trauma and emergency surgery : official publication of the European Trauma Society 45(5): 849-855.

INTRODUCTION AND PURPOSE: Computerized brain tomography (CBT) imaging plays a key role in the management of patients with head trauma, and there is an indication for CBT in moderate and severe injuries. However, it is difficult to determine an indication for CBT in patients with minor head trauma. The primary aim of this study is to compare the efficiency of the most commonly used clinical decision rules: the guidelines of the Pediatric Emergency Care Applied Research Network (PECARN), and those of the Canadian Assessment of Tomography for Childhood Head Injury (CATCH)., METHODS: The study, which was designed as a prospective cohort study, sought to determine the appropriate CBT indications for children younger than 18 years who were referred to the emergency department with minor blunt head trauma. The effectiveness of PECARN and CATCH clinical decision rules, which are recommended by literature to be applied in order to diagnose severely injured patients and minimize inappropriate CBT requests, was investigated. All patients included in this study were younger than 18 years of age, were admitted to the study with an isolated blunt head trauma, had a GCS of > 13, and had parental permission to participate in the study. Patients ages 18 and older, those with penetrating head trauma or trauma to other systems, those with GCS <= 13, those with incomplete data, and those whose parents did not agree to participate in the study, were excluded., RESULTS: A total of 256 patients were included in the study. PECARN and CATCH rules were both shown to be statistically significant in detecting the presence of pathology ($p < 0.001$, $p = 0.002$, respectively). Overall, PECARN was more successful than CATCH in detecting intracranial pathology. The sensitivity of PECARN was 95 (95% CI 72-100%) and specificity was 53 (95% CI 47-60%), while the sensitivity of CATCH was 48 (95% CI 25-71%) and specificity was 83 (95% CI 79-88%). Multivariate regression analyses were performed on the parameters (low GCS, abnormal mental status, age, non-frontal hematoma) and other parameters (vomiting, headache, abnormal behavior according to parents) that were considered to be clinically significant despite having a p value of < 0.3. Age, low

GCS, and non-frontal hematoma presence were found to be significant in predicting the presence of pathology. In particular, low GCS increased the probability of pathology 5.94-fold and non-frontal hematoma presence 4.37-fold., CONCLUSION: While both PECARN and CATCH were found to be effective in determining the necessity of CBT for children with minor blunt head trauma, PECARN proved to be more useful for emergency services because of its higher sensitivity. The authors suggest that conducting a CBT scan based on clinical decision rules may be a suitable approach for early detection of the presence of intracranial acute pathologies in young children with minor blunt head trauma, especially if the GCS score is < 15 and non-frontal hematomas are present.

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722. Bozic, K. (2009). "[Prophylactic use of antiepileptic drugs for posttraumatic epilepsy]." Medicinski pregled 62(11-12): 501-503.

The link between severe brain trauma and epilepsy in humans is well recognized Posttraumatic epilepsy is reported after 2-5% of closed head injuries but up to 50% or more following penetrating head injury. The control of "early seizures", i.e., those occurring hours or weeks after injury, is mandatory because those acute attacks may add secondary damage to the injured brain. Seizures occuring months or years after injury are called "late seizures". Recurring "late seizures" make up the clinical syndrome of "post-traumatic epilepsy". Prophylaris is the process of guarding against the development of a specific disease by action or treatment that affects pathogenesis. In animal "prophylaxis" by antiepileptic drugs seems efficacious in many experimental models including iron induced epilepsy which is considered a model of post-traumatic epilepsy. In the hunman being "prophylaxis" has been attempted by phenytoin, phenobarbital, carbamazepine and valproate but without any success. During the treatment period the occurrence of scizures is prevented but, after discontinuation of the drug, seizures occur just as in non treated patients. Although prevention of acute seizures that occur following head injury is a practical goal, such treatment is not likely to have a prophylactic effect against late development of epilepsy.

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723. Bozzeto-Ambrosi, P., et al. (2008). "Penetrating screwdriver wound to the head." Arquivos de neuro-psiquiatria 66(1): 93-95.

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724. Braca, J., et al. (2012). "Ghost image extraction technique utilizing intraoperative angiography for the controlled removal of an intracranial nail." Journal of neurointerventional surgery 4: A60-A61.

Penetrating intracranial trauma via nail gun injury is becoming more common and differs significantly from the sequelae of penetrating cranial trauma of gunshot wounds. Safe, effective extraction techniques are therefore necessary and can employ intraoperative angiography (IA). An (IA) Ghost Image Extraction technique for safe removal of an intracranial nail is described here and can be applied to future such situations. A 32-year-old right-handed male with a history of multiple, non-operative closed-head injuries presented complaining of a 3 day history of right retro-orbital headache, blurry vision in his right eye, and C8 distribution parasthesias on the left forearm. CTrevealed a 6 cm nail lodged in the right posterior frontal lobe, with the distal tip pointing superior and medially, without evidence of intracranial hemorrhage along the tract. On more pointed questioning, the patient admitted to non-accidental trauma. On arrival to our facility, the patient was afebrile and without meningeal signs. He was neurologically intact with the exception of a subtle left pronator drift and decreased sensation to light-touch distally in the left C8 distribution. The patient went to the angiography suite for pre-operative vascular mapping prior to surgical extraction of the embedded nail. Four vessel cerebral angiography demonstrated the course of the major, distal branches and tributaries of the intracranial vessels and, miraculously, none were injured. Given the proximity of the nail to major intracranial vessels and elegant cortex, the consideration for safe, controlled extraction of the nail involved the use of IA. The five French sheath was left in place. In the operating room after curvilinear incision and appropriate exposure a double concentric craniotomy was performed around the head of the nail. At this point, with the assistance of intra-operative fluoroscopy and angiography, the nail was slowly and

carefully removed under direct visualization so as to remove it in the identical course of its entry to avoid further intracranial injury. The subtracted ghost image of the nail (Abstract E-035 figure 1) that appears with IA allows for control of the distal tip of the nail by extraction via the nail's entry path so as to avoid inadvertent laceration of a vessel or further injury to elegant cortex. Periodic angiographic images were obtained during the deliberate extraction to ensure no intracranial vessel injury had occurred. Post-operative CTrevealed a small hemorrhage in along the tract of the nail. The patient did well postoperatively. (Figure presented).

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725. Bragg, S. (2006). "Head trauma from a nail gun." Journal of emergency nursing 32(4): 329.

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726. Bramlett, H. M., et al. (2016). "Erythropoietin Treatment in Traumatic Brain Injury: Operation Brain Trauma Therapy." Journal of neurotrauma 33(6): 538-552.

Experimental studies targeting traumatic brain injury (TBI) have reported that erythropoietin (EPO) is an endogenous neuroprotectant in multiple models. In addition to its neuroprotective effects, it has also been shown to enhance reparative processes including angiogenesis and neurogenesis. Based on compelling pre-clinical data, EPO was tested by the Operation Brain Trauma Therapy (OBTT) consortium to evaluate therapeutic potential in multiple TBI models along with biomarker assessments. Based on the pre-clinical TBI literature, two doses of EPO (5000 and 10,000 IU/kg) were tested given at 15 min after moderate fluid percussion brain injury (FPI), controlled cortical impact (CCI), or penetrating ballistic-like brain injury (PBBI) with subsequent behavioral, histopathological, and biomarker outcome assessments. There was a significant benefit on beam walk with the 5000 IU dose in CCI, but no benefit on any other motor task across models in OBTT. Also, no benefit of EPO treatment across the three TBI models was noted using the Morris water maze to assess cognitive deficits. Lesion volume analysis showed no treatment effects after either FPI or CCI; however, with the 5000 IU/kg dose of EPO, a paradoxical increase in lesion volume and percent hemispheric tissue loss was seen after PBBI. Biomarker assessments included measurements of glial fibrillary acidic protein (GFAP) and ubiquitin C-terminal hydrolase-L1 (UCH-L1) in blood at 4 or 24 h after injury. No treatment effects were seen on biomarker levels after FPI, whereas treatment at either dose exacerbated the increase in GFAP at 24 h in PBBI but attenuated 24-4 h delta UCH-L1 levels at high dose in CCI. Our data indicate a surprising lack of efficacy of EPO across three established TBI models in terms of behavioral, histopathological, and biomarker assessments. Although we cannot rule out the possibility that other doses or more prolonged treatment could show different effects, the lack of efficacy of EPO reduced enthusiasm for its further investigation in OBTT.

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727. Branco, B. C., et al. (2017). "Increasing use of endovascular therapy in pediatric arterial trauma." Journal of vascular surgery 66(4): 1175-1183.e1171.

Background Endovascular therapy has been increasingly used for critically injured adults. However, little is known about the epidemiology and outcomes of endovascularly managed arterial injuries in children. We therefore aimed to evaluate recent trends in the endovascular management of pediatric arterial injuries and its association with early survival. Methods An 8-year analysis of the National Trauma Databank (2007-2014) was performed to extract all pediatric trauma patients (aged ≤16 years) with arterial injuries. Demographics, clinical data, interventions (endovascular vs open), and outcomes (in-hospital mortality and length of stay) were extracted. Patients undergoing endovascular or open procedures were compared for differences in clinical characteristics using bivariate analysis. Multivariable logistic regression analysis quantified the association between endovascular therapy and survival in the context of other variables predictive of survival on univariate analysis, with $\alpha \leq .05$. Results There were 35,771 pediatric patients available for analysis. Overall, there was a significant increase in the use of endovascular procedures (from 7.8% in 2007 to 12.9% in 2014; $P < .001$), particularly among blunt trauma patients (5.8% in 2007 to 15.7% in 2014; $P < .001$). Conversely, a

significant decrease was noted for open procedures (P <.001). There was a stepwise increase in the proportion of patients managed endovascularly as the Injury Severity Score (ISS) increased (highest in the ISS spectrum of 31-50). Angioembolization of internal iliac injury and thoracic aortic endograft placement were the two most common endovascular procedures (n = 88 [33.4%] and n = 60 [22.9%], respectively). There were 331 decedents (9.1% vascular injured children), 242 (73.1%) of whom were dead on arrival. After controlling for differences in demographics and clinical data, when outcomes were compared between patients who underwent endovascular and open procedures, there were no significant differences regarding in-hospital mortality (3.0% vs 3.6%; odds ratio, 0.7; 95% confidence interval, 0.1-6.1; P =.778). A logistic regression model identified Glasgow Coma Scale score ≤8, ISS ≥16, positive result of ethanol or drug screen, and systolic blood pressure <90 mm Hg on admission as independent risk factors for death. Conclusions The use of endovascular therapy in pediatric vascular arterial trauma has significantly increased, especially among severely injured blunt trauma patients. Despite this successful integration into care, there was no in-hospital survival advantage conferred by endovascular therapy compared with traditional open therapy. Approximately 10% of children with arterial injuries died during initial trauma assessment before therapy could be offered. Glasgow Coma Scale score ≤8, ISS ≥16, positive result of ethanol or drug screen, and systolic blood pressure <90 mm Hg on admission were identified as independent risk factors for death. As children are a population of vulnerable patients, long-term, multicenter studies are required to determine the most appropriate use of and indications for endovascular therapy in pediatric arterial trauma.

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728. Brandel, J.-P., et al. (2020). "Variant Creutzfeldt-Jakob Disease Diagnosed 7.5 Years after Occupational Exposure." The New England journal of medicine 383(1): 83-85.

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729. Brandi, G., et al. (2018). "Moderate hyperventilation of short duration does not change cerebral metabolism in patients with severe traumatic brain injury." Critical Care 22.

Introduction: Hyperventilation (HV) reduces elevated intracranial pressure (ICP) by changing autoregulatory functions connected to cerebrovascular CO2 reactivity. Criticism to HV is due to the possibility of developing cerebral ischemia and tissue hypoxia because of hypocapnia-induced vasoconstriction. We aimed to investigate the potential adverse effects of moderate HV of short duration in the acute phase in patients with severe traumatic brain injury (TBI), using concomitant monitoring of cerebral metabolism, continuous brain tissue oxygen tension (PbrO2), and cerebral hemodynamic with transcranial color-coded duplex sonography (TCCD). Methods: A prospective trial was conducted between May 2014 and May 2017 at the University Hospital of Zurich. Adults (>18 years), with non-penetrating TBI, first GCS < 9, ICP-monitoring, PbrO2 and/or microdialysis (MD)-probes were included within 36 hours after injury. Data collection and TCCD measurements took place at baseline (A), at the begin of moderate HV (PaCO2 4-4.7 kPa) (C), after 50 minutes of moderate HV (PaCO2 4-4.7 kPa) (D), and after return to baseline (E) (Fig. 1). Repeated measures ANOVA was used to compare variables at the different time points followed by post hoc analysis with Bonferroni adjustment as appropriate. P-value < .05 was considered significant. Results: Eleven patients were included (64% males, mean age 36 ± 14 years). First GCS was 7 (3-8: median and interquartile range). Data concerning PaCO2, ICP, PbrO2, mean flow velocity (MFV) in the middle cerebral artery, and MD values are presented in Table 1. During HV, ICP and MFV decreased significantly. PbrO2 presented a trend of reduction. Glucose, lactate and pyruvate did not change significantly (Table 2). Conclusions: Short episodes of moderate HV have a potent effect on the cerebral blood flow, as assessed by TCCD, reduce ICP and PbrO2, and do not induce significant changes in cerebral metabolism. (Table presented) (Figure presented).

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730. Brandt, F., et al. (1983). "[Neurosurgical management of gunshot injuries to the head]." Die neurochirurgische Behandlung von Kopfschussverletzungen. 26(6): 164-171.

The article describes the pathophysiological mechanisms of injuries caused by shots in the head. In particular, the effect exercised on the cerebral tissue by the impact of rapid projectiles is explained. The review is based on 23 patients treated by the authors. These cases are discussed and critically assessed, using the results communicated in other papers as basis. The requisite surgical measures are considered; the need for effecting complete cleansing of the path of the bullet is viewed with some reserve.

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731. Brandt, S. K. (1993). "Bullet discovered on a panoramic radiograph." Oral surgery, oral medicine, and oral pathology 75(5): 660-661.

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732. Brandvold, B., et al. (1990). "Penetrating craniocerebral injuries in the Israeli involvement in the Lebanese conflict, 1982-1985. Analysis of a less aggressive surgical approach." Journal of neurosurgery 72(1): 15-21.

From June, 1982, through June, 1985, 113 patients were evacuated to Rambam Maimonides Medical Center with penetrating craniocerebral injuries sustained in ongoing military hostilities in Lebanon. Two factors distinguished this group of patients from those presenting in earlier conflicts: 1) this was the first large series in which computerized tomography (CT) was routinely used to initially evaluate combat head injuries; and 2) in an effort to preserve maximum cerebral tissue, intracranial debridement was significantly less vigorous than that advocated during the Korean or Vietnam conflicts. No efforts were made to locate or remove in-driven bone or metal fragments visualized on CT unless they readily presented themselves on gentle irrigation. In fact, it was elected to treat a number of patients without intracranial hematomas nonoperatively. The acute outcome was quite similar to that reported in Vietnam series in respect to both complications and mortality. Of the 83 survivors, 46 were Israeli citizens and thus were available for follow-up review. These 46 patients were reevaluated in late 1988, a mean follow-up period of 5.9 years. None had died in the interim; 10 had developed chronic seizure disorders, and there was one case of delayed meningitis in a patient with no retained fragments. Repeat CT scans were performed on 43 patients; 22 (51%) were found to have retained intracranial bone fragments. No relationship existed between the presence of retained fragments and the development of either a seizure disorder or an infection of the central nervous system. These findings suggest that not only is it unnecessary to reoperate for retained bone fragments, but it may also be possible to temper the initial debridement in an effort to preserve additional cerebral tissue.

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733. Bratzke, H., et al. (1985). "[An unusual ability following a contact gunshot wound of the head]." Ungewohnliche Handlungsfahigkeit nach Kopfsteckschuss. 175(1-2): 31-39.

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734. Brauer, M., et al. (2019). "[How many potential organ donors are there really? : Retrospective analysis of why determination of irreversible loss of brain function was not performed in deceased patients with relevant brain damage]." Wie viele potenzielle Organspender gibt es wirklich? : Retrospektive Analyse zu nichterfolgter Diagnostik des irreversiblen Hirnfunktionsausfalls bei verstorbenen Patienten mit relevanter Hirnschadigung. 68(1): 22-29.

BACKGROUND: No systematic study has previously been undertaken in Germany to ascertain why irreversible brain death determination (BDD) has not been carried out., OBJECTIVE: A comprehensive analysis of reasons for unperformed BDD in deceased patients with acute, severe brain damage could improve the identification of potential organ donors., METHOD: Using the Transplantcheck program of the German Organ Transplantation Foundation (DSO) an analysis of the data from 2016 was undertaken in participating hospitals in Saxony, Saxony-Anhalt and Thuringia (Region East of the DSO), regarding why a BDD was not initiated in deceased patients with primary or secondary brain damage., RESULTS: In 128 of the 144 Region East hospitals, 7889 deceased patients

with primary or secondary brain damage were detected. In 7389 patients a BDD was out of the question for a variety of reasons. In 232 patients organ donation was not considered due to an advance directive. In 195 cases treatment was limited based on the patient's infaust neurological prognosis without the possibility of organ donation being discussed with relatives. In 73 cases initiation of BDD was indicated but not performed., CONCLUSION: The number of potential organ donors in Region East of the DSO could be significantly increased by identifying patients where BDD is indicated. By consistent evaluation of patients' wills in terms of organ donation before treatment is withdrawn in patients with poor neurological prognosis, additional potential organ donors could be identified. Furthermore, involving neurointensive care physicians in the care of all patients with brain damage could improve the prognostic assessment.

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735. Braun, R., et al. (2017). "Absent Left Common Carotid Artery in a Trauma Patient." Journal of vascular and interventional radiology : JVIR 28(2): 230.

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736. Braun, T., et al. (2015). "[Near-infrared spectroscopy for the detection of traumatic intracranial hemorrhage: Feasibility study in a German army field hospital in Afghanistan]." Nahinfrarotspektroskopie zur Detektion intrakranieller traumatischer Hirnblutungen: Praktikabilitatsstudie in einem Bundeswehrrettungszentrum in Afghanistan. 118(8): 693-700.

Traumatic brain injury (TBI) is one of the most common causes of death in ordinary accidents, natural disasters, or warfare. The gold standard for diagnosis of TBI is the CT scan; a delay of diagnostics or medical care is the strongest independent predictor of mortality of TBI patients--particularly in the case of a surgically treatable intracranial hematoma. The proper classification of these patients is of major importance in situations where a CT is not accessible. A portable screening device that uses near-infrared spectroscopy (NIRS) technology allows a preliminary estimate of an intracranial hematoma. This study assessing practicability shows that the use of the device in a military medical rescue center (Kunduz, Afghanistan) is easy to learn and can be repeatedly used even under emergency room conditions. The technique can be applied in penetrating and blunt TBIs in the absence of an immediately available CT scan in rural areas, preclinically, under mass casualty conditions (e.g., in disaster situations) as well as in humanitarian crises or war zones. Nevertheless, further studies to assess the validity of this device are necessary.

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737. Braun, U. (2009). "Traumatic pericarditis in cattle: clinical, radiographic and ultrasonographic findings." Veterinary journal (London, England : 1997) 182(2): 176-186.

Pericarditis is an inflammation of the pericardium with accumulation of serous or fibrinous inflammatory products. In cattle, it is almost always attributable to a reticular foreign body that has penetrated the reticular wall, diaphragm and pericardial sac. The lead signs of pericarditis are tachycardia, muffled heart sounds, asynchronous abnormal heart sounds, distension of the jugular veins and submandibular, brisket and ventral abdominal oedema. The glutaraldehyde test is an important diagnostic tool because it is positive in >90% of affected cattle. Other common laboratory findings are leukocytosis and hyperfibrinogenaemia (indicating inflammation), and elevation of liver enzyme activity (reflecting hepatic congestion). Radiographs of the thorax and reticulum often show a foreign body cranial to the reticulum. In the majority of cases, massive fibrinopurulent adhesions obscure the cardiophrenic angle, cardiac silhouette and ventral diaphragm. Ultrasonography is the method of choice for diagnosis and characterisation of pericardial effusion. Echogenic deposits and strands of fibrin are seen on the epicardium, and the ventricles are compressed by the effusion. Severe pleural effusion is usually evident. In cattle with distension of the jugular veins and tachycardia, the differential diagnosis includes right-sided cardiac insufficiency attributable to other causes. Distension of the jugular veins without signs of right-sided cardiac insufficiency may occur with obstruction or compression of the cranial vena cava. The prognosis is poor, and pericardiocentesis or pericardiotomy are inadequate

methods of treatment. Thus, prompt and humane euthanasia is indicated for cattle with traumatic reticuloperitonitis. Because a definitive diagnosis of traumatic reticuloperitonitis is not always possible based on clinical signs alone, radiography and ultrasonography of the thorax and reticulum are indicated in doubtful cases.

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738. Brauner, E., et al. (2022). "Dental Management of Maxillofacial Ballistic Trauma." Journal of Personalized Medicine 12(6).

Maxillofacial ballistic trauma represents a devastating functional and aesthetic trauma. The extensive damage to soft and hard tissue is unpredictable, and because of the diversity and the complexity of these traumas, a systematic algorithm is essential. This study attempts to define the best management of maxillofacial ballistic injuries and to describe a standardized, surgical and prosthetic rehabilitation protocol from the first emergency stage up until the complete aesthetic and functional rehabilitation. In low-velocity ballistic injuries (bullet speed <600 m/s), the wound is usu-ally less severe and not-fatal, and the management should be based on early and definitive surgery associated with reconstruction, followed by oral rehabilitation. High-velocity ballistic injuries (bul-let speed >600 m/s) are associated with an extensive hard and soft tissue disruption, and the management should be based on a three-stage reconstructive algorithm: debridement and fixation, re-construction, and final revision. Rehabilitating a patient with ballistic trauma is a multi-step chal-lenging treatment procedure that requires a long time and a multidisciplinary team to ensure suc-cessful results. The prosthodontic treatment outcome is one of the most important parameters by which a patient measures the restoration of aesthetic, functional, and psychological deficits. This study is a retrospective review: twenty-two patients diagnosed with outcomes of ballistic traumas were identified from the department database, and eleven patients met the inclusion criteria and were enrolled.

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739. Brawman-Mintzer, O., et al. (2016). "Rivastigmine transdermal patch treatment for moderate to severe cognitive impairment in veterans with traumatic brain injury: a double-blind, placebocontrolled multicenter study (RiVET Trial)." Neuropsychopharmacology 41: S211.

Background: Traumatic brain injury (TBI) represents one of the most significant health risks related to military duty. Even in peacetime, military personnel have higher rates of TBI than civilians with the risk of TBI increasing significantly during war-time. Since 2000, 348,000 service members were diagnosed with TBI. The most common injuries inflicted in the conflicts in Afghanistan and Iraq are caused by improvised explosive devices (IEDs), rocket propelled grenades, and land mines, with approximately 60% of blasts to which military personnel are exposed resulting in brain injuries. Not surprisingly, TBI is often called the “signature wound” of the Iraq and Afghanistan wars. With the improvement in acute care provided to these patients, treatment of long-term sequelae of TBI is paramount. Despite significant variation in the severity of TBI, data consistently indicate deficits in cognitive functions such as memory, attention, speed of information processing, and executive functions among these individuals. Approximately 10-15% of people with mild TBI have persistent cognitive and behavioral complaints, and 65% of those with moderate to severe TBI experience long-term cognitive difficulties. It is well recognized that cognitive impairment is one of the most debilitating consequences for individuals who attempt to fully function in society. Research findings both in animal models and humans suggest that cholinergic function is chronically deficient among subjects with TBI, and that cholinergic deficits may be a significant contributor to post-traumatic cognitive impairments-particularly memory impairments. As such, cholinergic deficits may be a useful target for the pharmacotherapy of TBI-related cognitive impairments. However, despite recommendations by VA-sponsored consensus groups advocating the use of cholinesterase inhibitors in the treatment of posttraumatic memory deficits in Veterans with TBI, no standard for pharmacological treatment of memory impairments among Veterans with TBI has been established. Herein we will present the first multicenter clinical trial, conducted in five VA Medical Centers, evaluating the efficacy and safety of rivastigmine transdermal patch, an intermediate-acting cholinesterase inhibitor, in Veterans suffering from moderate to severe

posttraumatic memory impairment following TBI. Methods: This is the first phase II, randomized, multi-site, double-blind, placebo-controlled 12-week trial evaluating the effect on cognition and the safety of rivastigmine 9.5 mg/24 hours (10cm2) transdermal patch in Veterans with closed, non-penetrating TBI who present with moderate to severe memory impairment (NCT01670526). The study consisted of a one-week single-blind, placebo run-in phase, and a 12-week double-blind acute treatment phase (Phase I). During this phase, there was an initial 4-week titration period (5cm2 patch for 4 weeks increased to 10 cm2 patch thereafter) followed by an 8-week continuation phase. Following the 12-week acute treatment phase, participants continued in the double-blind phase (Phase II) for an additional 14 weeks or until study treatment period ended. Participants were Veterans with a history of closed head trauma(s) (non-penetrating) at least 12 months prior to study enrollment, based on ICD 9 CM diagnosis code 854.0, and who met or exceeded modified ACRM criteria for mild TBI as determined by TBI diagnostic assessment. Participants were required to have a deficit in verbal memory, as assessed by the Total Recall index (Trials 1-3) of the Hopkins Verbal Learning Test, Revised (HVLT-R). Persistent cognitive deficit was defined as a Total Recall index (Trials 1-3) that is at least 20% lower than an intelligence-adjusted “expected score,” based on the WAIS-IV Information and Vocabulary subtests. Participants who exhibited invalid data on cognitive testing utilizing TOMM and MSVT were excluded. The primary outcome variable was defined as the proportion of responders who had at least 5-word improvement on HVLT-R Trials 1-3. Secondary outcomes inclu ed PASAT, COWAT, Digit Span and Letter-Number Sequencing subtests of WAIS-IV, Trail Making, BVMT-R, Q-LES-Q, SDS, NFI, PCL-M, BDI-II, University of California San Diego Performance-Based Skills Assessment (UPSA-B), CGI, CSSRS and treatment-emergent adverse events. Results: Ninety-six participants were randomized. The last study participant visit occurred on May 25, 2016. Database lock occurred on July 6, 2016. Demographic characteristics of study sample include: mean age 40.7 years; 95.7% males; 68.1% Caucasian. Baseline mean HVLT-R Total Recall index was 20.0, corresponding to severe impairment (2nd percentile compared to HVLT-R normative sample) for the participants' mean age. Study codes have not been broken; pre-planned statistical analyses will be completed by September 26, 2016 and presented at the meeting. Conclusions: This trial provides the largest dataset to date of Veterans with TBI and posttraumatic memory deficits enrolled in a pharmacological clinical trial. Its results will lead to a better understanding of the role that rivastigmine transdermal patch could play in the care of these patients.

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740. Brawman-Mintzer, O., et al. (2021). "Rivastigmine Transdermal Patch Treatment for Moderate to Severe Cognitive Impairment in Veterans with Traumatic Brain Injury (RiVET Study): A Randomized Clinical Trial." Journal of neurotrauma 38(14): 1943-1952.

Cognitive impairment is common in veterans with histories of traumatic brain injury (TBI). Cholinergic deficits have been hypothesized as contributors to this impairment. We report the effects of cholinesterase inhibitor rivastigmine transdermal patch treatment in veterans with TBI and post-traumatic memory impairment. Our objective was to evaluate the efficacy and safety of a 9.5 mg/24 h (10 cm2) rivastigmine patch in veterans of military conflicts with persistent moderate to severe memory impairment at least 12 weeks after TBI. This randomized, outpatient, double-blind, placebo-controlled 12-week trial with an exploratory double-blind phase of an additional 14 weeks was conducted at 5 VA Medical Centers, among veterans with closed, non-penetrating TBI who met or exceeded modified American Congress of Rehabilitation Medicine criteria for mild TBI with verbal memory deficits, as assessed by the Hopkins Verbal Learning Test, Revised (HVLT-R). Patients were randomized 1:1 to rivastigmine or matching placebo patches after a 1-week single-blind, placebo run-in phase. At randomization, patients received 4.6 mg/24 h rivastigmine patches or matching placebo increased to a 9.5 mg/24 h patch after 4 weeks. The primary efficacy outcome measure was the proportion of participants who had at least a five-word improvement on the HVLT-R Total Recall Index (Trials 1-3). A total of 3671 participants were pre-screened, of whom 257 (7.0%) were screened; 96 (37%) randomized, and 94 included in study analyses. Responder rates were 40.8% (20 of 49) and 51.1% (23 of 45) in the rivastigmine and placebo groups, respectively (p = 0.41). A mixed-effect model including

treatment, time, and treatment-by-time interaction indicated no significant difference in treatment effect over time between the groups (p = 0.24). Overall, there were no significant differences in changes for all secondary outcomes between the rivastigmine and placebo groups. The most commonly observed adverse events were application site reactions. This trial provides the largest sample to date of veterans with TBI and post-traumatic memory deficits enrolled in a pharmacological trial. Trial Registration: clinicaltrials.gov Identifier: NCT01670526.

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741. Brazeau, J. and R. K. Wong (1997). "Analysis of gunshot residues on human tissues and clothing by X-ray microfluorescence." Journal of forensic sciences 42(3): 424-428.

The analysis of gunshot residues on human tissues and clothing in suicide, homicide, suspicious death, or attempted murder events, permits the forensic scientist to confirm the possibility of an entry wound caused by a gunshot bullet from a pistol, revolver, rifle, etc. The residues to be detected are lead (Pb), antimony (Sb), barium (Ba) usually from the primer, copper (Cu) and zinc (Zn) usually from the metal jacket bullet and iron (Fe) possibly from the barrel of the gun used. The presence or absence of these elements and their relative concentrations can help in the interpretation of the event.

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742. Breeze, J. and D. B. Powers (2020). "Current opinion in the assessment and management of ballistic trauma to the craniomaxillofacial region." Current opinion in otolaryngology & head and neck surgery 28(4): 251-257.

PURPOSE OF REVIEW: Ballistic trauma represents a small proportion of injuries to the craniomaxillofacial (CMF) region, even in societies where the availability of firearms is more prevalent. The aim of this article is to review current opinion in the assessment and management of ballistic injuries sequentially from primary survey to definitive reconstruction., RECENT FINDINGS: For mandibular fractures because of ballistic trauma, load-bearing fixation remains the mainstay in the treatment. The use of load sharing fixation is rarely advised, even if the fracture pattern radiologically appears to fulfil the traditional indications for its use. Clinicians must be aware of specific situations in early internal fixation is contraindicated, particularly in those unstable patients requiring short damage control surgical procedures, avulsive soft and hard tissue defects and those injuries at increased risk of infection., SUMMARY: Staged surgery for complex injuries is increasingly becoming accepted, by which injuries are temporarily stabilized by means of maxillary--mandibular fixation (MMF) or an external fixation. Patients are subsequently repeat CT-scanned, and definitive internal fixation performed a few days later. Increased access to virtual surgical planning (VSP) and three-dimensional plates has revolutionized fracture reconstruction.

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743. Breeze, J., et al. (2022). "Physiological and radiological parameters predicting outcome from penetrating traumatic brain injury treated in the deployed military setting." BMJ military health.

INTRODUCTION: Penetrating traumatic brain injury (TBI) is the most common cause of death in current military conflicts, and results in significant morbidity in survivors. Identifying those physiological and radiological parameters associated with worse clinical outcomes following penetrating TBI in the austere setting may assist military clinicians to provide optimal care., METHOD: All emergency neurosurgical procedures performed at a Role 3 Medical Treatment Facility in Afghanistan for penetrating TBI between 01 January 2016 and 18 December 2020 were analysed. The odds of certain clinical outcomes (death and functional dependence post-discharge) occurring following surgery were matched to existing agreed preoperative variables described in current US and UK military guidelines. Additional physiological and radiological variables including those comprising the Rotterdam criteria of TBI used in civilian settings were additionally analysed to determine their potential utility in a military austere setting., RESULTS: 55 casualties with penetrating TBI underwent surgery, all either by decompressive craniectomy (n=42) or craniotomy+/-elevation of skull fragments (n=13). The odds of dying in hospital attributable to TBI were greater with casualties with increased glucose on arrival

(OR=70.014, CI=3.0399 to 1612.528, OR=70.014, p=0.008) or a mean arterial pressure <90 mm Hg (OR=4.721, CI=0.969 to 22.979, p=0.049). Preoperative hyperglycaemia was also associated with increased odds of being functionally dependent on others on discharge (OR=11.165, CI=1.905 to 65.427, p=0.007). Bihemispheric injury had greater odds of being functionally dependent on others at discharge (OR=5.275, CI=1.094 to 25.433, p=0.038)., CONCLUSIONS: We would recommend that consideration of these three additional preoperative clinical parameters (hyperglycaemia, hypotension and bihemispheric injury on CT) when managing penetrating TBI be considered in future updates of guidelines for deployed neurosurgical care.

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744. Brenke, C., et al. (2013). "Surgical management of basilar artery laceration caused by transorbital penetrating injury: case report." Journal of neurological surgery. Part A, Central European neurosurgery 74 Suppl 1: e239-241.

Transorbital penetrating injuries are rare and present with a heterogeneity of intracranial injury patterns that require individualized therapeutic procedures. In this report, we describe the case of a distal basilar artery laceration in a 16-month-old boy caused by accidental transorbital penetration with a pencil. Surgical removal of the pencil was performed, but hemostasis could only be achieved by clipping the impaired vessel. Adequate diagnostics and an individualized surgical strategy are necessary to deal with these life-threatening injuries.

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745. Brennan, J. (2013). "Head and neck trauma in Iraq and Afghanistan: different war, different surgery, lessons learned." The Laryngoscope 123(10): 2411-2417.

OBJECTIVES/HYPOTHESIS: The objectives are to compare and contrast the head and neck trauma experience in Iraq and Afghanistan and to identify trauma lessons learned that are applicable to civilian practice., STUDY DESIGN: A retrospective review of one head and neck surgeon's operative experience in Iraq and Afghanistan was performed using operative logs and medical records., METHODS: The surgeon's daily operative log book with patient demographic data and operative reports was reviewed. Also, patient medical records were examined to identify the preoperative and postoperative course of care., RESULTS: The head and neck trauma experiences in Iraq and Afghanistan were very different, with a higher percentage of emergent cases performed in Iraq. In Iraq, only 10% of patients were pretreated at a facility with surgical capabilities. In Afghanistan, 93% of patients were pretreated at such facilities. Emergent neck exploration for penetrating neck trauma and emergent airway surgery were more common in Iraq, which most likely accounted for the increased perioperative mortality also seen in Iraq (5.3% in Iraq vs. 1.3% in Afghanistan). Valuable lessons regarding soft tissue trauma repair, midface fracture repair, and mandible fracture repair were learned., CONCLUSION: The head and neck trauma experiences in Iraq and Afghanistan were very different, and the future training for mass casualty trauma events should reflect these differences. Furthermore, valuable head and neck trauma lessons learned in both war zones are applicable to the civilian practice of trauma., LEVEL OF EVIDENCE: Level 4.

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746. Brenner, L. A., et al. (2009). "Self-inflicted traumatic brain injury: Characteristics and outcomes." Brain injury 23(13-14): 991-998.

OBJECTIVE: To characterize the population of those receiving inpatient rehabilitation who sustained a traumatic brain injury (TBI) secondary to a suicide attempt and identify differences between such individuals and a demographically-matched control group (n = 230) of those whose TBIs were of an unintentional aetiology., METHOD: Analysed cases were identified from the TBI Model Systems National Database. Based on ICD-9-CM external cause-of-injury codes, 79 participants incurred a TBI secondary to a suicide attempt. An approximate 1 : 3 matched case-control (age, gender, race, injury

year) design was chosen to make statistical comparisons., RESULTS: Those who sustained a TBI secondary to a suicide attempt had greater pre-existing psychiatric and psychosocial problems (substance use problems ($p = 0.01$) prior suicide attempt ($p < 0.0001$), psychiatric hospitalization ($p = 0.014$) and non-productive activity ($p = 0.014$)), required more resources during acute and rehabilitative hospitalizations (i.e. charges per day; $p = 0.024$, $p = 0.047$) and had greater disability at the time of discharge, even after controlling for injury severity ($p = 0.022$)., CONCLUSION: Individuals who sustained TBIs secondary to a suicide attempt had increased pre-injury psychiatric and psychosocial problems and poorer outcomes at discharge than those who incurred unintentional injuries. For these individuals, acute and rehabilitation charges per day were higher and could not be accounted for by injury severity.

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747. Brent, A. J., et al. (2017). "A new cause of lacrimal gland calcification: Retained metallic foreign bodies." Orbit (Amsterdam, Netherlands) 36(2): 118-121.

A 49-year-old male presented with a 4 month history of dysaesthesia in the left periorbital region. A CT scan showed a lacrimal gland mass with areas of dense calcification. Biopsies of the left lacrimal gland revealed a silver material with associated chronic granulomatous inflammation and secondary calcification. The histological specimen was sent for X-ray microanalysis. This confirmed the silver material to be aluminium. The metal fragments were subsequently discovered to be from a car aerial, which caused an orbital impaling injury 20 years prior to presentation. This is the first reported case of lacrimal gland calcification secondary to chronic metal foreign body exposure. The case is presented alongside literature reviews of lacrimal gland calcification and associated radiological findings.

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748. Bresky, R. H. and S. Charles (1969). "Pupil motor perimetry." American journal of ophthalmology 68(1): 108-112.

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749. Breslau, J., et al. (1995). "Phased-array surface coil MR of the orbits and optic nerves." AJNR. American journal of neuroradiology 16(6): 1247-1251.

PURPOSE: To devise a practical technique for high-resolution evaluation of the anterior optic apparatus using a phased-array surface coil system, and to evaluate this system in patients with suspected optic pathway abnormalities., METHODS: A four-element phased-array coil pair was placed on each side of the head, and signal-to-noise measurements were obtained using a head phantom. Comparison between the phased-array coil, the quadrature coil, and a single-turn 12.7-cm (5-in) surface coil was done. T1 spin-echo and T2 fast spin-echo sequences were obtained in the oblique axial and oblique sagittal planes, to approximate the long axis of the optic nerves and the nonoblique coronal plane., RESULTS: The phantom signal-to-noise measurements at simulated locations of the optic nerve head, optic canal, and optic chiasm revealed an improvement of at least 30% using the phased-array system. Of 24 imaged cases, 9 had trauma, 5 had suspected neoplasms, and 2 had optic neuritis. In 3 patients, an unexpected diagnosis of optic pathway contusion or infarction was made. The remaining 8 patients had various suspected visual pathway lesions., CONCLUSION: Phased-array surface coils allow rapid, thin-section imaging of the entire anterior optic pathway, with improved signal-to-noise ratio. This may improve evaluation of optic pathway lesions over conventional techniques.

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750. Briceño, F., et al. (2013). "Evaluation of temporomandibular joint total replacement with alloplastic prosthesis: Observational study of 27 patients." Craniomaxillofacial Trauma and Reconstruction 6(3): 171-178.

Background: Temporomandibular joint (TMJ) total replacement with alloplastic prostheses has been performed since 1960s. Research in these last two decades has achieved important improvement in

the development of biomaterials, design, adaptation, and fixation of the prosthesis components. Objective: To evaluate total TMJ replacement with alloplastic prostheses. Methods: We studied 27 patients, between 19 and 73 years old, who had total TMJ uni- or bilateral replacement surgery with custom-made alloplastic prostheses manufactured by TMJ Concepts, Inc. (Ventura, CA) between 1996 and 2011. The general data and preoperative measurements were taken from medical records. Subjective data related to pain, diet consistency, and current quality of life were collected with a questionnaire answered by the patients; measures of maximum interincisal opening and lateral mandibular movements were obtained from direct examination. Results: We found significant difference ($p < 0.05$) comparing pre- to postoperative results about improvement in mouth opening, pain relief, and satisfaction with the surgery and diet consistency. Conclusion: The results of this study show that total alloplastic TMJ prostheses are an efficient, safe, and stable long-term solution for patients who need TMJ total replacement.

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751. Brickell, T., et al. (2017). "The relationship between perceived burden and health-related quality of life in caregivers of military service members with traumatic brain injury." Brain injury 31(6-7): 888-889.

Background: Family members often assume the role of 'caregiver' and bear primary responsibility for assisting a service member (SM) with long-term physical, emotional and social care following a traumatic brain injury (TBI). The purpose of this study was to examine the influence of self-reported caregiver burden on overall health-related quality of life in caregivers of military SMs who have sustained a TBI. Methods: Participants were 85 caregivers (female = 96.1%) of US military SMs who sustained a penetrating, severe, moderate or mild TBI. Caregivers were recruited from multiple DoD Medical Treatment Facilities nationwide and by using community outreach initiatives and social media. The mean age of the sample was 39.8 years (SD = 8.2) and the mean number of years caregiving was 5.5 years (SD = 3.0). The majority of the sample was Caucasian (95.3%) and caring for a spouse/partner (88.2%). Participants completed 12 sub-scales from the Patient-Reported Outcomes Measurement Information System (PROMIS), four sub-scales from the TBI-Caregiver Quality of Life (TBI-CareQOL) scale, and the Caregiver Appraisal Scale (CAS). Using the CAS, the sample was divided into three Caregiver Burden groups: High Burden (n = 40); Neutral Burden: (n = 35); Low Burden: (n = 10). Results: There were significant differences across the three Caregiver burden groups on all 16 measures ($p = .001$ to $p < .001$). Pairwise comparisons revealed significant differences ($p < .05$) and large to very large effect sizes for the vast majority of measures/comparisons. For all measures, higher caregiver burden was consistently and significantly associated with worse overall functioning (i.e. High > Neutral > Low). The largest effect sizes were found when comparing High vs. Low burden groups (d = 1.24-2.90), followed by Neutral vs. Low (d=.79-2.16), and High vs. Neutral (d=.44-1.26) groups. Using a series of regression analyses to determine whether CAS-Perceived Burden total scores could predict each of the 16 measures separately, caregiver burden was a significant predictor of all measures (all ps<.001). Those measures accounting for the highest variance were TBI-CareQOL Feelings of Loss (58.3%), followed by TBI-CareQOL Caregiver Strain (51.9%), TBI-CareQOL Feeling Trapped (45.1%), PROMIS Anxiety (42.7%), TBI-CareQOL Specific Anxiety (42.9%), PROMIS Ability to Participate in Social Roles and Activities (39.6%), and PROMIS Global Health- Mental Health (38.8%). When combined, these variables account for 70.8% of the variance towards the prediction of CAS-Perceived Burden total scores. Conclusions: These results suggest that high caregiver burden is associated with a substantial decline in overall physical, mental and social functioning (i.e. anger, general anxiety, caregiver worry, depression, fatigue, poor sleep, stress/strain, social isolation, social dissatisfaction, feelings of being trapped, feelings of grief and loss, and a lack of emotional and informational support). Given that almost half of this sample reported high caregiver burden (i.e. 47.1%), there is an urgent need to increase attention and resources to help this underserved population.

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752. Brickell, T., et al. (2017). "Post-9/11 family caregivers: examining the characteristics and perceived burden of family members who care for U.S. military service members following traumatic brain injury." Journal of Head Trauma Rehabilitation 32(6): E71-E72.

Introduction/Rational Little is known about the effect of caring for a service member (SM) following traumatic brain injury (TBI) on the post- 9/11 family caregiver. The purpose of this study was to characterize the post-9/11 family caregiver providing care to a SM following TBI and to examine caregiver burden. Method/Approach Participants were 226 caregivers (female = 73.3%) of U.S. military SMs who sustained a mild-severe, or penetrating TBI. The majority were caring for a spouse/partner (89.4%) and had one or more dependent children under the age of 18 years (72.6%; M = 2.3 children, SD = 1.3, range = 1-7). The mean age was 38.6 years (SD = 9.9; range = 20-70) and the mean number of years caregiving was 4.9 years (SD = 2.7; range = 1.1-16.9 years). Caregivers were recruited through community outreach and atWalter Reed National Military Medical Center (Maryland) and Naval Medical Center San Diego (California). Participants completed the Caregiver Appraisal Scale (CAS) and a questionnaire designed for this study. Results/Effects Caregivers typically provided help with physical, medical, self-awareness, cognitive, psychological, social interaction, communication, daily activities, and financial problems (77- 99%), 7 days/week (87%), 11-24 hours/day (52%). Many caregivers rated their emotional (55%) and medical health (39%) as fair/poor; and had experienced some financial loss from caregiving (62%). Caregivers who reported that their responsibilities were a high burden on their lives (66%) were more likely to provide help with physical, social, communication, and financial problems; spend more time in an active caregiver role (i.e., 7 days/week, 11+ hours/day); and rated their physical and mental health as fair/poor (p's < .046). Conclusions/Limitations Caregiving for a SM following TBI can place a significant emotional, personal, financial, and/or health-related burden on the caregiver. While the importance of providing care for an injured SM is routinely acknowledged, it is also critical that similar care is provided to family members who adopt the caregiver role.

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753. Brickell, T., et al. (2017). "The influence of traumatic brain injury severity on health-related quality of life in caregivers of a service member or veteran with traumatic brain injury." Brain injury 31(6-7): 863-864.

Background: Little is known about the effect of TBI severity on the family member providing care to a service member or veteran (SMV) following a TBI. Objective: The purpose of this study was to examine the impact of TBI severity on the family caregiver's health-related quality of life (HRQOL) for those providing care to a SMV following a TBI. Methods: Participants were 31 caregivers (90.3% female; 71% spouse; age: M = 39.8 years, SD = 10.6) of SMVs who had sustained an equivocal (n = 9), mild (n = 11), moderate (n = 3), severe (n = 3) or penetrating (n = 5) TBI during a combat or non-combat incident. Caregivers were recruited through community outreach initiatives and multiple DoD Medical Treatment Facilities nationwide. Caregiver's participated in one of six focus groups (approx. 90 mins) designed to elicit information regarding HRQOL and access to services. Caregivers were classified into three groups based on the SMV's TBI severity: (a) equivocal, (b) mild and (c) modsevere/ penetrating TBI. Thematic analysis using a constant comparative approach was conducted with qualitative analysis software to identify common themes across the three severity groups. Results: The most commonly endorsed themes for all caregivers were poor physical health (80.7%), having no time for themselves (71.0%) and increased stress/anxiety (64.5%). When stratified by TBI severity group, a greater proportion of the mod-severe/penetrating TBI group reported having no time for themselves (100%) and increased stress/anxiety (100%), compared to the equivocal TBI (55.6% for both themes) and mild TBI groups (54.6% and 36.4%, respectively). Similarly, a greater proportion of the mod-severe/penetrating TBI group reported being depressed (45.5%), exhausted (45.5%), having poor sleep (81.8%) and negative impacts on family life (63.6%), compared to the equivocal TBI (22.2%, 11.1%, 11.1% and 22.2%, respectively) and mild TBI groups (27.3%, 18.2%, 18.2% and 9.1%, respectively). Approximately one-quarter (25.8%) of all caregivers reported a lack of access to services (e.g., health care/support groups). However, a lack of access to services was predominantly reported by the equivocal TBI group (66.7%) when compared to the mild TBI (18.2%) and mod-severe/penetrating groups (0%).

Conclusions: These results suggest that reduced HRQOL (e.g., depression, stress, exhaustion, poor sleep and negative effects on family life) is commonly reported among family caregivers providing care to SMVs following a TBI. Although worse overall HRQOL was associated with caring for a SMV who had sustained a TBI in the higher end of the severity spectrum, some caregivers of SMVs with less severe injuries are also at risk of poor HRQOL. While the importance of providing care for an injured SMV is routinely acknowledged, it is also critical that similar care is provided to family members who adopt the caregiver role. These preliminary results demonstrate a need to increase healthcare provision for family members who care for injured SMVs.

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754. Brickell, T., et al. (2017). "The influence of caregiver burden on health status and perceived role efficacy in caregivers of US military service members with traumatic brain injury." Brain injury 31(6-7): 886.

Background: Following a traumatic brain injury (TBI), some family members assume the role of 'caregiver' for their loved one who is injured. Caregivers often experience significant burden from the demands placed on them in this role. The purpose of this study was to examine the influence of caregiver burden on overall health status and perceived efficacy of functioning in caregivers of US military service members (SMs). Methods: Participants were 283 caregivers (female = 96.1%) of SMs who sustained a mild-severe or penetrating TBI. The majority of the sample was Caucasian (92.6%) and was caring for a spouse/partner (86.2%). The mean age was 38.7 years (SD = 10.3) and the mean number of years of caregiving was 4.1 years (SD = 2.9). Caregivers were recruited through community outreach initiatives and from multiple DoD Medical Treatment Facilities nationwide. Participants completed the Caregiver Appraisal Scale (CAS) and the SF-36v2 Health Survey (SF36) that included 11 measures of interest. The sample was divided into three Caregiver Burden groups using the CAS-Perceived Burden scale: High (n = 138); Neutral (n = 106); Low (n = 139). Results: The percentage of participants who reported that their caregiving duties were a high burden was 48.8%. Caregiver burden was not associated with age (p =.779), number of years of caregiving (p =.924), or time post injury (p =.317). Using ANOVA, there was a significant main effect across the three Caregiver Burden groups on all 11 CAS and SF36 subscales (p =.010 to p <.001). Pairwise comparisons revealed a significant linear relation between caregiver burden and outcome on 7 of the 11 measures (all ps <.05; i.e. High > Neutral > Low). As caregiver burden increased, there were increasingly worse scores on the SF36 Role Physical (d=.44-1.02), SF36 General Health (d=.51-1.03), SF36 Vitality (d=.66-1.44), SF36 Social Function (d=.54-1.31), SF36 Role Emotional (d=.53-1.15), SF36 Mental Health (d=.64-1.40), and CAS Caregiver Mastery (d=.33-.91) scales. In addition, participants in the High Burden group had significantly worse scores (all p <.05) on the SF36 Physical Functioning (d = 40 and .51), SF36 Bodily Pain (d=.64 and .82) and CAS Caregiver Satisfaction (d=.61 and .82) scales compared to the Neutral Burden and Low Burden groups (i.e. High > Neutral & Low). Using Stepwise Regression Analysis, the SF36 Social Functioning, SF36 Vitality, CAS Caregiver Satisfaction, and CAS Caregiver Mastery scales were significant predictors (p <.001) of CAS Caregiver Burden total scores, accounting for 43.3% of the variance. Conclusions: In this sample, there was a strong linear relation between increased perceived burden and (a) poor overall health status, and (b) negative self-appraisal of their efficacy as a caregiver. These findings suggest that many caregivers may benefit from training programmes designed to increase their caregiving skills in addition to increased support allowing them time to improve their physical, mental and social functioning.

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755. Brickell, T. A., et al. (2018). "Burden among caregivers of service members and veterans following traumatic brain injury." Brain injury 32(12): 1541-1548.

OBJECTIVES: To determine the (a) health status and caregiving appraisal and (b) influence of perceived burden on health and appraisal in a sample of caregivers helping service member/veterans (SMVs) following a traumatic brain injury (TBI)., METHODS: Participants were caregivers (N = 283, female = 96.1%, 86.2% = spouse/partner) of SMVs who sustained a mild-severe or penetrating TBI.

Participants completed the Caregiver Appraisal Scale (CAS) and the SF-36v2 Health Survey (SF-36v2). Participants were divided into three burden groups: high, neutral, and low., RESULTS: Almost half the sample (48.8%) reported negative feelings on the CAS Perceived Burden scale. A substantial proportion had lower scores than a normative sample on four SF-36v2 physical health scales (35.1-64.5%) and four mental health scales (70.7-79.8%). A significant main effect was found across caregiver burden groups on three CAS scales ($p = 0.010$ to $p < 0.001$), two SF-36v2 component scores (all ps < 0.001), and eight SF-36v2 scales ($p = 0.001$ to $p < 0.001$). Caregivers with high perceived burden reported significantly worse scores, except CAS Caregiving Ideology. All CAS and SF-36v2 scales were significant predictors of CAS Perceived Burden scores (all ps< 0.001), with the SF-36v2 Social Functioning scale accounting for the most variance (32.6%)., CONCLUSIONS: Health care and social services are needed for caregivers who help SMVs to foster resilience, wellness, and growth.

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756. Bricolo, A., et al. (1972). "[Electroclinical study of a mesencephalic syndrome caused by a bullet: neuroanatomical considerations]." Studio elettroclinico di una sindrome mesencefalica da proiettile: considerazioni neuroanatomiche. 42(5): 465-476.

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757. Brierley, J. K., et al. (1991). "Diagnostic and management dilemmas in a patient with tracheal trauma." British journal of anaesthesia 66(6): 724-727.

A patient with a foreign body penetrating the neck and chest was found to have physical signs which were consistent with serious tracheal injury and included a large movement of air through the lower part of the neck. The subsequent management of the patient and the difficult problem of securing an airway are described. At operation, the tracheal damage was found to be less severe than anticipated and the observed air flow was a result of penetration of the foreign body into the pleural cavity. The management of the patient is discussed and the potential for misinterpretation of the physical signs in this type of trauma is emphasized.

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758. Brigadnova, L. L. (1986). "[Analysis of negative results following osteoplasty of the mandible]." Analiz otritsatel'nykh rezul'tatov posle kostnoi plastiki nizhnei cheliusti. 65(4): 42-43.

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759. Briggs, M. and M. Shanmugam (2013). "Approximation of a foreign object using x-rays, reference photographs and 3D reconstruction techniques." Journal of visual communication in medicine 36(3-4): 95-100.

This case study describes how a 3D animation was created to approximate the depth and angle of a foreign object (metal bar) that had become embedded into a patient's head. A pre-operative CT scan was not available as the patient could not fit though the CT scanner, therefore a post surgical CT scan, x-ray and photographic images were used. A surface render was made of the skull and imported into Blender (a 3D animation application). The metal bar was not available, however images of a similar object that was retrieved from the scene by the ambulance crew were used to recreate a 3D model. The x-ray images were then imported into Blender and used as background images in order to align the skull reconstruction and metal bar at the correct depth/angle. A 3D animation was then created to fully illustrate the angle and depth of the iron bar in the skull.

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760. Brigode, W., et al. (2019). "Alcohol in Traumatic Brain Injury: Toxic or Therapeutic?" The Journal of surgical research 244: 196-204.

BACKGROUND: Alcohol (EtOH) poses a challenge in traumatic brain injuries (TBIs) given its metabolic and neurologic impact. Studies have had opposing results regarding mortality and complication rates in the intoxicated TBI patient. We hypothesized that trauma mechanism, brain injury

severity, and blood alcohol concentration (BAC) would influence the impact of EtOH on mortality in TBI., METHODS: We performed a single-institution retrospective review of consecutive adult trauma patients tested for EtOH and a diagnosis of TBI. The primary outcome was mortality, and secondary outcomes included infectious complications. The primary analysis included univariate and multivariate regression comparing mortality between intoxicated and sober patients, at different values of BAC, different brain injury severities, and among mechanisms of trauma., RESULTS: Admission EtOH was assessed in 583 patients with TBI, with 256 testing positive for EtOH and 327 testing negative. Overall, EtOH was associated with lower mortality on univariate analysis (4.7% versus 8.9%, P = 0.05) but not on multivariate analysis (P = 0.21). There was no effect of EtOH on mortality when patients were stratified by brain injury severity or among penetrating trauma victims. However, EtOH was associated with lower overall infectious complications on univariate and multivariate regression. Finally, EtOH was predictive of mortality with an area under the receiver operator characteristic curve of 0.83., CONCLUSIONS: We found that EtOH is not associated with mortality in the patient with TBI, suggesting no causative effect. However, EtOH showed some predictability of mortality based on a receiver operator characteristic analysis. Interestingly, EtOH was associated with lower infectious complications, suggesting an immunomodulatory effect of EtOH in TBI.

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761. Brinck, T., et al. (2015). "Trauma registry comparison: six-year results in trauma care in Southern Finland and Germany." European journal of trauma and emergency surgery : official publication of the European Trauma Society 41(5): 509-516.

PURPOSE: To compare the treatment and survival of trauma patients in Germany and Southern Finland., METHODS: Data from Helsinki University Hospital trauma registry (TR-THEL) and TraumaRegister DGU(R) (TR-DGU) were compared in a period from 2006 until 2011. From TR-DGU level-one trauma centers treating annually >50 injury severity score (ISS) >15 patients were included. The inclusion criterion was ISS >15. Patients under 16 years with penetrating trauma without head injury and transferred in with isolated head injury were excluded. The compared parameters were age, sex, pre-injury ASA, injury scoring, injury pattern, mechanism of injury, injury distribution, pre-hospital timings, transportation method, pre-hospital intubation, treatment at hospital, discharge destination, and 30-day hospital mortality. Expected mortality was defined with the Revised Injury Severity Classification score (RISC)., RESULTS: Eighty-five German level-one trauma centers were included. A total of 15,306 and 1,274 patients were included in the outcome analysis from TR-DGU and TR-THEL, respectively. The difference between the observed and expected mortality of all patients was -4.1% (standardized mortality ratio [SMR] 0.82) at German hospitals and -4.0% (SMR 0.79) in Helsinki. Differences in the pre- and in-hospital treatment between the two countries were noted (transportation method, intubation rate, intensive care unit treatment, ventilation time, length of stay)., CONCLUSION: The overall outcome results of the Helsinki University Hospital trauma unit were similar to those of the German level-one trauma centers. Registry comparison is a feasible method of quality control in a trauma centre.

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762. Brinck, T., et al. (2016). "Unconscious trauma patients: outcome differences between southern Finland and Germany-lesson learned from trauma-registry comparisons." European journal of trauma and emergency surgery : official publication of the European Trauma Society 42(4): 445-451.

PURPOSE: International trauma registry comparisons are scarce and lack standardised methodology. Recently, we performed a 6-year comparison between southern Finland and Germany. Because an outcome difference emerged in the subgroup of unconscious trauma patients, we aimed to identify factors associated with such difference and to further explore the role of trauma registries for evaluating trauma-care quality., METHODS: Unconscious patients [Glasgow Coma Scale (GCS) 3-8] with severe blunt trauma [Injury Severity Score (ISS) >=16] from Helsinki University Hospital's trauma registry (TR-THEL) and the German Trauma Registry (TR-DGU) were compared from 2006 to 2011.

The primary outcome measure was 30-day in-hospital mortality. Expected mortality was calculated by Revised Injury Severity Classification (RISC) score. Patients were separated into clinically relevant subgroups, for which the standardised mortality ratios (SMR) were calculated and compared between the two trauma registries in order to identify patient groups explaining outcome differences., RESULTS: Of the 5243 patients from the TR-DGU and 398 from the TR-THEL included, nine subgroups were identified and analyzed separately. Poorer outcome appeared in the Finnish patients with penetrating head injury, and in Finnish patients under 60 years with isolated head injury [TR-DGU SMR = 1.06 (95 % CI = 0.94-1.18) vs. TR-THEL SMR = 2.35 (95 % CI = 1.20-3.50), p = 0.001 and TR-DGU SMR = 1.01 (95 % CI = 0.87-1.16) vs. TR-THEL SMR = 1.40 (95 % CI = 0.99-1.81), p = 0.030]. A closer analysis of these subgroups in the TR-THEL revealed early treatment limitations due to their very poor prognosis, which was not accounted for by the RISC., CONCLUSION: Trauma registry comparison has several pitfalls needing acknowledgement: the explanation for outcome differences between trauma systems can be a coincidence, a weakness in the scoring system, true variation in the standard of care, or hospitals' reluctance to include patients with hopeless prognosis in registry. We believe, however, that such comparisons are a feasible method for quality control.

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763. Brink, O., et al. (1998). "Pattern of injuries due to interpersonal violence." Injury 29(9): 705-709.

The specific aim of this study was to find characteristics of violence-related injuries, its anatomic distribution and the mechanisms. During a one-year period 1481 consecutive assault victims were interviewed and examined at the Accident and Emergency departments or the Department of Forensic Medicine in Aarhus, Denmark. Information about 2432 violence-related injuries was analysed. The results showed significant differences in injury location, type of injury and injury mechanisms between male and female victims. 69% of all injuries were craniofacial. The injury mechanism was mostly blunt trauma by fist or feet. Cases with penetrating trauma, were predominantly caused by broken drinking glasses. Weapons such as knives and guns only caused 3.7% of all injuries. The results are similar to other studies.

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764. Broadbent, T. R. and R. M. Woolf (1972). "Gunshot wounds of the face: initial care." The Journal of trauma 12(3): 229-232.

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765. Brockhoff, H. C., et al. (2012). "Incidence of major blood vessel injuries presenting in mandibular fractures." Journal of oral and maxillofacial surgery 70(9): e104-e105.

Extra-cranial vascular injuries of the head and neck are relatively under-diagnosed in the acute trauma patient and can carry devastating sequale should there be a delay in treatment. Little is known about the overall incidence of injuries to these vessels with regards to a specific fracture or injury pattern of the face. The aim of this study was to review the trauma experience at a single institution level 1 trauma center over a 14-year period. We wished to identify the correlation between mandibular fractures and injuries to major vessels of the head and neck. This information will provide insight into early recognition of these types of injuries to major vessels in patients presenting with a mandibular fracture, and result in timely identification of this potential concomitant injury. Materials and Methods: IRB approval was obtained per institutional protocol, and a retrospective review of our trauma registry was performed from 1993-2007. The data on all mandibular fractures was collected. The metrics of interest included type of mandibular fracture, age, gender, length of stay, mechanism of injury, and associated vascular injuries. All gathered information was then placed into a Microsoft excel spreadsheet and analyzed. Results: Over a 14 year period of time, a total of 2288 patients presented to Parkland Memorial Hospital with mandible fractures and 47 (2%) patients had an injury to a major vessel of the neck. 39 patients were male and 8 female, with ages ranging from 3-72. Nearly half, 23 (48.9%), were the result of a high-velocity penetrating injury, namely gunshot wounds. While 17 (36. 2%) were secondary high velocity blunt motor vehicle or motor cycle collisions. The remaining 7 (14.9%) were a

result of a fall or the mechanism was unknown. High velocity mechanisms accounted for 41 (87.2%), low velocity was 4 (8.5%), and 2 (4.3%) had undocumented mechanisms. The internal carotid artery was injured 18 times (0.8%) and the external carotid was injured a total of 7 times (0.3%) in the 2288 patient series. Injuries to nonspecific blood vessels of the head and neck accounted for 15 (0.66%) patients and injury to multiple blood vessels of the neck occurred 6 (0.26%) times. The remaining 10 injuries were divided between: common carotid artery, external jugular vein, internal jugular vein, subclavian/ innominate artery and vein, and dissection of carotid. Conclusion: When evaluating patients presenting with facial trauma, an awareness of potential concomitant injuries should always be considered. The results of this study demonstrate that those patients who sustain a mandibular fracture in the setting of a high velocity mechanism, should be approached with the possibility of vascular injury of the great vessels and vessels of the neck in mind.

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766. Brockman, K., et al. (2021). "AIR INJECTION, RARE YET DEADLY: A CASE OF VENOUS AIR EMBOLISM." Chest 160(4): A1470.

TOPIC: Imaging TYPE: Medical Student/Resident Case Reports INTRODUCTION: Patients with intravenous drug use are at risk for the development of air aneurysm through intravenous introduction of air. In this report, we present a patient with intravenous drug use-induced venous air embolism without cerebral embolism who had a non-operative spontaneous resolution and was ultimately safely discharged home. CASE PRESENTATION: A 35-year-male with ongoing intravenous illicit drug use and alcohol use disorder, presented to the emergency department after being unresponsive on the floor for a prolonged period of time. Patient was found to be in acute renal failure complicated by hyperkalemia and rhabdomyolysis and his urine toxicology was positive for cocaine. On physical examination, he was noted to be disoriented, diaphoretic, and with signs of anterior chest ecchymosis. During his evaluation, a contrast-enhanced CT imaging of the chest demonstrated air in the right ventricle/right pericardium as well as the innominate vein and right internal mammary vein. Head CT imaging revealed no evidence of cerebral air embolism. Patient was managed for metabolic derangements and acute renal failure. His hospitalization was complicated by compartment syndrome of the right upper extremity, requiring surgical decompression. Patient remained hemodynamically stable and ultimately had a non-operative spontaneous resolution of his venous air embolism. Patient was able to be safely discharged home. DISCUSSION: Venous air embolism (VAE) is a condition in which air or gas is introduced to the venous system. Although it is most commonly associated with iatrogenic complications via interventional procedures, it can be caused from a variety of circumstances including penetrating trauma, diving, and intravenous drug use. VAE cases are typically asymptomatic with most cases going unreported and generally found incidentally. Where symptoms are present, they are usually nonspecific and prompt further investigation. Complications can be fatal as air can further embolize through pulmonary and cerebral venous system. In cases where venous air embolism is suspected, prompt Trendelenburg with left lateral decubitus positioning help allow the stabilization of air emboli within the apex of the ventricle and reduces the risk of pulmonary outflow tract obstruction. In cases where intravenous drug use is the suspected etiology, counseling and close monitoring are important to prevent progression or recurrence of VAE. CONCLUSIONS: Patients with history of IV drug use or recent intravenous medical interventions have higher risks for the development of venous air embolism, a rare but potentially fatal condition. Clinicians must have high index of suspicion in those patient populations to ensure prompt investigation and intervention. REFERENCE #1: 1. Groell, Reinhard, et al. "Vascular air embolism: location, frequency, and cause on electron-beam CT studies of the chest." Radiology 202.2 (1997): 459-462. REFERENCE #2: 2. La Pietra, Pasquale, et al. "Iatrogenic Venous Air Embolism." Eurorad (2013). REFERENCE #3: 3. Orebaugh, STEVEN L. "Venous air embolism: clinical and experimental considerations." Critical care medicine 20.8 (1992): 1169-1177. DISCLOSURES: No relevant relationships by Ahmed Aladham, source=Web Response No relevant relationships by Kyle Brockman, source=Web Response No relevant relationships by Navitha Ramesh, source=Web Response

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767. Brody, A., et al. (2010). "Fatal gunshot wounds to the head: a critical appraisal of organ donation rates." American journal of surgery 200(6): 728-733.

BACKGROUND: Patients sustaining fatal gunshot wounds to the head are often young, without associated comorbidities, and are potentially ideal transplantation candidates., METHODS: A 5-year review of a level I trauma center's prospective database was performed for all patients sustaining fatal gunshot wounds to the head. Demographic, physiologic, anatomic, and laboratory variables were collected., RESULTS: Sixty-eight patients were identified, of whom 10 (14.7%) were organ donors. Of 25 admitted to the intensive care unit who eventually did not become donors, 15 (60%) were due to lack of consent., CONCLUSIONS: Despite frequent intensive care unit admissions, organ donation is infrequent following fatal gunshot wounds to the head, primarily because of lack of consent. Improved communication with next of kin could improve organ recovery and reduce futile care in this group.

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768. Bromberg, B. E., et al. (1972). "Split-rib mandibular reconstruction." Plastic and reconstructive surgery 50(4): 357-360.

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769. Brommeland, T., et al. (2018). "Best practice guidelines for blunt cerebrovascular injury (BCVI)." Scandinavian journal of trauma, resuscitation and emergency medicine 26(1): 90.

Blunt cerebrovascular injury (BCVI) is a non-penetrating injury to the carotid and/or vertebral artery that may cause stroke in trauma patients. Historically BCVI has been considered rare but more recent publications indicate an overall incidence of 1-2% in the in-hospital trauma population and as high as 9% in patients with severe head injury. The indications for screening, treatment and follow-up of these patients have been controversial for years with few clear recommendations. In an attempt to provide a clinically oriented guideline for the handling of BCVI patients a working committee was created. The current guideline is the end result of this committees work. It is based on a systematic literature search and critical review of all available publications in addition to a standardized consensus process. We recommend using the expanded Denver screening criteria and CT angiography (CTA) for the detection of BCVI. Early antithrombotic treatment should be commenced as soon as considered safe and continued for at least 3 months. A CTA at 7 days to confirm or discard the diagnosis as well as a final imaging control at 3 months should be performed.

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770. Brookes, G. B. (1983). "Post-traumatic cholesteatoma." Clinical otolaryngology and allied sciences 8(1): 31-38.

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771. Brooks, A., et al. (2002). "Field resuscitation." Current Anaesthesia and Critical Care 13(5): 256-260.

Field resuscitation is constrained by resources and circumstance. These factors influence subsequent anaesthesia and surgery. Current BATLS guidelines are a balance between available evidence, consensus guidelines and pragmatism. These will continue to develop as new evidence becomes available and as field practitioners report their operational experience.

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772. Brooks, C. A., et al. (2021). "Traumatic intracranial nail-gun injury of the right internal carotid artery causing pseudoaneurysm and caroticocavernous fistula." BMJ case reports 14(8).

Penetrating trauma due to nail gun is an uncommon yet important clinical entity. There are numerous case reports describing these injuries, yet few describe those resulting in cerebrovascular

injury. Laceration of cerebral blood vessels may result in significant intracranial haemorrhage and cerebral ischaemia, with catastrophic consequences. In the present study, we report a female patient who was shot in the face with a nail gun in a domestic assault. The nail entered her right cavernous sinus and lacerated her right internal carotid artery causing a pseudoaneurysm and a caroticocavernous fistula. This report details the approach to, and pitfalls of, managing a cerebrovascular injury due to penetrating intracranial nail. Catheter cerebral angiography is essential in the diagnosis and treatment of these injuries. Best treatment and outcomes require clinicians with expertise in endovascular and surgical repair strategies.

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773. Broos, P. L., et al. (2000). "Life saving surgery in polytrauma patients." Przeglad lekarski 57 Suppl 5: 118-119.

Life saving surgery is the surgery which has to be performed during the acute or reanimation period (1 to 3 h) and during the primary or stabilisation period (first day surgery). During the reanimation period lifethreatening conditions are identified and management is begun simultaneously. Many trauma surgeons talk about the first "golden hours" as the time interval starting immediately after the injury when rapid intervention will save lives and a lack of intervention will result in life loss. Most common, these critical conditions are exsanguinating hemorrhage, acute pump failure, obstruction of airways, mechanical failure of ventilation or severe brain damage with tentorial herniation. During this period, the following acts are necessary: surgical access to live support systems (airway, veins), life saving decompression of body cavities, resuscitative thoracotomy, control of exsanguinating external hemorrhage and control of exsanguinating hemorrhage into the body cavities. The primary or stabilisation period starts when vital functions stabilise. This period consists of further diagnostic procedures and treatment of injuries that are not directly life-threatening, but which may become life endangering or severely disabling if not treated promptly. The priorities of the surgical treatment are: brain injuries, eye- and facial injuries, progressive compression of the spinal cord, visceral injuries, musculoskeletal injuries. By improving prehospital care, rapid transport and last but not least immediate life saving surgical treatment preventable deaths can be reduced from 20-30% to 2-9% (5).

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774. Brown, C. and K. O'Toole (2009). "The interaction between development and traumatic brain injury: Using a developmental neuropsychology model is crucial." Archives of Clinical Neuropsychology 24(5): 465.

Objective: The greatest incidence of pediatric traumatic brain injury occurs before age 3. Research shows that longitudinal, neuropsychologic effects of such injuries vary due to interacting detrimental, protective, and developmental factors. The current study examined medical, cognitive, social, and behavioral effects of one child's early brain injury at several points over 12 years, with results framed by a developmental model of cognitive phenotype and medical condition interactions (Dennis, 2000). Methods: Neuropsychologic testing was conducted annually with a child who sustained a right inferior parietal gun-shot wound and craniotomy at 24 months, and subsequently developed seizures and ADHD. Cognitive, behavioral, academic, medical and social results are presented for early childhood, late childhood, and adolescence. CT findings are presented and explained in relationship to neuropsychologic findings. Results: Early childhood results indicated average intelligence, expressive and receptive language, and visuospatial abilities. Weaknesses included bilateral coordination, memory, adaptive functioning, and academic readiness. Late childhood skills showed decreased adaptive functioning and graphomotor difficulties, and improved memory/learning and attention. Approaching adolescence, writing progressed, but the child developed attention and reading comprehension difficulties. Socially and emotionally, he benefited from protective factors. Recent CT show parenchymal defects with multiple metallic fragments in right parietal and basal ganglia regions. Conclusions: Results show the importance of understanding the developmental framework in analyzing devastating effects of early injury. Appropriate school accommodations and proactive parents allowed

the child to gradually improve weak areas. Detrimental medical effects and increasing developmental demands challenge protective variables, leading to attentional difficulties in adolescence. Challenges to the theory of early brain plasticity will be discussed.

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775. Brown, F. D., et al. (1979). "Detailed monitoring of the effects of mannitol following experimental head injury." Journal of neurosurgery 50(4): 423-432.

The experimental model of a cerebral missile injury developed by Crockard was used in three groups of Rhesus monkeys treated with mannitol. One group received mannitol 15 minutes after being injured with a BB pellet at 90 m/sec impact. Another group was wounded identically, but mannitol treatment was delayed until 1 hour after injury. The last group was wounded with the missile traveling at 180 m/sec, and mannitol was started 15 minutes after trauma. The data were contrasted with the results from the original model. After receiving mannitol, all groups showed marked improvement in mean blood pressure, cerebral perfusion pressure, cerebral blood flow, and cerebral metabolic rate of oxygen consumption out of proportion to the degree of reduction in intracranial pressure (ICP). The authors conclude that the therapeutic value of mannitol may, in some injuries, be directly related to its effects on blood flow and metabolism, as well as to its better known effects upon ICP.

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776. Brown, J. B. and M. L. Gestring (2013). "Does helicopter transport impact outcome following trauma?" Trauma (United Kingdom) 15(4): 279-288.

Helicopter transport (HT) has evolved from military roots into a critical component of trauma systems throughout the world. Concerns over cost and safety continue to challenge the role of HT in the civilian setting. Despite this, recent evidence has demonstrated a survival advantage for trauma patients undergoing HT. For patients transported from the scene of injury, improved survival has been shown in several multicenter studies as well as evaluation of large national databases. Issues of overtriage, however, remain problematic for scene HT and represent a prime area for future research in helicopter emergency medical systems (EMS). Patients undergoing inter-facility transfer have also been shown to have improved outcomes over ground transport in terms of shorter transfer times and increased survival particularly in more severely injured patients. The benefits seen are likely a result of a combination of rapid transport, advanced medical capabilities, and accessibility to remote terrain. Several subgroups of patients undergoing HT have been the subject of study as well. Patients with severe head injury have consistently been shown to have superior outcomes over ground ambulance, attributable to improvements in airway management early in the course of their injury. Conversely, HT for urban and penetrating injury has not seen similar benefits, likely due to proximity of trauma centers and recent advancements in urban EMS systems. The benefits of including physicians in helicopter crews are less clear and vary by region and system. Helicopter transport for trauma does appear to improve outcomes for trauma patients, and optimizing utilization of this valuable resource will be key as the role of helicopter EMS continues to develop within trauma systems.

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777. Brown, S. J., et al. (2014). "A puzzling case of cryptococcal meningitis." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde 104(11): 720.

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778. Browne, A., et al. (2000). "The ethics of elective (non-therapeutic) ventilation." Bioethics 14(1): 42-57.

Elective ventilation (EV) is ventilation applied, not in the interest of patients, but in order to secure transplantable organs. It carries with it a small risk that patients who would otherwise have died will survive in a persistent vegetative state. Is EV ever justifiable? We argue: (1) The only thing which can justify exposing patients to risk not taken for their benefit is their consent, and we cannot rely on

implied consent or third party consent in the case of EV. Thus absent explicit consent of patients, EV is not justifiable. (2) It is not clear that explicit consent should be sought, or where it is offered honoured, given the potential EV has for deterring organ donors and causing stress to staff and families.

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779. Browning, J., et al. (2019). "Early post-traumatic seizures do not correlate with mossy fiber outgrowth in sub-acute phase of TBI in rats." Journal of neurotrauma 36(13): A55.

It is unknown whether early post-traumatic seizures are associated with the development of chronic post-traumatic epilepsy. Mossy fiber sprouting in the hippocampus has been implicated in epileptogenesis and may play a crucial role in the development of post-traumatic epilepsy. In this study we examined whether mossy fiber sprouting was associated with early post-traumatic seizures 2 weeks after a penetrating traumatic brain injury (pTBI) as a potential mechanism of post-traumatic epileptogenesis. Rats received skull EEG electrode implantation bilaterally over the frontal and parietal cortices. PTBI was performed through the right frontal cortex 3 days after EEG surgery. Spontaneous seizures were detected by continuous video-EEG recording for 72 hours following injury. Mossy fiber outgrowth was examined in the pyramidal and granular cell layers of the hippocampus bilaterally and scored on a 3 point scale. Seizure frequency was correlated with mossy fiber outgrowth at 2 weeks following brain injury. The majority of PTBI rats (74%) experienced non-convulsive seizures detected by EEG during the 72-hour post-injury monitoring period with an average frequency of 18.05 ± 5.3 seizures per animal (range: 0-69 seizures). Scores for mossy fiber outgrowth were low amongst all animals with an average score of 1.08 ± 0.15 in the pyramidal cell layer and 0.85 ± 0.10 in the granular cell layer. However, no significant correlations were detected between acute seizure frequency and mossy fiber outgrowth at 2 weeks post-injury. Low mossy fiber sprouting scores at 2 weeks post injury may indicate a slow process of post-traumatic epileptogenesis. Additional longitudinal studies are needed to correlate the time-course of mossy fiber sprouting and the development of delayed post-traumatic epilepsy during a longer latent period.

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780. Browning, J. R., et al. (2018). "Topiramate lowers seizure activities in a rat model post-traumatic seizures." Journal of neurotrauma 35(16): A202.

Background: Traumatic brain injury (TBI) carries a risk of developing acute post-traumatic seizures (PTS) that can lead to secondary injury and escalate the mortality rate by increasing metabolic demands, intracranial pressure, and the release of excitatory neurotransmitters. The most frequently used anti-epileptic drugs (AEDs) for early PTS are phenytoin and levetiracetam. While both drugs decrease PTS in some patients, a significant number of patients are nonresponsive to these treatments. In this study, we tested topiramate as a potential novel AED therapy for PTS. Topiramate has diverse mechanisms of action and has been used to treat seizures and epilepsies not associated with TBI. Topiramate was tested as monotherapy in order to determine its dose-response profile. Methods: Adult male Sprague-Dawley rats were anesthetized and EEG electrodes were implanted bilaterally into the skull above the frontal and parietal cortical regions. Penetrating ballistic-like brain injury (10% brain volume) was performed unilaterally in the right hemisphere. Rats were assigned to one of 5 treatment groups (vehicle, 5 10 20, or 30 mg/kg topiramate). Injections were given IV twice per day for a total of 3 days beginning 30 minutes post-injury. Spontaneously occurring PTS were detected by continuous video-EEG recording for 3 days following injury. Results: Topiramate significantly reduced PTS incidence (number of animals which experienced seizures within a dose group) and frequency of seizures experienced by individual animals compared to vehicle treated controls. A 50% reduction in seizure incidence was achieved at doses of 10mg/kg or higher. The average frequency of seizures was reduced by 50% at 5mg/kg and further suppressed at doses of 10mg/kg or higher. Conclusions: The current study provides support for the anti-seizure activities of topiramate monotherapy to suppress seizures following penetrating TBI, suggesting that topiramate may be an alternative treatment for early PTS. Although the data suggests that topiramate may be effective as a monotherapy, insolubility at higher doses may limit its use. The dose-response profile provides a dose range which is useful for the

consideration of its combined treatment with phenytoin or levetiracetam to improve the overall anti-seizure therapy in treating PTS.

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781. Browning, M., et al. (2016). "Levetiracetam Treatment in Traumatic Brain Injury: Operation Brain Trauma Therapy." Journal of neurotrauma 33(6): 581-594.

Levetiracetam (LEV) is an antiepileptic agent targeting novel pathways. Coupled with a favorable safety profile and increasing empirical clinical use, it was the fifth drug tested by Operation Brain Trauma Therapy (OBTT). We assessed the efficacy of a single 15 min post-injury intravenous (IV) dose (54 or 170 mg/kg) on behavioral, histopathological, and biomarker outcomes after parasagittal fluid percussion brain injury (FPI), controlled cortical impact (CCI), and penetrating ballistic-like brain injury (PBBI) in rats. In FPI, there was no benefit on motor function, but on Morris water maze (MWM), both doses improved latencies and path lengths versus vehicle ($p < 0.05$). On probe trial, the vehicle group was impaired versus sham, but both LEV treated groups did not differ versus sham, and the 54 mg/kg group was improved versus vehicle ($p < 0.05$). No histological benefit was seen. In CCI, there was a benefit on beam balance at 170 mg/kg ($p < 0.05$ vs. vehicle). On MWM, the 54 mg/kg dose was improved and not different from sham. Probe trial did not differ between groups for either dose. There was a reduction in hemispheric tissue loss ($p < 0.05$ vs. vehicle) with 170 mg/kg. In PBBI, there was no motor, cognitive, or histological benefit from either dose. Regarding biomarkers, in CCI, 24 h glial fibrillary acidic protein (GFAP) blood levels were lower in the 170 mg/kg group versus vehicle ($p < 0.05$). In PBBI, GFAP blood levels were increased in vehicle and 170 mg/kg groups versus sham ($p < 0.05$) but not in the 54 mg/kg group. No treatment effects were seen for ubiquitin C-terminal hydrolase-L1 across models. Early single IV LEV produced multiple benefits in CCI and FPI and reduced GFAP levels in PBBI. LEV achieved 10 points at each dose, is the most promising drug tested thus far by OBTT, and the only drug to improve cognitive outcome in any model. LEV has been advanced to testing in the micropig model in OBTT.

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782. Brozek, M., et al. (2005). "[Pneumoencephalon and pneumatocoele intrabulbaris--the consequence of penetrating wounds of the orbital cavity and severe ocular injury--case reports]." Odma srodczaszkowa (pneumoencephalon) oraz odma wewnatrzgalkowa (pneumatocoele intrabulbaris) w nastepstwie urazu oczodolu-- opis przypadkow. 107(4-6): 348-350.

Pneumoencephalon i.e. the presence of the intracranial air is commonly detected in the consequence of the head injury or penetrating wound of orbital cavity. The most characteristic sign of pneumoencephalon is the bruit hydroaerique, which is a splashing sound heard only by the patient on postural change. The diagnosis of this rare complication was possible on clinical symptoms and computed tomography (CT) brain scan. The article outlines another case of the intraocular presence of the air (pneumatocoele intrabulbaris) after severe ocular injury with almost total absence of vitreous body, choroid and retina and hypotony.

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783. Brozek-Mucha, Z. and K. Zdeb (2018). "Controversial Suicide Case Using a Submachine Gun with a Sound Suppressor-The Need of Team Work of Forensic Chemistry and Firearm Examiners." Journal of forensic sciences 63(3): 921-929.

Evidence materials in a presumed suicide case were studied by a firearm examiner and a forensic chemist. The victim's body with double gunshot wounding in his forehead, a machine gun in the sustained fire mode with a silencer, and four cartridge cases were found. Examinations of the evidence, the case file studies, and experiments dedicated to the case were carried out. Relationships between the placement of cartridge cases and the gun were established using a fast camera. The distributions of gunshot residues on the evidence materials and within the comparative gunshot patterns were studied by means of optical and electron microscopy, X-ray microanalysis, and infrared spectroscopy. The shooting distance was assessed to be 30 cm or more, whereas the greatest distance that could have been achieved

by the victim himself was about 11-13 cm. The obtained results supported the version of homicide rather than suicide. Copyright © 2017 American Academy of Forensic Sciences.

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784. Bruce, D. (1995). "Craniofacial trauma in children." The Journal of cranio-maxillofacial trauma 1(1): 9-19.

Craniofacial trauma is relatively uncommon in children, but the potential involvement of the structures at the base of the skull and the intracranial space makes it important for physicians to understand the potential dangers presented by such injuries. This report delineates the different types of injury that can damage the upper facial skeleton and the brain of a child. The author reviews initial management and diagnosis of such injuries and examines the approach to definitive reconstructive surgery using three case studies as examples for discussion.

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785. Bruckmann, H., et al. (1986). "Orbital venous congestion in childhood. Diagnostic and therapeutical implications." Klinische Padiatrie 198(6): 489-492.

A case study of 2 patients with venous congestion of the orbit due to different etiologies is presented. Both the children demonstrated orbital pain, proptosis, chemosis and conjunctival injection. In one case early diagnosis left to complete recovery by conservative treatment in a patient with a pyogenic cavernous sinus thrombosis. In the other case a traumatic carotid sinus cavernous fistula could be treated successfully using transvasculary navigated detachable balloons.

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786. Brune, J. E., et al. (2018). "Delayed lethal pulmonary air embolism after a gunshot head injury." BMJ case reports 2018.

We present a case of a young male patient with a fatal pulmonary air embolism following a penetrating gunshot head injury. He suffered from severe head trauma including a laceration of the superior sagittal sinus. Operative neurosurgical intervention did not establish a watertight closure of the wounds. Eight days after the trauma, the patient suddenly collapsed and died after an attempt to mobilise him to the vertical. Forensic autopsy indicated pulmonary air embolism as the cause of death. Retrospectively, we postulate an entry of air to the venous system via the incompletely occluded wounds and the lacerated superior sagittal sinus while mobilisation to the vertical created a negative pressure in the dural sinus.

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787. Bruno, J. R., et al. (1999). "Treatment of traumatic mandibular nonunion." The Journal of cranio-maxillofacial trauma 5(2): 27-32.

BACKGROUND AND OBJECTIVES: Nonunion is a complication in mandibular fractures. The causative factors include delay in treatment, infection, inadequate immobilization, and improper internal fixation; concomitant infection may be present. Pain, mobility of the fracture segments, and radiographic evidence of radiolucency did in diagnosis., METHODS AND MATERIALS: Three clinical cases are used to present the methods of treatment to manage nonunion following a gunshot wound, assault with a blunt object, and a fall. Treatment included antimicrobial therapy, fracture site debridement, segment immobilization, and bone grafting. Maxillomandibular fixation, debridement, and placement of a reconstruction plate were used in the first case; reconstruction plate, autogenous bone graft in a polyglactin resorbable mesh, and screw buttons in the second; and custom reconstruction plate and iliac crest bone graft in the third., RESULTS AND/OR CONCLUSIONS: All cases healed uneventfully. Due to rapid revascularization, use of autogenous cancellous bone grafts is preferred to cortical bone. Custom-molded polyglactin mesh provides control of the loose cancellous bone graft.

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788. Bruns, B. R., et al. (2014). "Blunt cerebrovascular injury screening guidelines: what are we willing to miss?" The journal of trauma and acute care surgery 76(3): 691-695.

BACKGROUND: Blunt cerebrovascular injury (BCVI) is reported to occur in approximately 2% of blunt trauma patients, with a stroke rate of up to 20%. Guidelines for BCVI screening are based on clinical and radiographic findings. We hypothesized that liberal screening of the neck vasculature, as part of initial computed tomographic (CT) imaging in blunt trauma patients with significant mechanisms of injury, identifies BCVI that may go undetected., METHODS: As per protocol, patients at risk for significant injuries undergo a noncontrast head CT scan followed by a multislice CT scan (40-slice or 64-slice) incorporating an intravenous contrast-enhanced pass from the circle of Willis through the pelvis (whole-body CT [WBCT] scan). The trauma registry was retrospectively reviewed, and all patients with BCVI from 2009 to 2012 were analyzed. Patients undergoing WBCT scan were then identified, and records were reviewed for BCVI indicators (skull base fracture, cervical spine injury, displaced facial fracture, mandible fracture, Glasgow Coma Scale score <= 8, flexion mechanism, hard signs of neck vascular injury, or focal neurologic deficit)., RESULTS: Of 16,026 patients evaluated during the study period, 256 (1.6%) were diagnosed with BCVI. The population consisted of 185 patients with suspected BCVI after WBCT scan. One hundred twenty-nine patients (70%) had at least one indicator for BCVI screening, while 56 (30%) had no radiographic or clinical risk factors; 48 of the 56 patients underwent confirmatory CT angiography of the neck within 71 hours of initial WBCT scan, with 35 patients having 45 injuries., CONCLUSION: More liberalized screening for BCVI during initial CT imaging in trauma patients clinically judged to have sufficient mechanism is warranted. Using current BCVI screening guidelines leads to missed BCVI and risk of stroke., LEVEL OF EVIDENCE: Diagnostic study, level III.

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789. Bryant, J. E., et al. (2011). "A retrospective cohort study on the use of dexmedetomidine in patients with traumatic brain injury." Pharmacotherapy 31(10): 422e.

PURPOSE: Dexmedetomidine is known for its unique sedative properties in critically ill patients however, its effects in patients with traumatic brain injury (TBI) are not well studied. This study was designed to characterize the safety and efficacy of dexmedetomidine use in TBI patients. METHODS: Retrospective review of medical records for patients who received dexmedetomidine at our institution between December 1, 2008 and December 31, 2010 was conducted. Patients included in the study were adults with non-penetrating TBI and no past medical history related to any neurologic illness or impairment. Richmond Agitation Sedation Scale (RASS) score, Glasgow Coma Scale (GCS) score, heart rate, mean arterial pressure (MAP), intracranial pressure (ICP), and dexmedetomidine dose were recorded. RESULTS: For the 27 patients included in the study, mean age was 41 years, and 24 patients were male. The average dexmedetomidine dose administered was 0.65 μg/kg/hour. Median admission GCS score was 6 with 51.9% of patients classified as minor brain injury, 14.8% as moderate, and 33.3% as severe. RASS scores were generally within target range with 276 of the 402 (68.7%) scores assessed between -2 to +1. Fifteen patients experienced 110 total episodes of bradycardia (< 60 beats per minute), and 21 patients experienced 300 total episodes of tachycardia (> 110 beats per minute). Twelve patients had a total of 17 MAP readings < 60 mmHg. ICP was monitored in two patients, both of which were controlled (ICP<20 mmHg). CONCLUSION: Overall, the use of dexmedetomidine in this study population proved to be safe and efficacious. Episodes of bradycardia occurred less often than previously observed. Based on the limited ICP data, dexmedetomidine did not appear to adversely affect ICP in this study population.

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790. Bryden, D. W., et al. (2019). "Blast-Related Traumatic Brain Injury: Current Concepts and Research Considerations." Journal of Experimental Neuroscience 13.

Traumatic brain injury (TBI) is a well-known consequence of participation in activities such as military combat or collision sports. But the wide variability in eliciting circumstances and injury severities makes the study of TBI as a uniform disease state impossible. Military Service members are

under additional, unique threats such as exposure to explosive blast and its unique effects on the body. This review is aimed toward TBI researchers, as it covers important concepts and considerations for studying blast-induced head trauma. These include the comparability of blast-induced head trauma to other mechanisms of TBI, whether blast overpressure induces measureable biomarkers, and whether a biodosimeter can link blast exposure to health outcomes, using acute radiation exposure as a corollary. This examination is contextualized by the understanding of concussive events and their psychological effects throughout the past century's wars, as well as the variables that predict sustaining a TBI and those that precipitate or exacerbate psychological conditions. Disclaimer: The views expressed in this article are solely the views of the authors and not those of the Department of Defense Blast Injury Research Coordinating Office, US Army Medical Research and Development Command, US Army Futures Command, US Army, or the Department of Defense.

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791. Buchalter, G. M., et al. (2002). "Penetrating trauma to the head and neck from a nail gun: a unique mechanism of injury." Ear, nose, & throat journal 81(11): 779-783.

Published reports of nail gun injuries to the head and neck are rare. We describe the cases of three patients who sustained nail gun injuries to the head and who were managed at our institution. All patients were treated successfully and all recovered with minimal morbidity. Any physician who is called on to manage a nail gun injury to the head or neck should understand that most likely the patient will have sustained a surprisingly limited amount of tissue injury, owing to the relatively low velocity of the projectile compared with that delivered by firearms. Computed tomography and selective angiography can play a vital role in assessing the integrity of relevant vascular structures. Moreover, catheter angiography with embolization can be a most useful nonsurgical adjunct to control the extent of vascular injury.

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792. Buchwald, C., et al. (1991). "Cerebrospinal fluid leak from nontumor ear after acoustic neuroma surgery: diagnostic and therapeutic problems." The American journal of otology 12(5): 384-387.

An unusual case of CSF leak from the nontumor ear after removal of a 3-cm acoustic neuroma is presented. Prior to tumor removal a ventricular-peritoneal shunt was established because of increased intracranial pressure. After the shunt was clamped the patient twice developed rhinoliquorrhea and underwent in both instances unsuccessful closure of the leak on the tumor side. Finally the leak was established in the nontumor ear, most likely due to sequelae after a hunting accident 20 years before, where a projectile created a defect in the tegmen tympani. The CSF leak was probably provoked by the pressure changes following tumor removal and shunt treatment.

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793. Buck, U., et al. (2008). "Haptics in forensics: the possibilities and advantages in using the haptic device for reconstruction approaches in forensic science." Forensic science international 180(2-3): 86-92.

Non-invasive documentation methods such as surface scanning and radiological imaging are gaining in importance in the forensic field. These three-dimensional technologies provide digital 3D data, which are processed and handled in the computer. However, the sense of touch gets lost using the virtual approach. The haptic device enables the use of the sense of touch to handle and feel digital 3D data. The multifunctional application of a haptic device for forensic approaches is evaluated and illustrated in three different cases: the representation of bone fractures of the lower extremities, by traffic accidents, in a non-invasive manner; the comparison of bone injuries with the presumed injury-inflicting instrument; and in a gunshot case, the identification of the gun by the muzzle imprint, and the reconstruction of the holding position of the gun. The 3D models of the bones are generated from the Computed Tomography (CT) images. The 3D models of the exterior injuries, the injury-inflicting tools and the bone injuries, where a higher resolution is necessary, are created by the optical surface scan. The haptic device is used in combination with the software FreeForm Modelling Plus for touching the

surface of the 3D models to feel the minute injuries and the surface of tools, to reposition displaced bone parts and to compare an injury-causing instrument with an injury. The repositioning of 3D models in a reconstruction is easier, faster and more precisely executed by means of using the sense of touch and with the user-friendly movement in the 3D space. For representation purposes, the fracture lines of bones are coloured. This work demonstrates that the haptic device is a suitable and efficient application in forensic science. The haptic device offers a new way in the handling of digital data in the virtual 3D space.

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794. Buczek, M. and A. Pieninski (1993). "[Deep penetrating brain injury with 20 years of asymptomatic survival: a case report]." Przypadek glebokiego urazu drazacego mozgu Z 20-letnim bezobjawowym przezyciem. 47(6): 553-556.

Authors report the case of penetrating injury of the head with large metallic fragment embedded to the brain with 20 years asymptomatic survival. Patient sustained head injury during work, 20 years ago and for these period of time was not aware of having foreign body intracranially with excellent general condition and no signs of neurological deficit. Metal nail was detected incidentally by plain skull X-ray films (and subsequent CT scan) during routine procedures when patient was admitted to the Laryngologic Dpt. for surgical procedure. In our opinion presented case in uncommon because of asymptomatic course. Most of penetrating head injuries are considered as life threatening due to sudden onset, severe general patient condition and possible deterioration according to the type of injury and extent of cerebral destruction. For those reasons earliest possible definitive neurosurgical treatment is recommended. We emphasize the role of debridement for most of brain penetration injuries.

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795. Buente, H. and D. Filler (1974). "The acute abdomen caused by trauma." Munchener Medizinische Wochenschrift 116(27): 1301-1308.

The acute abdomen caused by trauma may be summarized: Far more patients die as a result of operating too late than of operating unnecessarily. Laparotomy should therefore be carried out in case of doubt. Wrong diagnoses are rare if the patient is repeatedly examined by the same experienced physician. Serious traumatic sequelae must not be overlooked on laparotomy. The statistics of surgical results will be improved by the advice of an experienced anesthetist when assessing the operability and the postoperative treatment.

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796. Bugra, A. and T. Das (2020). "Embolism of Cerebral Tissue to the Lung After Head Trauma: A Case Report." The American journal of forensic medicine and pathology 41(4): e64-e66.

Embolism of cerebral tissue to pulmonary circulation is a rare entity. It can be occur because of penetrating or closed head trauma at any age or during difficult vaginal deliveries at any age. We present a case of cerebral tissue pulmonary embolization after severe head trauma in a male adult. The autopsy revealed multiple skull fractures, subdural hematoma, subarachnoid hemorrhages, and contusions. Microscopically, we observed cerebral tissue inside the branches of the pulmonary arteries. Embolism of cerebral tissue to the pulmonary circulation is a rare condition. It should always be kept in mind in sudden unexpected deaths during delivery and head trauma cases at any age.

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797. Buhas, C., et al. (2016). "The difficulty in establishing the generating mechanism of cranial and vertebral lesions in a cadaver partially skeletonised." Romanian Journal of Legal Medicine 24(4): 300-303.

The presented case is a 71 year old male, found deceased in the woods during summer, two weeks after his death, partially skeletonised (at the level of cranium and thorax), exposed to the effect of the environment and insects. From the investigation data, it was initially believed that the mechanism which caused the cranial and cervical vertebrae fractures was a series of repeated impacts with a hard,

blunt object. Based on the investigation data and assessments of the cadaver, the supposed aggressor was sentenced to 25 years in prison. The case was reopened and a new medico-legal assessment was performed. Fully reexamining the fractured bones by performing cranial reconstruction and using radiographic investigations which showed small metallic fragments on these bones, it allowed precise identification of the real mechanism which produced the lesion: a gunshot wound from a hunting rifle.

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798. Bui, J., et al. (2021). "Multidisciplinary Management of an Aorto-esophageal Injury Caused by Foreign Body Ingestion." Annals of vascular surgery 72: 668.e661-668.e664.

A 37-year-old incarcerated male ingested a complex "X-shaped" foreign body that resulted in a penetrating aorto-esophageal injury. A primary esophagotomy with retrieval of the foreign body and muscle flap closure was performed simultaneously with thoracic endovascular aortic repair. This multidisciplinary surgical approach controls for both immediate exsanguination and postoperative complications to improve patient outcome.

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799. Buitendag, J. J. P., et al. (2017). "The spectrum and outcome of paediatric traumatic brain injury in KwaZulu-Natal Province, South Africa has not changed over the last two decades." South African Medical Journal 107(9): 777-780.

Objectives. This retrospective review of a prospectively entered and maintained hybrid electronic trauma registry was intended to develop a comprehensive overview of traumatic brain injury (TBI) in children and adolescents and to compare it with previous audits from our local environment and from other developing world centres. All TBI patients admitted to hospital were included in this study. We reviewed the age, gender, outcomes, radiological findings and treatment of the patients. Methods. All patients aged ≤18 years old who were admitted by the Pietermaritzburg Metropolitan Trauma Service (PMTS) with TBI between December 2012 and December 2016 were included in this audit. Results. During the 4-year period under review, a total of 563 children and adolescents were treated for TBI by the PMTS. The median age was 6.4 years and 29% (n=165) were females. The mechanism of TBI was blunt trauma in 96% (n=544) of cases, with 4% (n=19) suffering penetrating trauma. The penetrating mechanisms included impalement by a cow horn and miscellaneous injuries due to saws, axes, barbed wire, spades, stones and knives. The blunt mechanisms included falls (n=102), assaults (n=108), collapse of a building (n=28), bicycle-related injury (n=14), falling off a moving vehicle (n=280), motor vehicle accident (MVA; n=59), pedestrian vehicle accident (PVA; n=183) and animal-related injuries (n=8). There were 454 (80%) mild, 67 (12%) moderate and 42 (7%) severe cases of TBI. A total of 48 patients were admitted to the intensive care unit and 23 were admitted to the high care unit. Nine patients died. All the deaths were in the MVA and PVA group. The spectrum of TBI as diagnosed on computed tomography scans was nonspecific cerebral contusion (n=92), depressed skull fracture (n=70), sub-arachnoid haemorrhage (n=60), extradural haemorrhage (n=41), intracerebral haemorrhage (n=19), free air (n=19), subdural haemorrhage (n=13), intraventricular haemorrhage (n=9). A total of 62 (11%) patients required surgery. Conclusion. There is a significant burden of paediatric TBI in Pietermaritzburg. The majority of TBI was related to blunt trauma and assaults were very common. Although the short-term outcomes are good, the long-term consequences are poorly understood. Injury prevention programmes are needed to help reduce this burden of disease and a nationwide trauma registry is long overdue.

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800. Buitendag, J. J. P., et al. (2020). "A comparison of blunt and penetrating pancreatic trauma." South African journal of surgery. Suid-Afrikaanse tydskrif vir chirurgie 58(4): 218.

BACKGROUND: This project reviews our experience with managing pancreatic trauma from 2012 to 2018., METHODS: All patients over the age of 15 years with a pancreatic injury during the period December 2012-December 2018 were retrieved from the Hybrid Electronic Medical Registry at Grey's Hospital and reviewed., RESULTS: During the study period 161 patients sustained a pancreatic

injury. The mechanism of trauma was penetrating in 86 patients (53%) and blunt in 75 (47%). The blunt mechanisms included MVA in 27, PVA in 15, falls in four and assaults in the remaining 29. There were 52 stab wounds and 34 gunshot wounds of the pancreas. A total of 26 patients (16%) were shocked on presentation with a systolic blood pressure of 90 mm Hg or less. The median injury severity score was 16. There were 90 patients with American Association for the Surgery of Trauma (AAST) grade I injury to the pancreas, 36 AAST grade II, 27 AAST grade III, 7 AAST grade IV and a single AAST grade V. Fifty-four patients (34%) were initially treated non-operatively of which three eventually required surgery. Of the patients who required surgery, 26 (16%) underwent a distal pancreatectomy. The remainder simply underwent pancreatic drainage. The overall mortality rate was 13% (21/161). The operative mortality was 11% (18/161). Thirteen patients (8%) with penetrating injuries and eight patients (5%) with blunt injuries died. Of the 21 patients who died, 14 had multiple injuries. Five patients died due to overwhelming sepsis. One patient died due to hypovolemic shock and another due to a traumatic brain injury., CONCLUSION: Our centre not infrequently deals with pancreatic trauma secondary to both blunt and penetrating trauma. We follow the general principles outlined in the literature. Despite this, pancreatic trauma is still associated with significant morbidity and mortality.

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801. Bukach, C. M., et al. (2008). "Preservation of mouth region processing in two cases of prosopagnosia." Journal of neuropsychology 2(1): 227-244.

Although most adults are considered experts in face recognition, brain trauma can produce a selective loss in this ability, a condition referred to as prosopagnosia. This study examined the processing strategies of prosopagnosic patients LR and HH using the Face Dimensions Test. In this test, featural and configural information in the upper and lower halves of the face was parametrically varied and sensitivity to these changes measured. We found that relative to age-matched control participants, LR and HH exhibited an impaired ability to discriminate differences in the eye region, but a preserved ability to detect featural and configural differences in the mouth region. This pattern of impairment and sparing was demonstrated in tests of direct perception and immediate memory. The obtained findings demonstrate that prosopagnosia does not necessarily cause a global impairment to face perception, but a selective impairment to the perception of information in the upper half of the face.

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802. Bula-Sternberg, J., et al. (2011). "[CT-findings in penetrating captive bolt injuries to the head and brain: analysis of the trauma-related CT-findings and review of the literature]." CT-Befunde bei penetrierenden Kopfverletzungen durch Bolzenschussgerate--Analyse der verletzungsspezifischen CT-Befunde und eine Ubersicht uber die relevante Literatur. 183(11): 1070-1074.

Penetrating gunshot injuries to the head and brain are rare in Germany and the rest of Western Europe. Due to the small number of cases over here no consistent diagnostic and therapeutic standards exist in this respect. Thus these kinds of injuries present a great challenge to the attending physicians. Most of these violations are a result of a suicidal attempt or an accident. Beside violations by firearms also penetrating injuries to the head and brain due to captive bolt devices, as used in slaughtery business for the "humane" killing of animals, occur from time to time. The impact on the head differs from that caused by firearms because no projectile is leaving the barrel and the used bolt, as a fix part of the device, does not remain in the affected tissue. That implies characteristic results within the radiological imaging that might be pathbreaking for the further treatment, because the origin of such a head injury is often unknown during primary care. Consequently the knowledge of these specific findings is central to the radiologist to make the appropriate diagnosis. Based on some clinical examples the trauma-related CT-findings are introduced and a short overview of the relevant literature is also given.

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803. Bullingham, A., et al. (1994). "An impaled neck. Management of difficult airway access." Anaesthesia 49(10): 866-869.

We describe the management of a patient impaled through the lower submandibular area by the top spike of some iron railings which immobilised his jaw and blocked access to the trachea. The Fire Brigade used specialised equipment to cut out a section of the railings so that the patient could be transported to hospital. Awake fibreoptic intubation was used to gain access to the patient's airway before induction of anaesthesia.

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804. Bullock, J. D., et al. (1994). "Unusual penetrating intraorbital foreign body." Archives of ophthalmology (Chicago, Ill. : 1960) 112(12): 1618-1619.

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805. Bullock, J. D., et al. (1999). "Unusual orbital foreign bodies." Ophthalmic plastic and reconstructive surgery 15(1): 44-51.

PURPOSE: To describe the clinical features of patients with unusual orbital foreign bodies., METHODS: The clinical histories, preoperative photographs, imaging studies, and surgical pathologic findings of five patients with unusual orbital foreign bodies are presented. Additionally, published reports pertaining to similar cases were reviewed., RESULTS: The five patients treated by the authors had good outcomes., CONCLUSIONS: An orbital foreign body may be overlooked because a small penetrating wound may be accompanied by minimal or no signs of inflammation early in the clinical course. A careful history and physical examination, imaging studies, and a strong suspicion are helpful for establishing the diagnosis of an orbital foreign body.

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806. Bullock, M. R. (2008). "Sir Victor Horsley's contributions to the study and treatment of gunshot wounds of the head: Commentary." Neurosurgery 63(4): 812.

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807. Bullock, M. R., et al. (2006). "Surgical management of depressed cranial fractures." Neurosurgery 58(3 Suppl): S56-iv.

INDICATIONS: Patients with open (compound) cranial fractures depressed greater than the thickness of the cranium should undergo operative intervention to prevent infection. Patients with open (compound) depressed cranial fractures may be treated nonoperatively if there is no clinical or radiographic evidence of dural penetration, significant intracranial hematoma, depression greater than 1 cm, frontal sinus involvement, gross cosmetic deformity, wound infection, pneumocephalus, or gross wound contamination. Nonoperative management of closed (simple) depressed cranial fractures is a treatment option., TIMING: Early operation is recommended to reduce the incidence of infection., METHODS: Elevation and debridement is recommended as the surgical method of choice. Primary bone fragment replacement is a surgical option in the absence of wound infection at the time of surgery. All management strategies for open (compound) depressed fractures should include antibiotics.

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808. Bullock, M. R., et al. (1999). "An open-label study of CP-101,606 in subjects with a severe traumatic head injury or spontaneous intracerebral hemorrhage." Annals of the New York Academy of Sciences 890: 51-58.

CP-101,606 is a postsynaptic antagonist of N-methyl-D-aspartate (NMDA) receptors bearing the NR2B subunit. When administered intravenously (i.v.), it decreases the effects of traumatic brain injury (TBI) and focal ischemia in animal models. Therapeutic plasma concentrations (200 ng/ml) in animals, have been well tolerated in healthy human volunteers. The purpose of the present dose escalation study was to assess the safety, tolerability, and pharmacokinetics of CP-101,606 in subjects who had suffered either an acute severe TBI (Glasgow Coma Scale 3-8) or spontaneous intracerebral hemorrhage. Thirty

patients, 20 with a TBI and 10 with a stroke, were enrolled in the trial and began receiving an i.v. infusion of CP-101,606 for 2 hours, 24 hours, or 72 hours within 12 hours of brain injury. For the first two hours, the drug was given a rate of 0.75 mg/kg/hr and then stopped (n = 17) or continued for 22 (n = 2) or 70 hours (n = 11) at 0.37 mg/kg/hr. Plasma and cerebrospinal fluid (CSF) were collected at serial times during and after treatment. There were no consistent changes in blood pressure or pulse nor any clinically significant hematological or electrocardiogram (ECG) abnormalities attributable to CP-101,606. No adverse events or behavioral changes were considered to be related to the drug. Plasma concentrations of CP-101,606 over 200 ng/ml were rapidly achieved in the blood and CSF within two hours and were sustained there as long as the drug was infused. CSF concentrations were slightly higher than that in plasma by the end of infusion suggesting good penetration of CP-101,606 into the CSF. Outcome in the severe TBI patients, as measured by the Glasgow Outcome Score at six months, suggested that a two-hour infusion yielded a range of scores similar to contemporary patients with a severe TBI treated at our hospital while the outcomes of the patients treated with either a 24- or 72-hour infusion were better on average. Thus, these results indicate that CP-101,606 infused for up to 72 hours is well tolerated, penetrates the CSF and brain, and may improve outcome in the brain-injured patient.

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809. Bullock, R. and J. R. van Dellen (1985). "Acute carotid-cavernous fistula with retained knife blade after transorbital stab wound." Surgical neurology 24(5): 555-558.

A patient who sustained an acute carotid-cavernous fistula due to a stab wound is presented. The management problems related to acute intracranial-penetrating injuries are discussed, with particular reference to vascular injury.

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810. Bullock, R. M., et al. (2009). "Outcome s following cranial gunshot wounds a clinical study." Journal of neurotrauma 26(8): A83.

Cranial Gunshot Wounds (CGSW) unfortunately remains common in the USA and is increasing in frequency, in urban areas, and due to military conflict. They represent up to 20% of severe TBI deaths, in some areas. Self-inflicted CGSW have increased exponentially, in recent months. We therefore reviewed and audited our experience with CGSW, over one year (Feb, 2008-Feb, 2009) at the Ryder Trauma Center, Jackson Hospital and University of Miami, which serves approximately three million people. Of 480 severe and moderate traumatic brain injuries, patients arriving alive at the trauma center, 98 were due to CGSW (20.42 %). Of these, 46 became brain dead or died in the trauma unit, within four hours (9.58%). 32 patients were admitted to neurosurgery/trauma surgery and all underwent craniotomy/craniotomy and de-bridement of these. The survival rate was 65.6 % (21 patients). Of the survivors, 2 remain vegetative but the remainders were discharged home. With aggressive surgical decompression=debridement, and neuro-intensive care, CGSW's can achieve outcomes comparable to closed severe TBI, and in accord with recent military reports.

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811. Bunc, G., et al. (2001). "Pneumocephalus secondary to a neck stab wound without neurologic injury in a 13-year-old girl." Pediatric neurosurgery 34(5): 239-241.

Pneumocephalus is usually caused by injury that damages the brain meninges and thus allows air to enter the intracranial cavity. Our intention was to establish the importance of considering a stab wound in the neck as a possible cause of traumatic pneumocephalus. The paper presents the case of a 13-year-old girl who was accidentally stabbed in the neck with a kitchen knife by her brother. She had no neurological deficit but had developed headaches. An examination showed cerebrospinal fluid leaking from the neck wound and a CT scan revealed the pneumocephalus. Following surgical treatment, the patient's clinical symptoms regressed. To our knowledge, this case is the first report of the manifestation of pneumocephalus as the result of a neck stab wound in a child; overall, there are only three reported cases of pneumocephalus caused by a neck stab wound. Copyright 2001 S. Karger AG, Basel

812. Bunevicius, A., et al. (2016). "Penetrating Anterior Skull Base Fracture Inflicted by a Cow's Horn." Journal of neurosciences in rural practice 7(Suppl 1): S106-S108.

Farm workers are at increased risk for animal-inflicted head injuries that are associated with significant morbidity and occasionally may be fatal. These injuries may cause permanent eye damage with or without concomitant skull base fracture. Here, we present a male farmer who suffered a cow attack that resulted in perforating orbital injury with comminuted frontobasal cranial fracture caused by a cow's horn. The next day, the patient developed nasal and orbital cerebrospinal fluid (CSF) leak. Computed Tomography cisternography revealed CSF leakage to frontal and maxillary sinuses. The patient was treated using prophylactic antibiotic therapy, lumbar drainage, and underwent craniotomy for debridement and dural tear plastic. Post operative course was uneventful and there were no signs of CSF leak 1 year after the surgery. The case illustrates unusual injury inflicted by a cow's horn and underscores the importance of careful investigation for underlying skull base fracture and CSF leakage in patients sustaining perforating orbital injuries. Adequate and timely management of dural tears is associated with favorable outcomes.

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813. Bungardt, N., et al. (2005). "[Suicidal shot in the mouth with an unmodified blank cartridge pistol]." Suizidaler Mundschuss mit nicht manipulierter Schreckschusspistole. 216(1-2): 1-6.

In the medicolegal literature reports of suicides with weapons designed for self-defence, especially gas pistols, are rare. We report on a suicide of a 54-year-old woman who fired a fatal shot in her mouth with an unmanipulated blank cartridge pistol, make Rohm RG 8, calibre 8 mm. The autopsy findings (lips and mucosa of the buccal vestibule without injuries, but extensive lesions of the tongue and the middle and rear third of the smooth palate) suggest that the shot was fired - as observed by a witness - with the barrel of the weapon inside the oral cavity. Both macroscopic inspection and histological investigations excluded the possibility that death was caused by an injury of the brain, in particular the brain stem. The immediate cause of death was deep aspiration of chyme with concurrent aspiration of blood.

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814. Bunse, J. (1987). "[Unchanged ability following temporal gunshot injury with multiple intracerebral gunshot pellets]." Ungestorte Handlungsfahigkeit nach temporaler Schussverletzung mit zahlreichen intrazerebralen Schrotkugeln. 58(5): 305-307.

The case of a 25-year-old male schizophrenic patient is reported, who with suicidal intent wounded himself in the left temporal region, using a shotgun. Despite having about 30 intacerebral smallshot, he remained continuously conscious. The clinical neurological status did not reveal any abnormalities in the course of treatment. The differing results of CT and NMR examination are reported. Finally, the complications reported in the literature are discussed.

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815. Bunzel, B., et al. (2007). "Mechanical circulatory support as a bridge to heart transplantation: what remains? Long-term emotional sequelae in patients and spouses." The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation 26(4): 384-389.

BACKGROUND: Implantation of a ventricular assist device (VAD) reduces short-term mortality and morbidity and provides patients with reasonable quality of life even though it may also be a long-lasting emotional burden. This study was conducted to analyze the long-time emotional consequences of VAD implantation, followed by heart transplantation in patients and spouses., METHODS: This cross-sectional study used the Impact of Event Scale-Revised (IES-R) Version, recording avoidance, intrusion, and hyperarousal, to investigate symptoms of post-traumatic stress disorder (PTSD), and VAD-related fears and concerns. The study cohort comprised 38 patients (36 men,

2 women) and 27 spouses (26 women, 1 man), 6 to 135 months post-operatively., RESULTS: Seven (26%) of the 27 spouses but none of the patients met the criteria for PTSD. Patients who were operated at the early stage of our VAD program (82.0 +/- 31.4 months between implantation and evaluation) were significantly more likely to have a spouse with PTSD syndromes than those whose operation took place later on (42.1 +/- 31.1 months, p = 0.007). Patients with higher avoidance scores and a higher level of hyperarousal were significantly more often affiliated with a PTSD spouse than those with lower avoidance (p = 0.008) and hyperarousal scores (p = 0.001). Spouses displayed significantly higher scores in all IES-R dimensions, and they worried more about device-related problems (malfunctioning, pain, infection, and stroke) than the patients themselves. The noise of the device system was not a crucial issue., CONCLUSION: Our study found that implantation of a VAD, followed by transplantation, does not lead to PTSD in patients but it does in their spouses in the long run. Their emotional well being deserves much closer attention.

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816. Burke, D. J. and S. H. Y. Chou (2018). "Anoxic brain injury and non-convulsive status epilepticus secondary to gunshot wound to airway: A case with favorable prognosis." Neurocritical care 29(1): S58.

Introduction We present a patient with anoxic brain injury and non-convulsive status epilepticus. Despite poor prognosis, as evidenced by marked cerebral edema and non-convulsive status epilepticus, the patient had a favorable prognosis. Methods A case report of a patient presenting with non-convulsive status epilepticus following anoxic injury. Results An 18-year-old healthy male presented following a gunshot wound to the oropharynx requiring emergent cricothyrotomy in the field due to compromised airway and desaturation. He had numerous desaturations in transport to SpO2 60% requiring urgent correction on arrival to our institution. Two hours post injury, the patient remained unresponsive and EEG showed non-convulsive status epilepticus with high amplitude 3 Hz generalized discharges. He was given 4mg of IV lorazepam push with resolution of the generalized discharges and emergence of a diffuse delta-theta background with spontaneous variability. At this point, aggressive treatment was pursued due to favorable background. Nonconvulsive status resumed and was refractory despite high dose levetiracetam, phenobarbital and midazolam drip. CT head showed diffuse cerebral edema and patient was started on pentobarbital infusion for both refractory cerebral edema and NCSE. An intracranial bolt was placed by Neurosurgery to monitor ICP. ICP was periodically >25mmHg and 23.4 percent NaCl was given. He was on pentobarbital for total of 14 days for both malignant cerebral edema and NCSE. One month after discontinuing pentobarbital, his exam improved with spontaneous eye opening and spontaneous movements of all extremities. His exam continues to improve and he is pending follow-up in Epilepsy Clinic. Conclusions We report a case of severe anoxic brain injury and non-convulsive status epilepticus with malignant cerebral edema. With aggressive management including 14 days of pentobarbital and intracranial multi-modality monitoring of ICP, he had a favorable prognosis.

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817. Burke, D. T., et al. (2003). "A mysterious temporal penetrating head wound without fracture." Brain injury 17(3): 245-253.

Unwitnessed head injuries are often diagnostic and management dilemmas. Low-velocity penetrating head wounds are rare. This paper describes a case of an accidental low-velocity penetrating head wound through the soft tissue of the temporal region. This lesion resulted in a deep intra-cerebral haemorrhage, after the initial assessment revealed no evidence of skull fracture, missile or missile track. The diagnostic evaluation and medical course of this case are presented. This is the first case in the medical literature of a brain injury by an object that penetrated the calvarium at low velocity but which did not produce a fracture of the skull. The evolving diagnostic dilemma is outlined to its conclusion, through 3 years of follow-up observation.

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818. Burnett, B. R. (1991). "Detection of bone and bone-plus-bullet particles in backspatter from close-range shots to heads." Journal of forensic sciences 36(6): 1745-1752.

A victim was shot in the head with a 9-mm Smith & Wesson pistol using Winchester Silvertip hollow-point ammunition. Of interest in this case was the distance from the muzzle of the weapon to the victim's head, since the wound characteristics were equivocal for firing distance. Two other handguns (revolvers) were involved in this shooting, in addition to a revolver owned by the victim. The handguns were sampled using tape lifts, and the casings were sampled by washing them in distilled water, followed by vacuum filtration of the washing water through 0.2-microns-pore Nuclepore filters. These materials were examined by scanning electron microscopy/energy-dispersive X-ray analysis. Calcium-phosphorous (bone) particles were detected on the 9-mm Smith & Wesson pistol, on two casings found at the scene, and on one of the revolvers. Two of the calcium-phosphorous particles on the casings had associated bullet fragments. Test shots on live pigs destined for slaughter showed that bone particles are a feature of backspatter from close-range shots to heads. Contamination of nearby surfaces by bone fragments and bone-plus-bullet fragments, as well as other organic debris, appears to be quite heavy.

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819. Burnett, B. R., et al. (2022). "Errors, omissions and mistaken testimony in a shooting case." Forensic Science International: Reports 6.

The female victim died 17 h after the discharge of a.38 caliber unjacketed bullet into the temporal bone above her right ear. Her boyfriend was accused of homicide and convicted. The victim was able to affect coordinated movements for some seconds after her devastating head wound. Her post shooting movements were documented by bloodstains. Two forensic pathologists where mistaken in calling gunpowder stippling on the victim's scalp as suture punctate wounds. The ruptured right meningeal artery was spurting. Blowback spatter transitioned into the arterial spurting spatter as the victim fell to the floor. The post-shooting movements of the victim created stains that confused two bloodstain experts who believed the victim could not move after her cranial wounding. The victim's hair sample, taken by the emergency room doctor, lacked chain and was subsampled by an unknown party prior to chemical gunshot residue (GSR) testing. The tests were negative which led to the erroneous conclusion the shot was from a distance. The mishandling of the hair sample was not discovered until after trial. A GSR expert testified that the airborne GSR settles in seconds in an enclosed area. However, later publications concluded GSR remains airborne for many minutes. The GSR contamination of the defendant was instrumental in his conviction. The GSR expert never informed the DA or the Court of his error. The evidence indicates the victim's gunshot wound was self inflicted.

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820. Burnett, C. A. and T. J. Clifford (2012). "Prosthodontic rehabilitation of patients with orofacial defects." Dental update 39(4): 291-296.

In 2007 in the UK, 5410 people were diagnosed with an oral cancer. It is therefore imperative that all dentists, medical practitioners and dental care practitioners are vigilant when examining the oral cavity so that any suspicious ulcers, swellings or changes in colour of the mucosa are referred at the earliest stage. To give the patient the best prognosis with an orofacial defect following tumour removal or trauma, it is most important to have the appropriate skills in a multidisciplinary team. The management of patients comprises pre-surgical, surgical and post-surgical phases.

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821. Burns, E. C., et al. (2015). "Pediatric mild traumatic brain injury with intracranial hemorrhage: Identifying low-risk patients who may not benefit from ICU admission." Academic emergency medicine 22(5): S209.

Background: Care of pediatric traumatic brain injury (TBI) is generally dictated by depth of coma and presence of traumatic intracranial hemorrhage (tICH). Patients with a Glasgow Coma Scale (GCS) score ≤13 are frequently admitted to intensive care areas (ICU) for monitoring. Though no guidelines exist, patients with tICH of any severity are often admitted to ICU for early detection of

secondary brain injury. We hypothesize there is a subset of children with mild TBI/ tICH for whom ICU care is unnecessary. Objectives: The aims of this study are to: 1) Quantify and assess TBI/tICH frequency and disposition within our catchment area; 2) identify a subset of patients at low-risk of receiving critical care interventions (CCI). Methods: This was a retrospective cohort study. We reviewed patients 0-17 years seen at two Level I trauma centers in Oregon from Mar 2008 - Aug 2013. We identified all potential subjects via ICD-9 visit codes, then manually reviewed and abstracted these records for completeness. Exclusions were made for penetrating trauma, coagulopathy, direct admit, or field CCI. CCI included mechanical ventilation, invasive monitoring, blood product transfusion, hyperosmolar therapy, and neurosurgery. Outcomes were ED disposition and incidence of CCI, and a multivariable regression analysis was conducted. Results: Of the 650 potential subjects reviewed, 270 had tICH. We excluded 49 patients for direct admit, penetrating trauma, or field CCI, leaving 221 patients for the primary sample. One-hundred ninety four (88%) were initially admitted to ICU; no patients initially admitted to non- ICU received CCI. In total, 37 (17%) had CCI, an outcome associated with low GCS, epidural hematoma (EDH), depressed skull fracture, and severe/ unknown mechanism. Of 80 patients with GCS >13, non-EDH, absence of depressed fracture, and mild-moderate mechanism, 1 had CCI, resulting in a decision rule with a negative predictive value (NPV) of 99%. Conclusion: Our results demonstrate a subset of low-risk patients that may not require ICU care. We propose a decision rule including physiologic, historical and imaging factors to identify low-risk children with tICH who may be observed outside ICU, barring other critical injuries. This decision rule will require prospective validation.

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822. Burns, J. J., et al. (2020). "Absence of caregiver explanation for injury as a predictor of serious traumatic brain injury in children." Journal of Investigative Medicine 68(2): 629.

Purpose of study The goal of this study is to compare the outcomes of traumatic brain injury (TBI) for children whose caregivers present with no explanation for the injury vs. those with an explanation. Methods used A retrospective study of 253 children, 0-36 months old who presented with TBI to the Emergency Department was conducted. Mechanisms of injury that had a degree of uncertainty such as falls, no explanation, struck by object were included whereas motor vehicle, bicycle related accidents or penetrating injury were excluded. Data was further stratified based whether an explanation of head injury was present vs. no explanation. Chi-square was used to compare outcomes including clinically important traumatic brain injury (CiTBI), clinical markers of serious head injury including Glascow score ≤8, seizures on presentation, or intensitve care unit admission for those with vs. without caregiver explanation of mechanism of injury. Also, comparisons of suspicion of abuse, and outcomes after discharge were conducted. Summary of results 19 of 24 infants (79.2%) with no explanation vs. 65 of 229 (28.4%) with explanation were found to have ciTBI ($p<0.001$). For no explanation there were higher rates vs. explanation of having: GCS ≤8 (16.7% vs. 4.8%; $p=0.041$ Fisher exact test), seizures (29.2% vs. 12.8%; $p=0.038$ Fisher Exact Test) and admission to ICU (66.7% vs. 39.1%; $p=0.009$). Suspicion for abuse was found in 100% for no explanation vs. 45.2% with explanation ($p<0.001$). Also, outcomes at discharge were unfavorable in 33.3% with no explanation vs. 7.9% with explanation ($p=0.001$ Fisher Exact Test). Conclusions Head injury in children is a major cause of morbidity and mortality. When no explanation is given in cases of traumatic brain injury, this study revealed increased incidence of ciTBI, increased markers of clinical acuity, higher suspicion for abuse, and poorer outcomes when compared to cases with caregiver explanation of the mechanism of injury. Lack of history should serve as a strong indicator to evaluate for ciTBI, especially in the children.

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823. Burns, R., et al. (2011). "Penetrating skull and brain injury due to a dog bite: a cautionary tale for the unwary." The British journal of oral & maxillofacial surgery 49(7): 582-583.

We describe a rare case of depressed skull fracture after a dog bite. To our knowledge only three such cases have been reported.

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824. Burns, T. G., et al. (2022). "A longitudinal evaluation of a penetrating traumatic brain injury: Theories of plasticity and vulnerability." Applied neuropsychology. Adult 29(4): 881-886.

Penetrating traumatic brain injury (TBI) is uncommon in infancy. The consequences may be devastating, especially when the injury is extensive and affects eloquent areas of the brain. There is the potential for neuropsychological dysfunction that may impact the individual's development and well-being into adulthood. In the context of early brain injury, the developing brain is both remarkably resilient and vulnerable. The present case study describes a patient who experienced a penetrating TBI at 9 days of age, subsequently developed intractable seizures, and underwent left hemispherectomy. Neuropsychological testing at ages 5, 10, 11, and 19 years are presented alongside fMRI and Wada testing. While the patient initially developed cognitive functions in the low-average range by age 5, scores on neuropsychological assessments began to decrease thereafter. This case is discussed with attention to vulnerability and plasticity theories. It highlights the ability of the brain to reorganize and allow the development of functions that would normally be sub-served by damaged areas and the limits of plasticity. Further, this case illustrates the vulnerability of the early brain to insult, the potential to grow into deficits, and the need to consider a variety of factors when predicting outcomes for cases of pediatric brain injury.

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825. Bursick, D. M. and R. G. Selker (1981). "Intracranial pencil injuries." Surgical neurology 16(6): 427-431.

A case of delayed central nervous system manifestations of intracranial penetration by a pencil is presented. Twenty-one additional cases of cerebral injury by pencils are reviewed and discussed. A high index of suspicion, liberal use of the computed tomographic scan, and early operative intervention in cases with cranial perforation are important points in the management of these injuries.

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826. Burstein, E. S. and D. R. Lazzaro (2013). "Traumatic ruptured globe eye injuries in a large urban center." Clinical Ophthalmology 7: 485-488.

Background: The purpose of this study was to examine patient characteristics and outcomes in a group of consecutive patients with ruptured globe eye injuries at Kings County Hospital Center, a large, urban, level 1 trauma center. Methods: A retrospective chart review was performed to identify all patients with ruptured globe eye injuries seen between January 2009 and October 2011. Thirty-eight patients who sustained ruptured globe eye injuries from all causes were investigated for etiology and final visual outcomes Results: Eight eyes in which vision could be assessed were evaluated as having no light perception at presentation and three of these eyes required primary enucleation. Of the 38 eyes, orbit fractures were found in 15 eyes and an intraocular foreign body was found in six eyes. Discussion: Our cohort revealed a 37.5% rate of primary enucleation in eyes with no light perception, which we believe to be a reflection of the severity of injury. All three cases were secondary to a gunshot wound. Further, our sample, although small in size, revealed a very high percentage of eyes that were ruptured secondary to violent causes compared with other studies.

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827. Burton, C. (1969). "The case of the mysterious missile." The Journal of trauma 9(3): 257-260.

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828. Bush, T. G., et al. (1999). "Leukocyte infiltration, neuronal degeneration, and neurite outgrowth after ablation of scar-forming, reactive astrocytes in adult transgenic mice." Neuron 23(2): 297-308.

Reactive astrocytes adjacent to a forebrain stab injury were selectively ablated in adult mice expressing HSV-TK from the Gfap promoter by treatment with ganciclovir. Injured tissue that was depleted of GFAP-positive astrocytes exhibited (1) a prolonged 25-fold increase in infiltration of CD45-

positive leukocytes, including ultrastructurally identified monocytes, macrophages, neutrophils, and lymphocytes, (2) failure of blood-brain barrier (BBB) repair, (3) substantial neuronal degeneration that could be attenuated by chronic glutamate receptor blockade, and (4) a pronounced increase in local neurite outgrowth. These findings show that genetic targeting can be used to ablate scar-forming astrocytes and demonstrate roles for astrocytes in regulating leukocyte trafficking, repairing the BBB, protecting neurons, and restricting nerve fiber growth after injury in the adult central nervous system.

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829. Busin, M., et al. (2016). "Corneal Epithelial Stem Cells Repopulate the Donor Area within 1 Year from Limbus Removal for Limbal Autograft." Ophthalmology 123(12): 2481-2488.

PURPOSE: To determine whether limbal epithelial stem cells (LESCs) repopulate the site harvested for limbal autograft transplantation (LAT), the expression of LESCs markers was evaluated in bioptic specimens obtained from the donor area 12 months or more after surgery., DESIGN: Interventional case series., PARTICIPANTS: Patients who underwent LAT for unilateral acquired limbal stem cell deficiency after chemical burn., METHODS: Corneal limbal explants were obtained from 2 sites, the harvested area and the untouched control area, in the donor eyes of 6 patients who previously underwent LAT for unilateral acquired limbal stem cell deficiency after chemical burn. Limbal epithelial stem cells were isolated, and cellular, immunohistochemistry, and histologic parameters were assessed to compare differences between LESCs isolated from harvested or control sites., MAIN OUTCOME MEASURES: Presence of LESCs 1 year or more after LAT., RESULTS: Specific markers (p63, Ki67, K12), percentage of LESCs, cell doubling, and number of passages in culture did not differ significantly between harvested and control sites. However, the distinctive structure of the palisades of Vogt was found only in 2 of 6 harvested sites., CONCLUSIONS: Limbal epithelial stem cells repopulate the donor site as early as 1 year after limbus removal for LAT. Autologous transplantation of conjunctiva and limbus are safe procedures and can be performed in cases that cannot be treated by simple grafting of LESCs cultured ex vivo.

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830. Bustos, J. L., et al. (2006). "Glasgow coma scale 7 or less surveillance program for brain death identification in Argentina: Epidemiology and outcome." Transplantation proceedings 38(10): 3697-3699.

BACKGROUND: In Argentina, the rate of cadaveric organ donation per million inhabitants has recently increased to 10.5 (it was previously <7)., PURPOSE: To overcome this challenge, the National Institute for Organ Donation and Transplantation (INCUCAI) created a proactive donor detection plan performed by intensive care unit (ICU) physicians (hospital transplantation coordinators) from 90 selected hospitals across the country., METHODS: A prospective, observational study of patients in severe coma status was conducted from September 2003 to December 2005. We enrolled hospitalized patients who displayed a Glasgow Coma Scale (GCS) of 7 or less and who were admitted to ICUs. Data included demographics, etiology of coma, cardiac arrest, brain death, discharge or derivation, and positive/negative donation., RESULTS: Among 9841 enrolled patients, we excluded 498 who were discharged to another hospital or had unknown outcomes, leaving 9343 for analysis including 64% males and 36% females of overall mean age 50 +/- 19 years (adults) and 5 +/- 4 years (children). Herein, we have highlighted the high risk of death during the first 2 days in the ICU of patients with GCS 7 or less. Gunshot to the head-injured patients and those with hemorrhagic strokes were less likely to survive. In this study, cardiac arrest events and organ donors (OD) GCS 7 or less ratios emerged as quality control markers of ICU care, unraveling problems of potential donor maintenance or inadequate policies., CONCLUSIONS: The GCS 7 or less surveillance program seemed to be a valuable tool for identifying organ donors and potentially treatable events, such as the high rate of cardiac arrest observed in this study.

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831. Butler, E. K., et al. (2021). "Surgeon choice in management of pediatric abdominal trauma." Journal of pediatric surgery 56(1): 146-152.

BACKGROUND: No guidelines exist for management of hemodynamically stable children with suspected hollow viscus injury. We sought to determine factors contributing to surgeon management of these patients., METHODS: Surgeon members of the Eastern Association for the Surgery of Trauma and American Pediatric Surgical Association completed a survey on 3 blunt abdominal injury scenarios: (1) isolated, (2) with multisystem injury, and (3) with traumatic brain injury (TBI), and a penetrating injury scenario. Multivariable logistic regression was used to determine factors associated with initial management of observation vs. operation for blunt injury and observation vs. local wound exploration versus laparoscopy for penetrating injury., RESULTS: Of 394 surgeons (response rate 22.3%), 50.3% were pediatric surgeons. For scenarios 1-3, 32.2%, 49.3%, and 60.7% of surgeons chose operation over observation, respectively. Compared to isolated blunt injury, surgeons were more likely to choose operation for patients with multisystem injury (aOR 2.20, 95%CI: 1.78-2.72) or TBI (aOR 3.60, 95%CI: 2.79-4.66). Pediatric surgeons were less likely to choose operation (aOR 0.32, 95%CI: 0.22-0.44). For penetrating injury, 39.1%, 29.5%, and 31.5% of surgeons chose observation, local wound exploration, and laparoscopy, respectively., CONCLUSIONS: Large variation exists in management of hemodynamically stable children with suspected hollow viscus injury. Although patient injury characteristics account for some variation, surgeon factors such as type of surgeon also play a role. Evidence-based practice guidelines should be developed to standardize care., TYPE OF STUDY: Cross-Sectional Survey., LEVEL OF EVIDENCE: N/A.

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832. Butler, L. J., et al. (2008). "Discussion." Journal of Trauma - Injury, Infection and Critical Care 64(5): 1182-1183.

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833. Buwembo, J. and J. G. De Villiers (1995). "Migrating retained intracranial missiles." African Journal of Neurological Sciences 14(1): 1-5.

Five cases of retained, migrating intracranial bullets are presented. The bullet migrated transventricularly in four patients and subdurally in one. In five cases the bullets were safely removed: via craniotomy for the four patients with an intraventricular location and through a borehole for the patient with a subcortical location. One patient presented a year after injury with severe headache, due to the bullet having become a third ventricular foreign body. The difficulties experienced in localising the missile using computerised tomography (CT) due to metallic artefact and the usefulness of air encephalography in one of the cases, are demonstrated. Intra-operative localisation using an image intensifier prior to siting the craniotomy, is essential.

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834. Buxton, N. (1997). "Penetrating cranio-cerebral injuries." Journal of the Royal Army Medical Corps 143(2): 112-114.

The modern soldier, as with his predecessors, remains at risk from penetrating cranio-cerebral injury. The subject is briefly reviewed and the modern approach outlined in a military context.

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835. Buyuk, Y., et al. (2009). "Fatal cranial shot by blank cartridge gun: two suicide cases." Journal of forensic and legal medicine 16(6): 354-356.

Blank firing pistols are generally considered to be harmless and these guns are not accepted as being firearms in most countries. Due to lack of legal regulations these guns are easily purchased by anyone aged over 18 years. Reports of serious injuries and even fatalities due to these guns are increasing in the literature. These guns when modified or even unmodified can cause serious and potentially fatal injuries. Without doing any changes to the barrel, using blank or tear gas cartridges, firing at contact range can cause penetration of gas into the body including bone originated from gun

powder. We report two suicide cases shooting themselves at temporal region with a blank cartridge gun at contact range. There was no foreign body on radiological examination and there was no trajectory of a bullet inside the brain. In both cases the wound was at the right temporal region and there was defect at temporal bone. There was circular soot around this bone defect. The injury of the brain tissue was localized at the level of the defect but there was widespread subarachnoidal bleeding. We discussed the potential danger of these guns and stressed the need of legal regulations concerning these guns.

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836. Buyukkaya, R., et al. (2014). "Massive cerebrovascular air embolism during posttraumatic cardiopulmonary resuscitation." The American journal of emergency medicine 32(2): 194.e191-192.

Air embolism is known to be a complicating factor in several clinical settings, including thoracic, cardiovascular, and neurosurgical operations; central line placement; and penetrating thoracic and cranial trauma. There are, however, only few case descriptions for cardiopulmonary resuscitation massive cerebral air embolism, and the frequency of this supposedly rare complication is unknown. Computed tomography is useful for showing cerebral air embolism. In this report, we present a 16-year-old adolescent girl with cerebrovascular air embolism on computed tomographic examination after a posttraumatic cardiopulmonary resuscitation and discuss the reasonable mechanisms of cerebrovascular air embolism.

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837. Buz, S., et al. (2008). "Conventional surgical repair and endovascular treatment of acute traumatic aortic rupture." European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery 33(2): 143-149.

OBJECTIVE: Endoluminal aortic stent grafting offers a potentially less invasive alternative to open chest surgery, especially in patients with polytrauma. We compare the results of conventional surgical repair and endovascular treatment of traumatic aortic rupture., METHODS: Retrospectively, 74 patients with acute traumatic aortic rupture were analyzed. Most of the patients had a rupture limited to the isthmus, and severe associated injuries. Thirty-five patients (6 female, 29 male, mean age 36 years) underwent surgical repair. Two patients were operated upon without cardiopulmonary bypass. In 39 patients (5 female, 34 male, mean age 36 years) thoracic endografts were implanted. The delay between trauma and treatment was comparable in the two groups., RESULTS: Hospital mortality was 20% (7 of 35 patients) in the surgical group and 7.7% (3 of 39 patients) in the endovascular group. The most common cause of death in the surgical group was brain death in severe traumatic patients. Ten surgical complications occurred in 5 patients: respiratory insufficiency (n=3), pulmonary infection (n=2), recurrent nerve palsy (n=2), repeat thoracotomy (n=2), and compartment syndrome (n=1). No patient in this group had paraplegia. Except for one case, which required conversion to conventional surgery, stent-graft implantation was successful in all cases, without peri-interventional complications or procedure-induced paraplegia. In 9 patients the left subclavian artery was covered with the device. Two patients underwent surgical repair 15 days and 4 months after endografting because of injury of the aortic wall by the stent and development of a spurious aneurysm, respectively., CONCLUSIONS: In the treatment of traumatic thoracic aortic rupture, the early outcome of patients treated with endovascular stent grafts appears to be better than that with conventional surgical repair. The new technique allows safe and successful repair of this life-threatening injury in the early phase of trauma management. How far this potential benefit is sustained in the long term remains unclear at present.

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838. Buznyk, O., et al. (2015). "Bioengineered Corneas Grafted as Alternatives to Human Donor Corneas in Three High-Risk Patients." Clinical and translational science 8(5): 558-562.

Corneas with severe pathologies have a high risk of rejection when conventionally grafted with human donor tissues. In this early observational study, we grafted bioengineered corneal implants made from recombinant human collagen and synthetic phosphorylcholine polymer into three patients for whom donor cornea transplantation carried a high risk of transplant failure. These patients suffered from

corneal ulcers and recurrent erosions preoperatively. The implants provided relief from pain and discomfort, restored corneal integrity by promoting endogenous regeneration of corneal tissues, and improved vision in two of three patients. Such implants could in the future be alternatives to donor corneas for high-risk patients, and therefore, merits further testing in a clinical trial.

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839. Byard, R. W. (2013). "Suicide attempts involving power drills." Journal of forensic and legal medicine 20(8): 1032-1034.

A 61-year-old man was found dead next to a power drill soiled with blood and bone dust. A 5 mm circular wound of the forehead corresponded to the size of the drill bit. Subarachnoid haemorrhage was present over the anterior pole of the left frontal lobe with a penetrating injury extending 75 mm into the frontal lobe white matter towards, but not involving, the basal ganglia. No major intracranial vessels had been injured and there was no significant intraparenchymal haemorrhage. Death was due to haemorrhage from self-inflicted stab wounds to the abdomen with an associated penetrating intracranial wound from a power drill. Deaths due to power drills are rare and are either accidents or suicides. Wounds caused by power drills may be mistaken for bullet entrance wounds, and the marks around a wound from the drill chuck as muzzle imprints. A lack of internal bevelling helps to distinguish the entrance wound from that due to a projectile. Significant penetration of the brain may occur without lethal injury.

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840. Byard, R. W. and P. Blumbergs (2011). "Foreign body penetration of the fontanelle: mechanisms and manner of death." The American journal of forensic medicine and pathology 32(3): 197-199.

Penetrating injuries of the anterior fontanelle are exceedingly uncommon and are most often associated with inflicted injury. This report of an 11-month-old boy, who fell backward onto a lamp-shade strut that penetrated his anterior fontanelle and left frontal lobe, demonstrates that accidental injuries may also rarely occur. Death was due to hypoxic-ischemic encephalopathy complicating raised intracranial pressure after a penetrating injury of the brain. Careful evaluation of the death scene with reconstruction incorporating the autopsy findings was required to establish the veracity of the history and the credibility of the proposed sequence of events. Mechanisms of death after penetrating injuries of the fontanelle include immediate effects from direct damage to cerebral vital structures or blood vessels with hemorrhage or delayed effects from either cerebral edema with hypoxic-ischemic encephalopathy or sepsis.

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841. Byrne, J. P., et al. (2017). "Effectiveness of low-molecular-weight heparin versus unfractionated heparin to prevent pulmonary embolism following major trauma: A propensity-matched analysis." The journal of trauma and acute care surgery 82(2): 252-262.

BACKGROUND: Pulmonary embolism (PE) is a leading cause of delayed mortality in patients with severe injury. While low-molecular-weight heparin (LMWH) is often favored over unfractionated heparin (UH) for thromboprophylaxis, evidence is lacking to demonstrate an effect on the occurrence of PE. This study compared the effectiveness of LMWH versus UH to prevent PE in patients following major trauma., METHODS: Data for adults with severe injury who received thromboprophylaxis with LMWH or UH were derived from the American College of Surgeons Trauma Quality Improvement Program (2012-2015). Patients who died or were discharged within 5 days were excluded. Rates of PE were compared between propensity-matched LMWH and UH groups. Subgroup analyses included patients with blunt multisystem injury, penetrating truncal injury, shock, severe traumatic brain injury, and isolated orthopedic injury. A center-level analysis was performed to determine if practices with respect to choice of prophylaxis type influence hospital PE rates., RESULTS: We identified 153,474 patients at 217 trauma centers who received thromboprophylaxis with LMWH or UH. Low-molecular-

weight heparin was given in 74% of patients. Pulmonary embolism occurred in 1.8%. Propensity score matching yielded a well-balanced cohort of 75,920 patients. After matching, LMWH was associated with a significantly lower rate of PE compared with UH (1.4% vs. 2.4%; odds ratio, 0.56; 95% confidence interval, 0.50-0.63). This finding was consistent across injury subgroups. Trauma centers in the highest quartile of LMWH utilization (median LMWH use, 95%) reported significantly fewer PE compared with centers in the lowest quartile (median LMWH use, 39%; 1.2% vs. 2.0%; odds ratio, 0.59; 95% confidence interval, 0.48-0.74)., CONCLUSIONS: Thromboprophylaxis with LMWH (vs. UH) was associated with significantly lower risk of PE. Trauma centers favoring LMWH-based prophylaxis strategies reported lower rates of PE. Low-molecular-weight heparin should be the anticoagulant agent of choice for prevention of PE in patients with major trauma., LEVEL OF EVIDENCE: Therapeutic study, level III.

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842. Byrne, J. V. (1999). "Traumatic A-V fistulae." Rivista di Neuroradiologia 12(SUPPL. 3): 47-50.

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843. Byrnes, D. P., et al. (1974). "Penetrating craniocerebral missile injuries in the civil disturbances in Northern Ireland." The British journal of surgery 61(3): 169-176.

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844. Byrnside, V., et al. (2010). "The vacuum-assisted closure in treating craniofacial wounds." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons 68(4): 935-942.

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845. Byvaltsev, V. A., et al. (2015). "A case of successful treatment of post-traumatic frontal lobe brain abscess in patient during subacute period of penetrating craniocerebral trauma." New Armenian Medical Journal 9(4): 80-88.

Brain abscesses are dangerous complications of penetrating traumatic brain injury, where the mortality rate of inflammatory processes progression is up to 60%. Risk factors for this pathology are penetrating traumatic brain injury, purulent inflammation of the lungs, bacterial endocarditis, arteriovenous fistula in the pulmonary circulation. Brain abscesses as a result of gunshot craniocerebral traumas during military actions in World War II were developed in 7.5-27.6% cases, 84% of which were single abscesses, whereas in 16% - multiple, while during military actions in Chechnya and Afghanistan brain abscesses range decreased up to 7.5%, and during peace in case of weapon injuries up to 5%. Firstly such decreasing tendency can be explained with the improved quality of preliminary surgical debridement, secondly with the appearance of antibiotics' new generation and thirdly, with the improvement of drainage systems incorporated onto the wounds. Brain abscesses pathogens are streptococci and staphylococci in 33-50% of cases. In 80% of cases several microorganisms are identified including anaerobic forms. Despite the fact that traumatic brain abscess is a subject to a surgical treatment according to the classic rules, there are reports of successful conservative treatment in literature. The indications for conservative therapy are hard-to-reach location, multiple lesions less than 2.5 cm in diameter, associated meningitis, encephalitic stage of the brain abscesses. There are not so many supporters of conservative treatment. According to several authors, solely conservative treatment of the brain abscesses is not effective at all, or, if applied in the later stages, the formation of brain abscesses ends with persistent neurological deficit in more than a half of the patients. The article presents literature review about epidemiology, pathophysiology, diagnostics and the treatment of patients with brain abscesses, as well as a clinical case of successful treatment of post-traumatic abscess of the left frontal lobe of the patient in the subacute stage of open penetrating traumatic brain injury. This case is interesting in its dynamics. Encapsulated abscess was formed in the result of inefficient conservative therapy within 1 month after traumatic brain injury.

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846. Cabano, F., et al. (1992). "[The surgery of liver trauma (clinical contribution)]." La chirurgia dei traumi epatici (contributo clinico). 44(3-4): 115-130.

Authors perform a retrospective review of all hepatic injuries operated on between 1974 and 1990 at Clinica Chirurgica II (ex Patologia Chirurgica II, ex Semeiotica Chirurgica) of Policlinico San Matteo (IRCCS) of Pavia. Thirteen patients were treated, 9 men and 4 women, with age ranged from 13 to 68 years and a mean age of 38 years. They were 21% of all patients operated on for abdominal trauma. Penetrating wounds were present in only two cases (15%), the other patients (85%) were affected by blunt trauma. The mechanisms of injuries were: road accidents (77%), fall at work (8%), gun shot wound (8%), stab wound (8%). All patients had associated injuries. The mortality was 31%: one patient died for haemorrhagic shock and the other three for craniocerebral injuries. After reviewing the several haemostatic techniques advocated for the various types of hepatic injuries, the authors stress that, although most lesions are minor and can be managed by simple technique of haemostasis, often the prognosis is severe for the associated injuries.

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847. Cacciatori, A., et al. (2018). "Does Traumatic Brain Injury by Firearm Injury Accelerates the Brain Death Cascade? Preliminary Results." Transplantation proceedings 50(2): 400-404.

Brain death (BD) triggers a series of pathophysiological events similar to multiple-organ dysfunction. Traumatic brain injury (TBI) due to firearm injury (FAI) causes lesions that could lead to BD. Patients admitted to the ICU due to severe TBI that evolved to BD were studied, including those caused by FAI; the 2 groups were compared with the objective of demonstrating that the support of the deceased donor by TBI due to FAI is more unstable and of shorter duration than the one related to TBI by another cause. Preliminary results demonstrated that the individuals with TBI by FAI died in BD in a higher percentage than the individuals with TBI caused by accidents (83% vs 41%). The donor treatment period was lower in individuals who presented TBI by FAI. These individuals needed higher doses of noradrenaline as vasopressor support for their treatment, without showing a statistically significant difference (P = .15), compared with individuals whose BD cause was TBI caused by accident.

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848. Cacciatori, A., et al. (2018). "Utility of Transcranial Doppler in the Coordination of Transplants: 10 Years of Experience." Transplantation proceedings 50(2): 408-411.

Transcranial Doppler (TCD) integrated to multimodal neuromonitoring of neurocritical patients is a useful tool in the clinical follow-up. A retrospective and descriptive study of 194 patients who were admitted into the intensive care unit (ICU) was carried out from December 2007 to February 2017. We analyzed the distribution of study frequencies with respect to the pathologies that motivated them, the characteristics of patients who evolved to brain death (BD), and most frequent patterns of cerebral circulatory arrest. Ninety-four of the patients that evolved to BD required 126 studies during their follow-up. The insonation of the 2 middle cerebral arteries and the basilar artery was the most frequent combination (30%). Most frequent reasons of request for a TCD included apnea test intolerance and reduction of waiting time and sedation analgesia. These 10 years of experience have enabled a deeper understanding of the cerebral hemodynamics and the identification of common patterns of high resistance to different pathologies (subarachnoid hemorrhage, severe skull trauma, anoxic ischemia, ammonia encephalopathy) that explain the severity of the acute brain injury, related to the increase of brain volume and its deleterious consequence: the elevation of intracranial pressure (ICP). In the same way, because invasive ICP monitoring is not available in all cases, with a tomographic scan of the skull we have been able to observe a correlation of some imaging signs suggestive of intracranial hypertension with patterns of high resistance obtained by the TCD in the pathologies mentioned. We recommend that each ICU that assists neurocritical patients should have TCD equipment and the skilled personnel to carry out the technique.

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849. Cacic, K. and J. Bonomo (2021). "NeuroEthics and End of Life Care." Emergency medicine clinics of North America 39(1): 217-225.

The emergency department is where the patient and potential ethical challenges are first encountered. Patients with acute neurologic illness introduce a unique set of dilemmas related to the pressure for ultra-early prognosis in the wake of rapidly advancing treatments. Many with neurologic injury are unable to provide autonomous consent, further complicating the picture, potentially asking uncertain surrogates to make quick decisions that may result in significant disability. The emergency department physician must take these ethical quandaries into account to provide standard of care treatment. Copyright Published by Elsevier Inc.

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850. Cackett, P. and J. Stebbing (2005). "Transorbital brain injuries." Emergency medicine journal : EMJ 22(4): 299.

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851. Cadena, G., et al. (2012). "CT scan interpretation in TBI: Implications for resident training." Journal of neurotrauma 29(10): A41.

Introduction Resident interpretation of cranial CT scans has been reported in various subspecialties, but no such study exists in the neurosurgery literature. We compared neurosurgery resident trauma head CT interpretations with those of a faculty member, with emphasis on year of training and features comprising the Rotterdam and Marshall CT scores. Methods Data was prospectively collected from traumatic brain injury (TBI) patients at a level 1 trauma center between September 2010 and November 2011. Enrollment criteria included adult and pediatric patients with blunt or penetrating TBI and abnormal admission head CT scans, or persistent neurological deficit and a negative head CT. All patients were evaluated by the neurosurgery resident on call. Resident interpretations were entered into an electronic consult note that required responses to variables such as the presence of parenchymal hematoma, contusions, intraventricular hemorrhage (IVH), epidural hematoma (EDH), subdural hematoma (SDH), subarachnoid hemorrhage (SAH), midline shift, cisternal compression, and skull fractures. An attending neurosurgeon who was blinded to resident interpretations reviewed each CT scan and recorded his interpretations. Marshall and Rotterdam scores were assigned to each CT scan interpretation using data gathered from the consult notes. Members blinded to the final analysis entered the data into a secure centralized database. Results 615 patients were evaluated for TBI at our level 1 trauma center between September 2010 and November 2011. Twenty-nine patients were excluded from the study due to unavailability of their image, resulting in a final study population of 586 patients. This group had an average age of 37 years, was comprised of 414 men and 172 women, and 238 (40.6%) of them were transferred from an outside hospital. Junior residents saw the majority of consults: 40% by PGY1s, 32% by PGY2s, and 22% by PGY3s. There were significant differences between resident and faculty interpretations with regard to the presence of contusions, IPH, and SAH. When comparing junior residents (PGY1 and PGY2) to faculty, the residents recorded more IPH and SDH, whereas faculty recorded more contusions, IVH, and SAH. More senior residents (PGY3 and PGY4) did not differ significantly from faculty with regard to identifying the presence of IVH or SAH. The presence of EDH and midline shift was also not significantly different between residents and faculty. The effects of these differences on CT scoring systems were also investigated. Resident interpretations resulted in more patients with Rotterdam scores of 2 and less scores of 3 as compared to faculty. When stratified by year of training, this difference diminished with each successive year of training. Resident scores were nearly identical to that of faculty by PGY3. Marshall CT scores demonstrated an opposite trend, with resident interpretations yielding a higher rate of false positive interpretations when scans were actually normal. This became less significant with increasing year of training. Type 3 injuries became more similar with each training year. Conclusions Neurosurgery residents generally perform well with respect to interpreting key features of trauma head CTs; and they are often on par with that of faculty. Differences between resident and faculty interpretation highlight

the importance of targeted education, and may influence accurate patient prognostication and/or enrollment in clinical trials that are based on admission CT criteria. However, these differences in interpretation do not seem to affect acute clinical decision making, as even our junior-most residents were adept at identifying large extra-axial lesions and midline shift, features that may prompt immediate surgical intervention and triaging. This large blinded investigational study confirms neurosurgery residents' abilities to critically and accurately interpret trauma head CT scans.

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852. Cage, T. A., et al. (2017). "Penetrating knife injury to the skull: A case report in pediatric neurosurgical care." Trauma (United Kingdom) 19(4): 302-307.

Isolated penetrating head injury in children is rare and is usually accidental. Each case is unique since the penetrating object and the trajectory through the brain parenchyma vary greatly among patients. We present a three-year-old girl who presented with a kitchen utility knife penetrating her left midface, skull, and brain abutting the anterior cerebral vasculature. Though the patient initially presented to a local trauma center, there were no pediatric nor vascular neurosurgeons on staff. Thus, she was transferred to our tertiary facility for definitive surgical management. A pediatric and vascular neurosurgeon worked together to remove the knife safely and the underlying vasculature remained intact. Postoperatively, the patient did well and was neurologically intact. Though penetrating cranial injury is rare in the pediatric population, such complex cases of brain injury can be properly managed with good outcome by an interdisciplinary team of specialists in tertiary care centers and can result in an excellent surgical and functional outcome for the patient.

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853. Cai, Z., et al. (2020). "Study on behind Helmet Blunt Trauma Caused by High-Speed Bullet." Applied Bionics and Biomechanics 2020.

The mechanism of Behind Helmet Blunt Trauma (BHBT) caused by a high-speed bullet is difficult to understand. At present, there is still a lack of corresponding parameters and test methods to evaluate this damage effectively. The purpose of the current study is therefore to investigate the response of the human skull and brain tissue under the loading of a bullet impacting a bullet-proof helmet, with the effects of impact direction, impact speed, and impactor structure being considered. A human brain finite element model which can accurately reconstruct the anatomical structures of the scalp, skull, brain tissue, etc., and can realistically reflect the biomechanical response of the brain under high impact speed was employed in this study. The responses of Back Face Deformation (BFD), brain displacement, skull stress, and dura mater pressure were extracted from simulations as the parameters reflecting BHBT risk, and the relationships between BHBT and bullet-proof equipment structure and performance were also investigated. The simulation results show that the frontal impact of the skull produces the largest amount of BFD, and when the impact directions are from the side, the skull stress is about twice higher than other directions. As the impact velocity increases, BFD, brain displacement, skull stress, and dura mater pressure increase. The brain damage caused by different structural bullet bodies is different under the condition of the same kinetic energy. The skull stress caused by the handgun bullet is the largest. The findings indicate that when a bullet impacts on the bullet-proof helmet, it has a higher probability of causing brain displacement and intracranial high pressure. The research results can provide a reference value for helmet optimization design and antielasticity evaluation and provide the theoretical basis for protection and rescue.

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854. Caird, J., et al. (2000). "Self-inflicted head trauma using a captive bolt pistol: report of three cases." British journal of neurosurgery 14(4): 349-351.

Three cases of self-inflicted head trauma using a captive-bolt pistol are described. This is a rarely reported phenomenon and presents with an unique pattern of brain injury.

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855. Cairns, G. and A. Belshaw (2021). "Successful management of internal carotid artery transection secondary to a gunshot wound and subsequent malignant MCA syndrome." Case Reports in Neurology 13(2): 276-283.

There are over 100,000 strokes each year in the UK. A very small proportion of these can be attributed to gunshot wounds and subsequent surgical intervention. We present a rare case of a 24-year-old male patient admitted to the Emergency Department having sustained a gunshot wound to the left side of his neck. Initial imaging and surgical exploration revealed significant left-sided vertebral artery damage and a complete transection of the internal carotid artery. Following damage control surgery (DCS), the patient was admitted to ITU but had an acute neurological deterioration and was found to have suffered malignant middle cerebral artery (MCA) syndrome, requiring an urgent decompressive craniectomy. The patient's National Institutes of Health Stroke Scale (NIHSS) at this stage was 26. After a prolonged ITU stay and repatriation to a local stroke unit for intensive therapies input, the patient walked out of the hospital independently on day 106, with an improved NIHSS of 3. This case report aims to highlight the rarity of an ischaemic stroke, secondary to the DCS required for a near fatal gunshot wound, along with the importance of timely recognition of an acute deterioration following artery ligation. Additionally, it aims to examine the lifesaving surgical management of malignant MCA syndrome and in turn the significance of the shared decision-making process between clinicians, the patient, and family members, due to the high rate of poor functional outcomes following this major surgery.

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856. Cakani, B., et al. (2022). "Through-and-through gunshot wound to the head in a rare case of survival." Clinical Case Reports 10(3).

We describe the case of a 42-year old Caucasian male who presented for follow-up treatment of refractory epilepsy. He suffered a cranial trauma 13 years before when a bullet from a pistol, (presumably accidentally) entered the right frontal side of the cranial vault and exited contralateral, causing severe neurological damage.

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857. Caldicott, D. G. E., et al. (2004). "Not just another 'head lac'...low-velocity, penetrating intra-cranial injuries: a case report and review of the literature." Injury 35(10): 1044-1054.

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858. Calica, A., et al. (1976). "Predicting survival after a bullet injury to the brain: the death equations." Surgical forum 27(62): 470-471.

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859. Caliskan, B., et al. (2014). "A case report-a rare cause of menengitis." Pediatric Critical Care Medicine 15(4): 171.

Background and aims: Bizarre craniocerebral-penetrating injuries have been reported in the literature that were caused by nails, metal poles, ice picks, keys, pencils, chopsticks, and power drills. Aims: Our aims are to identify the early and late complications of intracranial injuries due to foreign bodies penetrating through the paranasal sinuses. Methods: We present a case of 6 years-old girl with menengitis after transnasal penetrating head injury with a pencil. Results: Transnasal penetrating foreign bodies may cause serious complications such as intracranial injury, intracranial hemorrhage and intracranial infections. Conclusions: This case illustruates the necessity of advanced imaging modalites and consultations of ENT and neurosurgery.

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860. Calkins, C. M., et al. (2001). "Life-threatening dog attacks: a devastating combination of penetrating and blunt injuries." Journal of pediatric surgery 36(8): 1115-1117.

BACKGROUND/PURPOSE: Children often are the victims of dog attacks. Although bite injuries sustained in an attack characteristically are attributed to the penetrating component of the bite, the blunt nature of a bite may represent the most serious and devastating component of injury. The purpose of this study was to characterize a group of children suffering life-threatening dog bites and examine the predominant aspect of injury., METHODS: Thirty-nine children were admitted to the trauma service at a regional pediatric trauma center with the diagnosis of dog bite injury over a 6-year period (1994 through 1999). Patient demographics, site and description of injury, and surgical procedures performed were recorded from a chart review., RESULTS: Mean age of the 35 children included for analysis was 5.4 years (range, 0.8 to 17 years). Twenty-five (71%) injuries occurred in the head and neck region. Eight (23%) children sustained life-threatening injuries. Of these, blunt force was the predominant injury in 6. This resulted in 1 (20%) arterial occlusion requiring vascular reconstruction, 2 (40%) permanent neurologic injuries (stroke, spinal cord transection), and 1 (20%) death (exsanguination)., CONCLUSIONS: On evaluation of a dog attack, the focus generally is on the obvious penetrating aspect of the bite. Yet, we found the blunt component of injury can have devastating consequences reflected in acute arterial, brain, and spinal cord injury. Even in the absence of significant penetrating trauma, further evaluation should be considered to exclude occult blunt arterial or neurologic injury. Copyright 2001 by W.B. Saunders Company.

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861. Callahan, C. D. and K. J. Hagglund (1995). "Comparing neuropsychological and psychiatric evaluation of competency in rehabilitation: a case example." Archives of physical medicine and rehabilitation 76(10): 909-912.

This report describes the case of a 20-year-old man who sustained a gunshot wound to the forehead, resulting in traumatic brain injury and C2 ventilator-dependent quadriplegia. Issues of personal control and autonomy typified his psychological adjustment. The question of competency to refuse medical treatment arose when he disallowed intervention for a suspected ear infection not confirmed by culture. Subsequently, the patient was alternately described as incompetent by a psychiatrist and competent by a medical ethics review panel. These decisions are interpreted within the context of existing medical-legal literature and historical precedent of competency in civil law. Central to competency evaluation is the patient's ability to recognize that a decision-making process is required, to review the pros and cons of various options, and to communicate a decision. Importantly, this decision need not be in accordance with the opinion of family or the health care team. Neuropsychological screening indicated the patient's cognitive abilities were within functional limits, and he subsequently agreed to treatment after experiencing pain and fever, and learning of a positive culture. It is concluded that a two-pronged neuropsychological evaluation of competency based on the patient's information processing capabilities is most appropriate in medical rehabilitation settings.

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862. Callahan, N. and L. Moles (2021). "Posterior occipital gunshot wound causing orbital roof blow-in fracture with encephalocele." International journal of oral and maxillofacial surgery 50(12): 1603-1605.

Isolated orbital roof fractures are rare fractures that usually occur in conjunction with other facial bone fractures during high velocity trauma. This report concerns a patient with an isolated orbital roof fracture with encephalocele, including its diagnosis, surgical management, and clinical follow-up. This case required a multidisciplinary approach to safely repair the fracture, reduce the encephalocele, restore the orbital volume, and restore the patient's form and function.

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863. Callcut, R. A., et al. (2019). "The why and how our trauma patients die: A prospective Multicenter Western Trauma Association study." The journal of trauma and acute care surgery 86(5): 864-870.

BACKGROUND: Historically, hemorrhage has been attributed as the leading cause (40%) of early death. However, a rigorous, real-time classification of the cause of death (COD) has not been

performed. This study sought to prospectively adjudicate and classify COD to determine the epidemiology of trauma mortality., METHODS: Eighteen trauma centers prospectively enrolled all adult trauma patients at the time of death during December 2015 to August 2017. Immediately following death, attending providers adjudicated the primary and contributing secondary COD using standardized definitions. Data were confirmed by autopsies, if performed., RESULTS: One thousand five hundred thirty-six patients were enrolled with a median age of 55 years (interquartile range, 32-75 years), 74.5% were male. Penetrating mechanism (n = 412) patients were younger (32 vs. 64, $p < 0.0001$) and more likely to be male (86.7% vs. 69.9%, $p < 0.0001$). Falls were the most common mechanism of injury (26.6%), with gunshot wounds second (24.3%). The most common overall primary COD was traumatic brain injury (TBI) (45%), followed by exsanguination (23%). Traumatic brain injury was nonsurvivable in 82.2% of cases. Blunt patients were more likely to have TBI (47.8% vs. 37.4%, $p < 0.0001$) and penetrating patients exsanguination (51.7% vs. 12.5%, $p < 0.0001$) as the primary COD. Exsanguination was the predominant prehospital (44.7%) and early COD (39.1%) with TBI as the most common later. Penetrating mechanism patients died earlier with 80.1% on day 0 (vs. 38.5%, $p < 0.0001$). Most deaths were deemed disease-related (69.3%), rather than by limitation of further aggressive care (30.7%). Hemorrhage was a contributing cause to 38.8% of deaths that occurred due to withdrawal of care., CONCLUSION: Exsanguination remains the predominant early primary COD with TBI accounting for most deaths at later time points. Timing and primary COD vary significantly by mechanism. Contemporaneous adjudication of COD is essential to elucidate the true understanding of patient outcome, center performance, and future research., LEVEL OF EVIDENCE: Epidemiologic, level II.

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864. Calvano, C. J. and R. W. Enzenauer (2012). "Field diagnosis and treatment of ophthalmic trauma." Journal of special operations medicine : a peer reviewed journal for SOF medical professionals 12(2): 58-64.

UNLABELLED: Identification and management of injuries to the eyes and ocular adnexa is commonly encountered by frontline medical personnel. This brief review is intended for the Special Forces Medic of all branches and describes the clinical presentation of common ophthalmic and periocular trauma with appropriate management strategies. Prompt recognition of these wounds facilitates early treatment and optimized visual outcomes for affected Soldiers and civilians alike., KEYWORDS: trauma, eye, ophthalmology, vision, open globe. Copyright 2012.

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865. Calvano, T. P., et al. (2010). "Central nervous system infections in patients with severe burns." Burns : journal of the International Society for Burn Injuries 36(5): 688-691.

BACKGROUND: Central nervous system (CNS) infections develop in 3-9% of neurosurgical ICU patients and 0.4-2% of all patients hospitalized with head trauma. CNS infection incidence in burn patients is unknown and this study sets out to identify the incidence and risk factors associated with CNS infections., METHODS: A retrospective electronic chart review was performed from 1 July 2003 to 30 June 2008 evaluating inpatient medical records along with cerebrospinal fluid (CSF) microbiological results for the presence of CNS infection. The presence of facial and head injuries and burns, along with intracranial interventions were reviewed for association with CNS infections., RESULTS: There were 1964 admissions with 2 patients (0.1%) found to have CNS infection; 1 each with MRSA and Acinetobacter baumannii. Both patients had facial burns and trauma to their head that required intracranial surgery. Of note, both patients had bacteremia with the same microorganisms isolated from their CSF and both survived. Of all patients, 29% had head or neck trauma and burns; 0.35% of those had a CNS infection. Scalp harvest for grafts or debridement of burned scalp was performed on 125 patients of which 9 had an invasive surgical procedure that involved penetration of the skull. The 2 infected patients were from these 9 intracranial surgical patients revealing a 22% infection rate., CONCLUSION: The incidence of CNS infections in patients with severe burns is extremely low at 0.1%. This rate was low even with head and face burns with trauma unless the patient underwent an intracranial procedure.

866. Calvo-Rubal, A., et al. (2006). "[Cranial wounds of the skull caused by a fencing-foil]." Lesion intracraneal transorbitaria por florete. Caso clinico. 17(6): 550-554.

UNLABELLED: Penetrating stab cranial wounds of the skull by fencing-foil are rare in western countries., CASE REPORT: This 46-year-old man suffered a penetrating stab wound of the skull through the right orbital region. As a consequence he developed an intracranial hematoma requiring surgical evacuation., DISCUSSION AND CONCLUSIONS: Damage of intracranial contents due to transorbital penetrating objects other than missiles is a rare event.

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867. Calzolari, F., et al. (1994). "Magnetic Resonance Imaging of strange body: Considerations of intracranial strange body." Rivista di Neuroradiologia 7(2): 286-288.

We report a case of a child presenting an intracranial foreign body. Child's mother told a history of headache. MR performed at first showed a rough artifact in frontal and parietal regions. Plain film x-rays of the skull and CT, performed afterwards, demonstrated a needle-shaped foreign body in the left frontal lobe; the eye of the needle was fixed in the cranial vault. Then, craniotomy was performed: a darning needle was removed. The manner of the needle penetration into the skull is still unknown; judicial authorities have been informed.

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868. Çam, I., et al. (2014). "Endovascular treatment of travmatic vertebral artery arteriovenous fistula and pseudoaneurysm." Neuroradiology 56: 389.

PURPOSE: The purpose of this study was to describe the clinical and anjiographic findings and present endovascular treatment of vertebral arteriovenous fistula and pseudoaneurysm after vertebral artery injury with gunshot wounds MATERIAL AN METHODS:53 year old woman was admitted to our hospital with two gunshot wounds to her head and neck . She was eveluated with cranial-cervikal X-ray, computed tomography (CT) (Toshiba aquillion,64 slice), Brain 3T MR (Philips Achievea Intera Release Eindhoven, Netherlands) and angiography. Electrically detachable coils were used for endovascular treatment. RESULTS: CT examination revealed multiple fracture of left maxillofacial bones and foramen transversarium on C1 vertebral bone. Postcontrast scan showed pseudoaneurysm of left vertebral artery. Cranial MRI showed no ischemic lesion. After stabilization , selective left vertebral angiography demonstrated pseudoaneurysm and fistula at C1 level between distal segment vertebral artery of PICA with vertebral venous plexus. Therefore a catheter was advanced into the right vertebral artery from right brachial artery. micro catheter (Excelsior SL-10) and microguide (Radiofocus 0.012 90°) was advanced into left vertebral artery via right vertebral artery and basillary artery. Distal part of Arteriorvenous fistula and pseudoaneurysm was occluded with electrically detachable coils. Catheter was advanced into the left vertebral artery via right femoral artery. Proximal part of arteriovenous fistula and pseudoaneurysm was occluded with electrically detachable coils. Control anjography showed complete occlusion of the arteriorvenous fistula and pseudoaneurysm. CONCLUSION: An arteriovenous fistula and psedoaneurysm involving the vertebral artery is rare. These lesions can be of traumatic or spontaneous origin. Traumatic lesions are freuquently associated with penetrating neck injuries. Endovascular techniques are safe and effective method of treatment and is not associated with significant morbidity and mortality. (Figure Presented).

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869. Cambria, S. and G. Cardile (1970). "[Gunbullet in the brain. Clinical contribution]." Proiettile d'arma da fuoco nel tronco encefalico. Contributo clinico. 14(2): 260-263.

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870. Cameron, D. (2002). "Craniocerebral gunshot injuries." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde 92(1): 9-10.

871. Cameron, D. and B. A. Lupton (1993). "Inadvertent brain penetration during neonatal nasotracheal intubation." Archives of disease in childhood 69(1 Spec No): 79-80.

During routine nasal intubation of a premature infant, the endotracheal tube penetrated the brain. Bloodstained cerebrospinal fluid and neural tissue was apparent. Initial cranial sonography was normal, but the infant later developed extensive intracranial haemorrhage. Rotation of an endotracheal tube to facilitate insertion angles the bevel at the tip upwards, increasing risk of brain penetration. Great care is required during nasal intubation; use of a small feeding tube over which to slide an endotracheal tube may be helpful.

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872. Campbell, A. A., et al. (2015). "Spontaneous Resorption of a Penetrating Orbital Bone Fracture Fragment." Ophthalmic plastic and reconstructive surgery 31(5): e123-125.

The authors describe a 20-year-old man who sustained multiple facial fractures in a high-speed motor vehicle crash, including a bone fragment from a skull base fracture that penetrated the orbital soft tissues superomedially. Serial CT scans documented spontaneous resorption over a 6-month period. While it is known that autologous bone grafts used in craniofacial reconstruction exhibit variable amounts of bone resorption, the complete resorption of an intraorbital fracture fragment has not been documented in the literature. His clinical care and the report of his case were undertaken in a fashion in accordance with the principles of the Health Insurance Portability and Accountability Act regulations.

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873. Campbell, E. H., Jr. and J. Martin (1946). "Cerebral fungus following penetrating wounds." Surgery 19: 748-755.

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874. Campbell-Hewson, G., et al. (1997). "The use of air weapons in attempted suicide." Injury 28(2): 153-158.

The use of airguns in attempted suicide is uncommon. In such instances, the surface wounds caused by discharged pellets may be inconspicuous or appear deceptively trivial to the medical examiner. Airgun pellets however are easily capable of penetrating the skull or abdominal cavity when fired at the close ranges involved in suicide attempts. The destructive power of these weapons at close range should not be underestimated. We describe three cases of attempted suicide and review the other nine cases reported in the medical literature: of the 12 suicide attempts there were three fatalities. Seventeen out of a total of 19 pellets fired penetrated either the cranial or peritoneal cavity or damaged deep structures. Most of the victims were male. The majority of wounds were right sided. Four of the attempts were extremely determined, involving repeated discharge of the airgun or the use of other means to effect suicide.

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875. Campbell-Malone, R., et al. (2008). "Gross and histologic evidence of sharp and blunt trauma in North Atlantic right whales (Eubalaena glacialis) killed by vessels." Journal of zoo and wildlife medicine : official publication of the American Association of Zoo Veterinarians 39(1): 37-55.

Vessel-whale collision events represented the ultimate cause of death for 21 (52.5%) of the 40 North Atlantic right whales (Eubalaena glacialis) necropsied between 1970 and December 2006. Injuries seen in vessel-struck whales fall into two distinct categories: 1) sharp trauma, often resulting from contact with the propeller, and 2) blunt trauma, presumably resulting from contact with a vessel's hull. This study analyzes four trauma cases that resulted from vessel-whale collisions, which together provide a framework for a more critical understanding of lethal blunt and sharp trauma resulting from vessel collisions with right whales. In case no. 1, contact with a propeller resulted in three deep lacerations. The animal survived acute trauma only to succumb nearly 14 years later when the lesions reopened and

became infected. In case no. 2, anecdotal reports linked the laceration of large arteries of the peduncle and histologic evidence of perimortem trauma at a bone fracture site to vessel-whale collision trauma. Case no. 3 had a laceration of the oral rete and a fracture of the rostrum. Both of the areas displayed histologic evidence of perimortem blunt trauma. Finally, in case no. 4, an antemortem mandibular fracture, two additional skull fractures, and widespread hemorrhage were consistent with severe blunt trauma. Evidence from each case, including the timing of trauma relative to the time of death and identifying characteristics of both trauma types, are presented. Before this study, no detailed comparative analysis of trauma pathology that resulted from lethal interactions between vessels and right whales had been conducted. This study demonstrates the importance of detailed gross and histologic examination in determining the significance and timing of traumatic events. This work represents a new paradigm for the differential diagnosis of lethal sharp and blunt trauma in right whales hit by ships and will enhance the present understanding of the impact of anthropogenic mortality on this critically endangered species.

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876. Campos, B. A., et al. (1973). "Intracranial foreign bodies: backfire. Report of 14 cases." Journal of neurosurgery 38(1): 96-98.

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877. Campos-Mollo, E., et al. (2007). "[Orbital penetrating wound by a bull horn]." Herida penetrante orbitaria por asta de toro. 82(10): 645-648.

INTRODUCTION: Bull horn injuries are severe lesions with a high risk of bacterial contamination, and are common in countries where people are fond of bullfighting and related spectacles., CASE REPORT: A 19-year-old man was referred with a penetrating wound in the superior left eyelid produced by a bull horn and resulting in a fracture of the orbital roof and a fat hernia. Prophylactic antibiotics and tetanus toxoid were administered and surgical reconstruction of the wound performed. Orbital cellulitis did develop, but this responded to systemic antibiotic therapy within a few days., DISCUSSION: Successful treatment of this type of lesion requires early diagnosis, meticulous surgical exploration and appropriate use of prophylactic antibiotics and tetanus toxoid.

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878. Campos-Pires, R., et al. (2016). "Xenon provides short-term and long-term neuroprotection in a rodent model of traumatic brain injury." Brain injury 30(5-6): 653.

Background: Traumatic brain injury (TBI) is a leading cause of morbidity and mortality in western societies. Despite improvements in medical care, clinical TBI treatment is mainly supportive and no specific neuroprotective drugs are currently available. TBI results from external forces applied to the head, resulting in immediate and irreversible damage, known as primary injury and triggering early and long-lasting, secondary injury cascades. Over-activation of N-methyl-Daspartate (NMDA) receptors is thought to play a key role in secondary injury development. Xenon is a noble gas and general anaesthetic. Xenon is a competitive inhibitor of the NMDA receptor at the glycine binding site and it has been shown to be neuroprotective in models of brain ischaemia. Much less is known about the xenon effect in the context of traumatic brain injury. Objectives: Our work focused on evaluating xenon's neuroprotective efficacy in the reproducible controlled cortical impact model of blunt traumatic brain injury, mimicking elements found after moderate-to-severe TBI in humans, such as contusional lesion, brain oedema, elevated intracranial pressure and neurological impairment. Methods: Adult C57BL/6 male mice (n = 196) were fixed in a stereotactic frame under anaesthesia and underwent a right parietal cortical impact, delivered by a custom-made electropneumatic impactor with a 3 mm diameter tip perpendicular to the brain surface. An impact velocity of 8 m s-1, impact duration of 150 ms and brain penetration depth of 1.0 mm were used. Throughout the procedure, core body temperature was monitored and controlled. Animals were randomly assigned to control (75% nitrogen:25% oxygen) and xenon treated (30%, 50% or 75% xenon:25% oxygen, balanced with nitrogen) groups. Short-erm and long-term outcomes, both functional and histological, were measured by researchers blinded to

treatment. Statistical significance was assessed with one-way and two-way ANOVA with Bonferroni's posthoc test (SigmaPlot software). Results: Our study showed 75% xenon significantly ($p < 0.05$) reduced contusion volume 24 hours after injury and significantly ($p < 0.05$) improved neurologic outcome up to 4 days after injury and clinically relevant locomotor parameters 1 month after injury. Xenon treatment significantly ($p < 0.05$) reduced contusion volume when given up to 3 hours after injury and significantly ($p < 0.05$) improved neurologic outcome when given up to 1 hour after injury. Significant ($p < 0.05$) reductions in contusion volume and an improvement in neurologic outcome 24 hours after injury were also achieved with 30% and 50% xenon concentrations. Conclusions: Our results show for the first time in an animal model of TBI that xenon improves functional outcomes and reduces contusion volume. We demonstrate both a reduction in the development of secondary injury and improvement in functional neurological outcome. Our findings, including the demonstration of long-term neuroprotection and a clinically relevant therapeutic time window, support the idea that xenon may be of benefit as a neuroprotective treatment in TBI patients.

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879. Can, C., et al. (2017). "The effect of brain tomography findings on mortality in sniper shot head injuries." Journal of the Royal Army Medical Corps 163(3): 211-214.

OBJECTIVES: Penetrating gunshot head injuries have a poor prognosis and require prompt care. Brain CT is a routine component of the standard evaluation of head wounds and suspected brain injury. We aimed to investigate the effect of brain CT findings on mortality in gunshot head injury patients who were admitted to our emergency department (ED) from the Syrian Civil War., METHODS: The study group comprised patients who were admitted to the ED with gunshot brain injury. Patients' GCS scores, prehospital intubations and brain CT findings were examined., RESULTS: 104 patients were included (92% male, mean age 25 years). Pneumocephalus, midline shift, penetrating head injury, patients with GCS scores <=6 and patients who had to be intubated in the prehospital period were associated with higher mortality ($p<0.05$)., DISCUSSION: The results of this study demonstrated that pneumocephalus, midline shift, a penetrating head injury, GCS scores <=6 and prehospital intubation are associated with high mortality, whereas patients with temporal bone fracture, perforating or single cerebral lobe head injury had a higher survival rates. The temporal bone has a relatively thin and smooth shape compared with the other skull bones so a bullet is less fragmented when it has penetrated the temporal bone, which could be a reason for the reduced cavitation effect. In perforating head injury, the bullet makes a second hole and so will have deposited less energy than a retained bullet with a consequent reduction in intracranial injury and mortality. Further studies are required to reach definitive conclusions.

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880. Canabate Reche, F., et al. (1993). "[Fatal wounding by a compressed air weapon]." Herida mortal por arma de aire comprimido: presentacion de un caso. Aspectos sociales. 39(5): 460-462.

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881. Cannon, J. W., et al. (2021). "Use of Thromboelastography in the Evaluation and Management of Patients With Traumatic Brain Injury: A Systematic Review and Meta-Analysis." Critical care explorations 3(9): e0526.

Traumatic brain injury is associated with coagulopathy that increases mortality risk. Viscoelastic hemostatic assays such as thromboelastography (Haemonetics SA, Signy, Switzerland) provide rapid coagulopathy assessment and may be particularly useful for goal-directed treatment of traumatic brain injury patients. We conducted a systematic review to assess thromboelastography in the evaluation and management of coagulopathy in traumatic brain injury patients., DATA SOURCES: MEDLINE, PubMed Central, Embase, and CENTRAL., STUDY SELECTION: Clinical studies of adult patients with traumatic brain injury (isolated or polytrauma) who were assessed by either standard thromboelastography or thromboelastography with platelet mapping plus either conventional

coagulation assays or platelet function assays from January 1999 to June 2021., DATA EXTRACTION: Demographics, injury mechanism and severity, diagnostic, laboratory data, therapies, and outcome data were extracted for analysis and comparison., DATA SYNTHESIS: Database search revealed 1,169 sources; eight additional articles were identified by the authors. After review, 31 publications were used for qualitative analysis, and of these, 16 were used for quantitative analysis. Qualitative and quantitative analysis found unique patterns of thromboelastography and thromboelastography with platelet mapping parameters in traumatic brain injury patients. Patterns were distinct compared with healthy controls, nontraumatic brain injury trauma patients, and traumatic brain injury subpopulations including those with severe traumatic brain injury or penetrating traumatic brain injury. Abnormal thromboelastography K-time and adenosine diphosphate % inhibition on thromboelastography with platelet mapping are associated with decreased survival after traumatic brain injury. Subgroup meta-analysis of severe traumatic brain injury patients from two randomized controlled trials demonstrated improved survival when using a viscoelastic hemostatic assay-guided resuscitation strategy (odds ratio, 0.39; 95% CI, 0.17-0.91; p = 0.030)., CONCLUSIONS: Thromboelastography and thromboelastography with platelet mapping characterize coagulopathy patterns in traumatic brain injury patients. Abnormal thromboelastography profiles are associated with poor outcomes. Conversely, treatment protocols designed to normalize abnormal parameters may be associated with improved traumatic brain injury patient outcomes. Current quality of evidence in this population is low; so future efforts should evaluate viscoelastic hemostatic assay-guided hemostatic resuscitation in larger numbers of traumatic brain injury patients with specific focus on those with traumatic brain injury-associated coagulopathy.

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882. Cantero, C. R. R. (2005). "Healthy years of life lost by traumatism in the Balbuena General Hospital." Medicina Interna de Mexico 21(5): 329-338.

Objective: To determine the healthy years of life lost by traumatism in the room of urgencies of the General Hospital Balbuena, from July 1 2003 to June 30 2004. Materials and methods: We included data of all the patients who entered in the room of urgencies of the General Hospital Balbuena, during the period from 1 July 2003 to June 30 2004, taking as inclusion approaches: a) patient who died due to traumatism in the room of urgencies of the General Hospital Balbuena, b) both sexes, c) any age; the exclusion approaches: a) lost file, b) patient that enter in cadaver quality. The hope of life considered was: men, 73.1 and women, 77.6, provided by the National Institute of Geography and Computer science in Mexico (INEGI). Results: During the period mentioned above, 104 patients died in the room of urgencies of the Hospital, of which 87 were male and 17 female. The days with the highest index of mortality were: Sunday (22 deaths), Monday, Thursday and Saturday (15 deaths). The months with the highest mortality were March and June (13 deaths), September and October (11 deaths). The age groups that had the biggest mortality were 30 to 44 years (28 deaths) and the one of the 15 to 29 years (24 deaths). The causes of mortality were: blunt traumatism (61 deaths) and penetrating traumatism (14 deaths). Brain injury traumatism accounted for 31 deaths in total, followed by the multiple traumatism with 26, and 26 cadavers were received. Traumatism originates 2,559.5 lost years of life, and the average for person of lost years of life due to traumatism is of 35.5. Conclusions: Traumatism is considered a cause of important mortality in the society that affects young people mainly, in reproductive and economically active age, which represents an important lost years of life, the lost healthy years of life. These results allow evaluating the impact (expressed in units of time) of different illnesses in a certain society, and offering a common metric for lost of health years for all the causes and all the ages.

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883. Canturk, G., et al. (2009). "Autopsy findings of suicidal deaths committed by firearms in Ankara, Turkey." Medicine, science, and the law 49(3): 207-212.

The purpose of this study was to examine autopsy findings from suicidal deaths using firearms in Ankara, Turkey, and to compare the results with those reported from other studies. We retrospectively evaluated suicidal deaths by firearms referred for autopsy to the Morgue Department, Institute of Forensic Medicine, between 2002 and 2004. Results were subjected to discriminant analyses using SPSS 11.5 package program. One hundred and fifteen cases (83.3%) were male, the ratio of male to female was 5 to 1 and the mean age was 31.96 years (range:12-85 years). Forty cases were aged between 12 years and 20 years, 28 were aged between 0 and 18 (20.29%). One hundred and thirty-three cases (96.4%) had one bullet entry and five cases (3.6%) had two bullet entries. Out of 143 bullet entries, 116 (81.12%) were caused by gunshots fired from contact or near contact range. Regarding bullet entry sites, 103 (72.03%) were on the head with 56 (54.37%) located on the right temporal region. Gunshot related crimes are an increasing cause for concern in Turkey. However, a simple preventive measure may prevent the suicidal deaths of many young people.

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884. Capanna, A., et al. (1980). "The use of computerized tomography in the localization of pellets following shotgun wounds of the head." Acta neurochirurgica 52(3-4): 265-272.

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885. Capanna, A. H. (1984). "Traumatic intracranial aneurysm and Gradenigo's syndrome secondary to gunshot wound." Surgical neurology 22(3): 263-266.

A patient suffering a gunshot wound subsequently developed an intracranial carotid aneurysm and Gradenigo's syndrome secondary to the aneurysm. A review of the related literature is presented.

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886. Caplan, A. L. (1987). "Should foetuses or infants be utilized as organ donors?" Bioethics 1(2): 119-140.

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887. Caplan, E. S., et al. (1983). "Response of traumatized splenectomized patients to immediate vaccination with polyvalent pneumococcal vaccine." The Journal of trauma 23(9): 801-805.

In recent years the syndrome of overwhelming post-splenectomy sepsis has been increasingly reported in adults. Since more than 50% of these infections are caused by pneumococcus these post-splenectomy patients are considered a suitable group to receive the pneumococcal vaccine. Previous studies of the response obtained in post-splenectomy patients have been conflicting and we found no study that looked at the response to immediate vaccination in this group of patients. Sixteen consecutive multitraumatized patients received polyvalent pneumococcal vaccine 0.5 ml IM within 72 hours of splenectomy and 10 normal controls were given 0.5 cc polyvalent pneumococcal vaccine. Patients received an average of 19.2 units of blood and blood products; seven were on steroids for concomitant head injury. Antibody was measured by the radioimmune assay. Most of the subjects of both groups responded to at least seven of the 12 measured antigens and no patient in the control group and only one in the splenectomized group responded to all 12 antigens. When rate of response to individual serotypes was compared no difference was found between the two groups. Comparison of geometric mean fold rise and fold rise between the two groups for each of the 12 serotypes revealed essentially no difference. We conclude the response to polyvalent pneumococcal vaccine among polytrauma splenectomized patients is similar to that of normal controls, and that the vaccine can be administered immediately post-splenectomy.

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888. Carbonell, A. L. and J. Boya (1988). "Ultrastructural study on meningeal regeneration and meningo-glial relationships after cerebral stab wound in the adult rat." Brain research 439(1-2): 337-344.

Meningeal regeneration and meninges-glial relationships during the reparation of an experimental brain stab wound, are studied with the electron microscope. At 14 days after the wound, a

continuous newly formed basal lamina separates both nervous and meningeal tissues. Later, the astroglial processes of regenerated glia limitans showed very infolded surfaces and numerous filaments inside of them. Across the cavity left by the wound, filament-rich astroglial processes, forming bundles or glial cords of variable diameter, were seen. Each glial cord was surrounded by a basal lamina covered on the outside by a discontinuous sheet of meningocytic processes. Although regenerated meningocytes displayed interlacing processes forming a loose reticular network, large cellular meningocyte masses were also found.

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889. Carbonell, W. S. and J. W. Mandell (2003). "Transient neuronal but persistent astroglial activation of ERK/MAP kinase after focal brain injury in mice." Journal of neurotrauma 20(4): 327-336.

Astrogliosis is a nearly ubiquitous response to a variety of insults to the central nervous system (CNS). This reaction is triggered rapidly, but can persist for years after the initial trauma. Little is known about the signaling mechanisms responsible for this activation and its chronic maintenance. Extracellular signal-regulated kinase/mitogen-activated protein kinase (ERK/MAPK) activation is implicated in several functions important to the reactive glial phenotype such as cellular proliferation and motility. Here we utilize immunohistochemistry with a phosphorylation state-specific antibody (pERK) to characterize the temporal and spatial pattern of ERK/MAPK activation in neurons and glia following a forebrain stab lesion (FSL) in mice. Early activation (1 h) was primarily in perilesional neuronal elements, particularly of the hippocampus. Occasional perilesional glia were also positive for pERK. Additionally, ependymal cells bilaterally stained prominently for pERK. These patterns of pERK immunoreactivity at 1 h were abolished by pretreatment with the selective MEK inhibitor, SL327. ERK/MAPK activation at later time points between 1 day (d) and 30 d was primarily restricted to perilesional astrocytes with maximum labeling at 3 d. However, pERK-positive astrocytes represented only a subset of total GFAP-positive cells and were found more proximal to the lesion suggesting specific functional activation of these cells. Finally, immunostaining for the phosphorylated form of cAMP response element-binding (CREB) protein, a downstream target of the ERK/MAPK cascade, was increased in perilesional glia 7 d after FSL. Sustained activation of the ERK/MAPK signaling pathway in perilesional reactive glia suggests a critical role for this cascade in astrogliosis.

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890. Carew, R. M., et al. (2021). "Suitability of 3D printing cranial trauma: Prospective novel applications and limitations of 3D replicas." Forensic Science International: Reports 4.

3D printed reconstructions of skeletal material offer a novel, interactive and increasingly used tool to support courtroom testimony and aid juror interpretation of expert testimony. While research has begun to address the accuracy of 3D printed skeletal material, there has been little consideration of the diverse applications of prints to support trauma demonstrations, particularly in relation to gunshot trauma. This study explored the suitability of three printed human crania replicas exhibiting either gunshot trauma or blunt force trauma for identifying whether the prints were sufficiently accurate for the presentation of trauma wounds. The data indicate that metric measurement and qualitative assessment of trauma macromorphology was possible from the 3D printed reconstructions. The findings also offer an indication that it is possible to obtain data around the accuracy of 3D printing bullet wounds and for establishing a bullet path. However, some limitations of prints reconstructed from post-mortem computed tomography (PMCT) data were identified including the observation that not all fracture lines were successfully replicated which indicates that at present virtual models should be used concurrently with 3D prints in court.

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891. Carey, M. E. (2000). "An overview of civilian brain wounds from bullets: 1963-1996." Neurosurgery Quarterly 10(1): 1-41.

The author reviews 34 clinical and 2 autopsy studies on civilian gunshot wounds (GSWs) of the brain from 1963 to 1996 to summarize evaluate, and interpret on what has been learned as increasingly

vigorous treatment has been applied to these injuries. Bullets injure tissue by trajectory and by energy deposit; the latter may cause damage at a distance from the bullet's path. Many who sustain a GSW die from apnea even though the bullet does not strike the respiratory centers. A few brain-wounded individuals may be helped by vigorous field resuscitation, but little evidence exists that rapid transport to a hospital will significantly lower overall brain GSW mortality. The Glasgow Coma Scale (GCS) and computed tomography scans are most often used to evaluate brain wound victims. Angiography should be strongly considered if a bullet passes near middle cerebral vessels because of possible pseudoaneurysm formation. Surgical mortality of brain GSWs is highly dependent on the GCS score of those operated on; overall mortality for patients with a GCS of 12-15 is low, and for those with GCS 3-5, it is 80% or higher. Operating on GCS 3-5 patients with penetrating brain wounds is controversial. The author concludes that GCS 3-5 patients with brain wounds should not be operated on. All GCS 6-8 patients deserve aggressive care, but because the surgical mortality of this group approaches 50%, surgical criteria for these patients may need to be refined.

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892. Carey, M. E., et al. (1990). "Brain edema after an experimental missile wound." Advances in neurology 52: 301-305.

We have developed an experimental model to study cerebral pathophysiology associated with a missile wound to the brain. After wounding, vasogenic edema occurs about the missile wound track in the injured cerebral hemisphere. This edema is relatively mild, does not appear life-threatening, peaks at 48 hr after wounding, and spontaneously resolved in 1 week.

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893. Carey, M. E., et al. (1984). "The correlation between surgical and CT estimates of brain damage following missile wounds." Journal of neurosurgery 60(5): 947-954.

The occurrence of distant brain damage following an apparent focal missile injury to the brain has not been well documented until computerized tomography scanning demonstrated this phenomenon. Mechanisms of additional or distant damage within the brain may include a high deposit of kinetic energy from the penetrating missile, additional vascular damage, and possibly neuronal and axonal degeneration. Widespread and distant brain changes may explain some instances of late neuropsychological and psychiatric dysfunction or rehabilitation failure following a brain wound. Brain imaging should be used to properly evaluate the full extent of brain damage following wounding.

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894. Carey, M. E., et al. (1971). "A bacteriological study of craniocerebral missile wounds from Vietnam." Journal of neurosurgery 34(2 Pt 1): 145-154.

Bacteriological studies were performed on 45 craniocerebral missile wounds incurred in Vietnam within 2 to 4 hours of occurrence. All missiles had penetrated into the brain. Aerobic and anaerobic cultures were taken of the skin wound, brain, and indriven bone fragments. Forty-four of the skin wounds were contaminated, predominantly with staphylococcus. Only five brain wounds showed bacterial contamination 2 to 4 hours after wounding, indicating that many missile tracks within the brain are initially sterile. Of the patients who had early debridement, 45% had contaminated bone within the brain; possibly up to 75% of all indriven bone chips were sterile. The authors draw the following conclusions. Complete brain debridement with removal of all indriven bone is ideal. Accessible retained bone should be removed by reoperation. Multiple reoperations for an inaccessible retained fragment are inadvisable, however, as fatalities or severe neurologic residua may result. An individual indriven bone chip has a small likelihood of bacterial contamination provided initial debridement was done early. This knowledge may justify an expectant policy in certain individuals harboring an inaccessible retained bone fragment. The retained fragment would be removed only if untoward difficulties develop.

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895. Carey, M. E., et al. (1974). "Follow-up study of 103 American soldiers who sustained a brain wound in Vietnam." Journal of neurosurgery 41(5): 542-549.

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896. Carlier, C. and C. Dufour (1969). "[2 cases of mandibular grafts after gunshot injury]." Greffes mandibulaires apres fracas balistique a propos de deux observations. 24(96): 231-238.

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897. Carloni, R., et al. (2016). "Scalp Tissue Expansion Above a Custom-Made Hydroxyapatite Cranial Implant to Correct Sequelar Alopecia on a Transposition Flap." World neurosurgery 95: 616.e611-616.e615.

BACKGROUND: Resection of cranial tumors involving both bone and scalp tissue may require the recruitment of soft tissue using a flap above the bone reconstruction. When a transposition flap has been chosen, the alopecia zone on the donor site may be difficult to treat afterward. Scalp expansion is the gold standard in these situations, but this has never been described above cranial implants. We report the first case of a patient who underwent a scalp tissue expansion above a custom-made hydroxyapatite cranial implant to correct sequelar alopecia., CASE DESCRIPTION: A 30-year-old man presented with a dermatofibrosarcoma of the scalp with bone invasion. A cranioplasty with a custom-made hydroxyapatite implant and a transposition flap were performed. Although healing was achieved, the donor site of the transposition flap left a 9 x 13 cm sequelar alopecia area on the vertex. To correct it, a rectangular 340-cm3 expander was partially placed above the cranial implant and under the transposition flap. A second 120-cm3 expander was put on the contralateral temporal region. The expansion was successful. No expander infection, cranial implant displacement, or fracture on imaging performed during the follow-up period was detected. The alopecia zone was entirely excised. The patient was very satisfied with the cosmetic result., CONCLUSIONS: Tissue expansion above hydroxyapatite implants may be of concern to the physician because of the risk of infection and rupture of the cranial implant. With this clinical case, we emphasize some precautions to prevent these issues.

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898. Carneiro, J. T., Jr., et al. (2011). "Orbitoethmoidal impacted injury by kitchen knife causing abducens nerve palsy." Oral and maxillofacial surgery 15(2): 107-108.

INTRODUCTION: Impacted knife injuries in the maxillofacial region are rare and infrequently reported. In cases of injury involving orbit or eye, these reports are even rarer., DISCUSSION: Damage to the orbital contents may result in a rupture of the globe, extraocular muscle injury, lacrimal gland damage, and others. Orbital foreign bodies are not only difficult to detect, and clinical features vary according to its size, characteristics, shape, penetrating method, and site. In this report, a case of abducens nerve palsy after orbitoethmoidal knife injury is presented.

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899. Carneiro, T., et al. (2019). "Neurobehçet presenting with sympathetic ophthalmia and pseudotumoral brainstem lesion in afro-american patient." Neurology 92(15).

Objective: NA Background: Neurological involvement in Behçet disease (BD) has been reported to be 5%. Although common in Eurasia, BD is extremely rare in afro-american population in which presentation is typically severe with negative HLA B51. Design/Methods: NA Results: 37 year-old afro-american male with history of perforating trauma to the left eye in childhood, developed recurrent episodes of bilateral panuveitis when he was diagnosed with sympathetic ophtalmia at age 27. Patient was then started on systemic immunosuppression but had multiple relapses throughout the years due to poor compliance. At age 37, patient presented with subacute headaches, fatigue, nausea, vomiting and gait instability. Physical exam notable for dysarthria, mild upper extremity dysmetria and wide-based gait. Brain MRI demonstrated diffuse T2 and FLAIR hyperintensity in brainstem with multifocal nodular enhancements concerning for malignancy or inflammatory lesion. CSF demonstrated

lymphocytic pleocytosis (32 total cells) and elevated protein (69 md/dl). Cytology and flow cytometry were negative for malignancy. Infectious, paraneoplastic and sarcoidosis work-up were negative. Patient was started on methylprednisolone for 3 days with partial recovery and was discharged. Two weeks later, patient was readmitted with same symptoms with interval MRI showing improvement of prior lesions and development of new enhancing lesions in midbrain. Systemic inflamatory markers were elevated. General exam was revealing for oral ulcers and lower extremitiy sterile pustules and a clinical diagnosis of BD was made. There was no evidence of genital ulcers or scars. HLA B51 and pathergy test were negative. Patient was started on infliximab with improvement of lesions. Conclusions: Behçet's disease is rare in afro-american population and diagnosis can be delayed due to atypical presentation and negative HLA B51. Sympathetic ophthalmia is a devastating bilateral panuveitis that may represent the spectrum of uveitis in BD. Neurobehçet remains a challenging diagnosis and must be considered in patients with brainstem lesions and systemic inflammatory signs.

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900. Carpenter, H., et al. (2018). "Penetrating trauma causing cerebrospinal fluid leak without nerve root damage." BMJ case reports 2018.

A 19-year-old man with a stab injury to the lower back presented with no focal neurology or haemodynamic instability. He complained of a headache that was improved by lying flat and underwent imaging to look for damage to local structures. He was found to have air in his intraspinal space. Initially this case was managed conservatively; however, 2 weeks after discharge, he presented with cerebrospinal fluid leak from his wound. This was managed with neurosurgical intervention and watertight closure of fascia. There were no further complications.

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901. Carpenter, K. L., et al. (2012). "A microdialysis study of oral vigabatrin administration in head injury patients: preliminary evaluation of multimodality monitoring." Acta neurochirurgica. Supplement 114: 271.

BACKGROUND: We assessed the feasibility of administering a neuroprotective drug, vigabatrin (VGB; gamma-vinyl-gamma-aminobutyric acid) with multimodality monitoring, including cerebral microdialysis, in severe head injury patients, to measure surrogate endpoints and blood-brain barrier (BBB) penetration., METHODS: Patients (n = 20) were randomised to VGB (0.5 g twice-daily, enteric) or control. ICP, ABP, CPP and cerebrovascular pressure reactivity index (PRx) were monitored. Microdialysate glucose, lactate, pyruvate, glutamate, glycerol, amino acids, VGB and GABA were analysed., RESULTS: Preliminary evaluation of results (five VGB-treated patients) showed that VGB levels rose in brain microdialysates, followed by a modest increase in GABA. VGB and GABA increased more in abnormal brain than in sites further from lesions, and were higher after multiple VGB doses. Highest VGB and GABA microdialysate levels were 75 and 4 &mgr;mol/L respectively. Microdialysate glucose and glycerol sometimes decreased, and glutamate and tyrosine sometimes increased, following VBG administration; causation unproven. VGB did not overtly affect ICP, ABP, CPP, PRx, or microdialysate lactate, pyruvate and lactate/pyruvate ratio., CONCLUSION: Multimodality monitoring, including cerebral microdialysis, is feasible for studying surrogate endpoints following drug administration. VGB crosses the BBB, leading to modest increases in extracellular GABA. Further analyses are ongoing. Microdialysis may assist the development of neuroprotective agents by determining penetration into extracellular fluid of the brain.

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902. Carpenter, K. L. H., et al. (2012). "A microdialysis study of oral vigabatrin administration in head injury patients: preliminary evaluation of multimodality monitoring." Acta neurochirurgica. Supplement 114: 271-276.

BACKGROUND: We assessed the feasibility of administering a neuroprotective drug, vigabatrin (VGB; gamma-vinyl-gamma-aminobutyric acid) with multimodality monitoring, including cerebral microdialysis, in severe head injury patients, to measure surrogate endpoints and blood-brain barrier (BBB) penetration., METHODS: Patients (n = 20) were randomised to VGB (0.5 g twice-daily, enteric) or control. ICP, ABP, CPP and cerebrovascular pressure reactivity index (PRx) were monitored. Microdialysate glucose, lactate, pyruvate, glutamate, glycerol, amino acids, VGB and GABA were analysed., RESULTS: Preliminary evaluation of results (five VGB-treated patients) showed that VGB levels rose in brain microdialysates, followed by a modest increase in GABA. VGB and GABA increased more in abnormal brain than in sites further from lesions, and were higher after multiple VGB doses. Highest VGB and GABA microdialysate levels were 75 and 4 mumol/L respectively. Microdialysate glucose and glycerol sometimes decreased, and glutamate and tyrosine sometimes increased, following VBG administration; causation unproven. VGB did not overtly affect ICP, ABP, CPP, PRx, or microdialysate lactate, pyruvate and lactate/pyruvate ratio., CONCLUSION: Multimodality monitoring, including cerebral microdialysis, is feasible for studying surrogate endpoints following drug administration. VGB crosses the BBB, leading to modest increases in extracellular GABA. Further analyses are ongoing. Microdialysis may assist the development of neuroprotective agents by determining penetration into extracellular fluid of the brain.

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903. Carr, R. M. and R. H. Mathog (1997). "Early and delayed repair of orbitozygomatic complex fractures." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons 55(3): 253-259.

PURPOSE: The goal of this study was to review experience with early and delayed repair of orbitozygomatic complex fractures and develop guidelines for repair based on timing and extent of injury., PATIENTS AND METHODS: Records of patients with orbitozygomatic complex fractures over a 10-year period were reviewed for cause of injury, signs and symptoms, length of time from injury to repair, and method of repair. Results were evaluated by office examination and telephone interviews at least 6 months to 10 years after surgery., RESULTS: Seventy-eight patients who had undergone 81 surgical procedures were analyzed. The series consisted of 49 primary repairs (1 to 22 days postinjury), 10 delayed repairs using osteotomies at 21 days to 5 months postinjury, and 22 delayed repairs requiring onlay bone grafting from 4 months to 16 years postinjury. Forty patients (43 procedures) were available for follow-up. Early surgical intervention dramatically improved esthetic and functional outcomes, whereas late repair was less satisfactory. Hypoesthesia was not improved by surgery. Osteotomy and onlay grafting techniques were necessary for delayed treatment., CONCLUSION: Orbitozygomatic fractures can be repaired up to 21 days postinjury using primary reduction and fixation techniques. Osteotomies are required after 21 days and can be used successfully up to 4 months postinjury. After 4 months, successful repair requires onlay bone grafting.

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904. Carrau, R. L., et al. (1994). "Computer-assisted frontal sinusotomy." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery 111(6): 727-732.

An osteoplastic frontal sinus flap with flat obliteration is the "gold" standard for the management of chronic frontal sinus inflammatory disease caused by obstruction of the nasofrontal duct. Frontal sinusotomy, with an osteoplastic technique, call for osteotomies, guided by a template obtained from a Caldwell radiographic view taken at a distance of 6 feet. The reliability of the template depends on the position of the patient, distance at which the radiograph is taken, penetration of the x-rays, and other technical aspects. Therefore the template is a potential source of error. We present the use of a computer-assisted frontal sinusotomy as a method to corroborate the shape and margins of the frontal sinus in six patients undergoing obliterative frontal sinus surgery. In our hands, this technique has proved more reliable than the radiographic template to corroborate the positioning of the osteotomies.

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905. Carrel, M., et al. (1994). "[Prehospital air ambulance and systemic secondary cerebral damage in severe craniocerebral injuries]." Medicalisation prehospitaliere heliportee et agressions cerebrales secondaires d'origine systemique chez les traumatises craniocerebraux graves. 13(3): 326-335.

Advanced supportive therapy at the site of the accident, associated with direct transfer to a trauma centre increases survival and reduces morbidity rates. Patients with severe head injury, especially those with multiple injuries, often arrive in the emergency department with potentially causes of serious secondary systemic insults to the already injured brain, such as acute anemia (Hematocrit < or = 30%), hypotension (systolic arterial pressure (Pasys) or = 45 mmHg, 6 kPa) and/or hypoxemia (Pao2 < or = 65 mmHg, 8.7 kPa). The incidence of such insults and their impact on mortality were studied in a group of 51 consecutive adults suffering from non penetrating severe head injury (Glasgow score < or = 8, mean age 31 +/- 17 yrs) rescued by a medicalized helicopter. Each patient received medical care on the site of the accident by an anaesthesiologist of a university hospital (UH) complying with an advanced trauma life support protocol including intubation, hyperventilation with FiO2 = 1, restoration of an adequate Pasys and direct transportation to the UH. Mean delay from call to arrival of the rescue team on the site was 15 +/- 5 min. Mean scene time was 32 +/- 10 min in cases not requiring extrication. Nineteen patients (Group I) were admitted without secondary systemic insults to the brain, 13 with isolated head injury, and 6 with multiple injuries, with a low Glasgow Outcome Score (GOS 1-3) of 42% at 3 months. In 32 patients (Group II), despite advanced supportive measures at the scene of the accident and during transportation, one or more secondary systemic insults to the brain were detected upon arrival at the emergency room, one with isolated head injury, 31 with multiple injuries, with a bad GOS of 72% at 3 months. We conclude that: 1) advanced trauma life support prevents from secondary systemic insults in the great majority of isolated severe head injured patients. 2) secondary systemic insults to the already injured brain are frequent in patients with multiple injuries and are difficult to avoid despite rapid aeromedical trauma care, 3) secondary systemic insults to the brain have a catastrophic impact on the outcome of severely head injured patients.

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906. Carreon, L. Y., et al. (2004). "Pediatric spine fractures: a review of 137 hospital admissions." Journal of spinal disorders & techniques 17(6): 477-482.

OBJECTIVE: The anatomy and biomechanics of the growing spine produce failure patterns different from those in adults. Spinal injury in the pediatric patient is a concern as prevention of further neurologic damage and deformity and the good potential for recovery make timely identification and appropriate treatment of such injury critical. A retrospective clinical case series was conducted to present data from a large series of pediatric patients with spine injuries from a single regional trauma center., METHODS: One hundred thirty-seven children with spine injuries were seen over 10 years and were divided into three age groups: 0-9, 10-14, and 15-17 years. Analysis of variance and chi2 were used to analyze differences between groups., RESULTS: There were 36 patients aged 0-9, 49 aged 10-14, and 52 aged 15-17. Spine injury incidence increased with age. Motor vehicular accidents were the most common cause in this series. There were 36% cervical, 34% thoracic, 29% lumbar, 34% multilevel contiguous, and 7% multilevel noncontiguous involvement. Nineteen percent had spinal cord injury. Thirteen of 21 complete neurologic injuries and all 3 incomplete injuries improved. Cord injury was more common in the 0-9 age group. Four of five patients with spinal cord injury without radiographic abnormality (SCIWORA) were in the 0-9 age group and had complete neurologic injuries. Young children with cervical injuries were more likely to die than older children. Fifty-three percent had associated injuries. Eighteen percent underwent decompression, fusion, and instrumentation. Two patients developed scoliosis. The complication rate in surgical patients was higher than in patients treated nonsurgically and in polytrauma patients. This may be related to the severity of the initial injury., CONCLUSIONS: Our results suggest age-related patterns of injury that differ from previous work. The incidence of cord injury is 20% with higher frequencies in the young child. Potential for neurologic recovery is good. Young children have a higher risk for death than older children. There was no

predominance of cervical injuries in the young child. The incidence of SCIWORA was low. Higher complication rates were seen in polytrauma and surgical patients.

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907. Carrick, M. M., et al. (2016). "Intraoperative hypotensive resuscitation for patients undergoing laparotomy or thoracotomy for trauma: early termination of a randomized prospective clinical trial." The journal of trauma and acute care surgery 80(6): 886.

BACKGROUND: Hemorrhagic shock is responsible for one third of trauma related deaths. We hypothesized that intraoperative hypotensive resuscitation would improve survival for patients undergoing operative control of hemorrhage following penetrating trauma., METHODS: Between July 1, 2007, and March 28, 2013, penetrating trauma patients aged 14 years to 45 years with a systolic blood pressure of 90 mm Hg or lower requiring laparotomy or thoracotomy for control of hemorrhage were randomized 1:1 based on a target minimum mean arterial pressure (MAP) of 50 mm Hg (experimental arm, LMAP) or 65 mm Hg (control arm, HMAP). Patients were followed up 30 days postoperatively. The primary outcome of mortality; secondary outcomes including stroke, myocardial infarction, renal failure, coagulopathy, and infection; and other clinical data were analyzed between study arms using univariate and Kaplan-Meier analyses., RESULTS: The trial enrolled 168 patients (86 LMAP, 82 HMAP patients) before early termination, in part because of clinical equipoise and futility. Injuries resulted from gunshot wounds (76%) and stab wounds (24%); 90% of the patients were male, and the median age was 31 years. Baseline vitals, laboratory results, and injury severity were similar between groups. Intraoperative MAP was 65.5 ± 11.6 mm Hg in the LMAP group and 69.1 ± 13.8 mm Hg in the HMAP group ($p = 0.07$). No significant survival advantage existed for the LMAP group at 30 days ($p = 0.48$) or 24 hours ($p = 0.27$). Secondary outcomes were similar for the LMAP and HMAP groups: acute myocardial infarction (1% vs. 2%), stroke (0% vs. 3%), any renal failure (15% vs. 12%), coagulopathy (28% vs. 29%), and infection (59% vs. 58%) ($p > 0.05$ for all). Acute renal injury occurred less often in the LMAP than in HMAP group (13% vs. 30%, $p = 0.01$)., CONCLUSION: This study was unable to demonstrate that hypotensive resuscitation at a target MAP of 50 mm Hg could significantly improve 30-day mortality. Further study is necessary to fully realize the benefits of hypotensive resuscitation., LEVEL OF EVIDENCE: Therapeutic study, level II.

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908. Carrillo, E. H., et al. (1998). "Embolization therapy as an alternative to thoracotomy in vascular injuries of the chest wall." The American surgeon 64(12): 1142-1148.

Hemothorax and persistent thoracic bleeding is frequently an indication for thoracotomy after trauma. Unfortunately, the source of the hemorrhage is often not identified. Presently, selective arteriography and transcatheter embolization (SATE) offers a good and safe alternative to localize and control hemorrhage from arterial injuries in selected patients. The records of eight patients who underwent SATE were reviewed. There were six blunt and two penetrating chest injuries. Four patients had significant preexisting medical comorbidities. Three patients with blunt injuries had undergone exploratory thoracotomy, but continued to bleed postoperatively. In three patients, angiography was indicated for associated thoracic and pelvic injuries, and five patients had SATE specifically due to thoracic hemorrhage. In all patients, SATE was effective to diagnose and control the hemorrhage. There were no complications related to the SATE procedure. Two patients died secondary to severe cerebral injuries. Given hemodynamic stability, SATE can be considered in patients who have already had a thoracotomy, have significant associated medical conditions, or those in need of other angiographic studies. Careful technique and a readiness to abandon SATE in unstable patients or when a suitable catheter position cannot be achieved are important technical points.

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909. Carrillo-Ruiz, J. D., et al. (2013). "Skull stab wound from a metal railroad nail perforating the right frontal lobe." Brain injury 27(7-8): 973-977.

STUDY DESIGN: Case report and review of literature., OBJECTIVE: To present the rare case of a 70-year-old man with a punctured cranial lesion, who was treated with surgery and had a positive recovery., SUMMARY OF BACKGROUND DATA: Cerebral trauma as the serious consequence of urban aggressiveness., METHOD: Clinical and imagery review of a cranial puncture trauma caused by a metal railroad nail, which penetrated the cranium, dura mater, frontal cerebral parenchyma and deep structures, lodging itself next to the midline, without damaging the superior sagittal sinus., RESULTS: The patient underwent a frontal craniotomy to remove the metal nail. He was hospitalized 2 weeks post-surgery and discharged. During external consultations, he manifested no neurologic deficit. A post-surgical CT ruled-out a brain abscess or other complications., CONCLUSIONS: Skull and brain stab wound lesions are highly infrequent, but evaluating the mechanism of injury and the successful medical and surgical treatment employed is illustrative of how post-traumatic recovery of this severe head injury can be achieved. The site of the injury and the position of the object were decisive for establishing an adequate diagnosis and prognosis. The patient reported an exemplary recovery without any secondary complications.

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910. Carson, H. J. (2010). "Dyads of father and son suicide separated by time and circumstances." The American journal of forensic medicine and pathology 31(1): 80-82.

We encountered 2 dyadic suicides among fathers and sons. In the first dyad, the father was a 64-year-old man with complications of heart surgery. He committed suicide with a shotgun. The decedent's son was a 38-year-old man. Five years after his father's death, the son had an argument with his wife. That morning, he drove to the house where his father had lived and inflicted a handgun wound to his head. In the second dyad, the son was a 22-year-old man whose girlfriend left him. He inflicted a shotgun injury to the head. His blood alcohol level was 294 mg/dL. The father of this decedent was a 43-year-old man who 1 year later was despondent after a fight with his girlfriend. He was found dead at home with a single handgun wound to the chest. His blood alcohol level was 173 mg/dL. All 4 suicides appear to have been premeditated and all 4 men used guns. Suicide in a family tends to cause depression and complicate bereavement in survivors more than other types of death. Copycat suicide is well-documented in high-profile cases. The effect of father-son relationships is likely closer and more influential than celebrity suicides.

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911. Cartagena, C. M., et al. (2016). "Subacute Changes in Cleavage Processing of Amyloid Precursor Protein and Tau following Penetrating Traumatic Brain Injury." PloS one 11(7): e0158576.

Traumatic brain injury (TBI) is an established risk factor for the development of Alzheimer's disease (AD). Here the effects of severe penetrating TBI on APP and tau cleavage processing were investigated in a rodent model of penetrating ballistic-like brain injury (PBBI). PBBI was induced by stereotactically inserting a perforated steel probe through the right frontal cortex of the anesthetized rat and rapidly inflating/deflating the probe's elastic tubing into an elliptical shaped balloon to 10% of total rat brain volume causing temporary cavitation injury. Separate animals underwent probe injury (PrI) alone without balloon inflation. Shams underwent craniectomy. Brain tissue was collected acutely (4h, 24h, 3d) and subacutely (7d) post-injury and analyzed by immunoblot for full length APP (APP-FL) and APP beta c-terminal fragments (betaCTFs), full length tau (tau-FL) and tau truncation fragments and at 7d for cytotoxic Beta amyloid (Abeta) peptides Abeta40 and Abeta42 analysis. APP-FL was significantly decreased at 3d and 7d following PBBI whereas APP betaCTFs were significantly elevated by 4h post-injury and remained elevated through 7d post-injury. Effects on betaCTFs were mirrored with PrI, albeit to a lesser extent. Abeta40 and Abeta42 were significantly elevated at 7d following PBBI and PrI. Tau-FL decreased substantially 3d and 7d post-PBBI and PrI. Importantly, a 22 kDa tau fragment (tau22), similar to that found in AD, was significantly elevated by 4h and remained elevated through 7d post-injury. Thus both APP and tau cleavage was dramatically altered in the acute and subacute periods post-injury. As cleavage of these proteins has also been implicated in AD, TBI pathology shown here may set the stage for the later development of AD or other tauopathies.

912. Cartagena, C. M., et al. (2013). "Delayed decreases in aquaporins after penetrating brain injury in rats." Journal of neurotrauma 30(15): A110.

Introduction Brain edema is a primary factor in the morbidity and mortality of traumatic brain injury (TBI). The various isoforms of aquaporin 4 (AQP4) and aquaporin 9 (AQP9) are important factors influencing edema following TBI. Others have reported that these AQPs are regulated by the transcription factor hypoxia inducible factor (HIF) 1a. Methods In the penetrating ballistic-like brain injury (PBBI) model, a temporary cavity and resultant injury was formed by the rapid inflation/ deflation (i.e. < 40 msec) of an elastic balloon attached to the end of the custom probe, injuring 10% of total brain volume. Tissue from the ipsilateral core and perilesional injury zones was collected. Total RNA was isolated at 4, 12, and 24 hr, 3 and 7 days post-injury (sham and PBBI, n = 6 per group). cDNA was synthesized using oligodT primers. Quantitative real time PCR was performed using Taqman expression assays for aqp4 (recognizing all isoforms), aqp9, and hif1a. Using separate animals, tissue lysate was collected at 4 and 24 hr, 3 and 7 days post-injury and analyzed by immunoblot for protein expression of multiple isoforms of AQP4, the single known isoform of AQP9 and for expression of transcription factor HIF1α (sham, probe only control, and PBBI, n = 8-10 per group). Results 24 hr post injury aqp4 mRNA levels were decreased. Three of the four known isoforms of AQP4 were detected by immunoblot, M1 (34kDa), M23 (32 kDa) and isoform 3 (30 kDa). In injured animals AQP4 M1 decreased significantly at 3 and 7 days post-injury. AQP4 M23 levels were highly variable but showed no significant changes. AQP4 isoform 3 levels were stable and were significantly decreased 3 days post-injury. From 4 through 24 hr aqp9 mRNA levels were significantly decreased in injured animals whereas AQP9 protein levels were significantly decreased at 3 and 7 days. At 12 and 24 hr post-PBBI hif1a mRNA levels increased but at 3 and 7 days mRNA levels significantly decreased. From 24 hr through 7 days HIF1α protein levels were significantly decreased. Unlike the AQP4 M1 and AQP9 acute response to injury, these aquaporins are decreased at delayed timepoints following PBBI when HIF1α is also suppressed. Conclusions PBBI is characterized by a loss of AQP4 M1 and AQP9 at delayed time-points temporally corresponding with suppression of HIF1α. The severity of the injury (PBBI versus probe control) increased these effects. Therefore, AQP9 and the AQP4 M1 isoform may be regulated by HIF1α, but not AQP4 isoform 3. This delayed loss of aquaporins may markedly reduce the ability of the brain to efflux water, contributing to the protracted edema that is characteristic following severe penetrating TBI. Factors contributing to edema differ with different types and severities of TBI. For example, cellular based edema is more prominent in diffuse non-penetrating TBI whereas vasogenic edema is more prevalent with TBI involving hemorrhage. Molecular regulation leading to edema will likely also differ, such that treatments which have been suggested for non-hemorrhagic moderate TBI, such as the suppression of aquaporins, may be detrimental in more severe forms of TBI.

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913. Cartagena, C. M., et al. (2013). "Mechanism of action for NNZ-2566 anti-inflammatory effects following PBBI involves upregulation of immunomodulator ATF3." Neuromolecular medicine 15(3): 504-514.

The tripeptide glycine-proline-glutamate analogue NNZ-2566 (Neuren Pharmaceuticals) demonstrates neuroprotective efficacy in models of traumatic brain injury. In penetrating ballistic-like brain injury (PBBI), it significantly decreases injury-induced upregulation of inflammatory cytokines including TNF-alpha, IFN-gamma, and IL-6. However, the mechanism by which NNZ-2566 acts has yet to be determined. The activating transcription factor-3 (ATF3) is known to repress expression of these inflammatory cytokines and was increased at the mRNA and protein level 24-h post-PBBI. This study investigated whether 12 h of NNZ-2566 treatment following PBBI alters atf3 expression. PBBI alone significantly increased atf3 mRNA levels by 13-fold at 12 h and these levels were increased by an additional fourfold with NNZ-2566 treatment. To confirm that changes in mRNA translated to changes in protein expression, ATF3 expression levels were determined in vivo in microglia/macrophages, T

cells, natural killer cells (NKCs), astrocytes, and neurons. PBBI alone significantly increased ATF3 in microglia/macrophages (820%), NKCs (58%), and astrocytes (51%), but decreased levels in T cells (48%). NNZ-2566 treatment further increased ATF3 protein expression in microglia/macrophages (102%), NKCs (308%), and astrocytes (13%), while reversing ATF3 decreases in T cells. Finally, PBBI increased ATF3 levels by 55% in neurons and NNZ-2566 treatment further increased these levels an additional 33%. Since increased ATF3 may be an innate protective mechanism to limit inflammation following injury, these results demonstrating that the anti-inflammatory and neuroprotective drug NNZ-2566 increase both mRNA and protein levels of ATF3 in multiple cell types provide a cellular mechanism for NNZ-2566 modulation of neuroinflammation following PBBI.

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914. Cartagena, C. M., et al. (2014). "Prolonged increases in 22 kDa tau fragment following penetrating TBI." Journal of neurotrauma 31(12): A72.

Tau is a protein involved in stabilizing microtubules in axons. Here we determine whether there are changes in levels of tau or tau fragments within the acute and subacute time frames following penetrating ballistic-like brain injury (PBBI). PBBI involves the rapid inflation/deflation of a custom probe causing a temporary cavity that in this case equaled 10% of total brain volume. Brain tissue was collected ipsilaterally within the injury tract at 4 and 24 hr, 3 and 7 days post-injury (n = 8-10). Tau levels and tau fragmentation was analyzed by immunoblot and normalized to beta-actin levels. Tau levels during PBBI are compared to probe only (no temporary cavity) and sham controls. Full length tau levels (55 kDa) were not altered 4 hr post-injury. By 24 hr post-injury, probe and PBBI tau levels were decreased 39% and 42%, respectively. At 3 days post-injury 73% and 89%, respectively; and at 7 days post-injury 87% and 96%, respectively. A 40 kDa fragment showed similar temporal decreases: 35% (probe, $p < 0.05$) and 45% (PBBI, $p < 0.05$) at 24 hr, 78% (probe, $p < 0.001$) and 94% (PBBI, $p < 0.001$) at 3 days, and 80% (probe, $p < 0.001$) and 93% (PBBI, $p < 0.001$) at 7 days. In contrast, a 22 kDa tau fragment, known for its involvement in tauopathies, including Alzheimer's disease, increased dramatically following injury: 544% (probe, $p < 0.01$) and 1541% (PBBI, $p < 0.001$) at 4 hr and 893% (probe, $p < 0.05$) and 2367% (PBBI, $p < 0.01$) at 24 hr. At 3 and 7 days post-injury PBBI levels again were significantly increased 1541% and 2424%, respectively Changes in tau levels and tau fragment levels are clearly influenced by injury severity (probe vs PBBI). Ongoing studies will determine if the dramatic increases in the 22 kDa tau fragment can be detected at more chronic time-points (i.e. month post-PBBI). Collectively, these early changes in tau fragmentation may be useful as prognostic indicators of neurodegenerative tauopathies utilizing in vivo neuroimaging such at positron emission tomography, and as early markers of therapeutic efficacy.

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915. Cartner, S. C., et al. (2007). "Loss of cortical function in mice after decapitation, cervical dislocation, potassium chloride injection, and CO2 inhalation." Comparative medicine 57(6): 570-573.

Electroencephalograms (EEG) and visual evoked potentials (VEP) in mice were recorded to evaluate loss of cortical function during the first 30 s after euthanasia by various methods. Tracheal cannulae (for positive-pressure ventilation, PPV) and cortical surface electrodes were placed in mice anesthetized with inhaled halothane. Succinylcholine was used to block spontaneous breathing in the mice, which then underwent continuous EEG recording. Photic stimuli (1 Hz) were presented to produce VEPs superimposed on the EEG. Anesthesia was discontinued immediately before euthanasia. Compared with that obtained before euthanasia, EEG activity during the 30-s study period immediately after euthanasia was significantly decreased after cervical dislocation (at 5 to 10 s), 100% PPV-CO2 (at 10 to 15 s), decapitation (at 15 to 20 s), and cardiac arrest due to KCl injection (at 20 to 25 s) but not after administration of 70% PPV-CO2. Similarly, these euthanasia methods also reduced VEP amplitude, although 100% PPV-CO2 treatment affected VEP amplitude more than it did EEG activity. Thus, 100% PPV-CO2 treatment significantly decreased VEP beginning 5 to 10 s after administration, with near abolition of VEP by 30 s. VEP amplitude was significantly reduced at 5 to 10 s after cervical dislocation and at 10 to 15 s after decapitation but not after either KCl or 70% PPV-CO2 administration.

The data demonstrate that 100% PPV-CO2, decapitation, and cervical dislocation lead to rapid disruption of cortical function as measured by 2 different methods. In comparison, 70% PPV-CO2 and cardiac arrest due to intracardiac KCl injection had less rapid effects on cortical function.

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916. Cartotto, R. and R. M. Zuker (1988). "An unusual facial injury highlighting the basics of diagnosis in maxillofacial trauma: a case report." Canadian journal of surgery. Journal canadien de chirurgie 31(5): 349-352.

The authors present an unusual and bizarre missile type of maxillofacial injury in a 7-year-old girl, who was struck in the middle of her face by an iron hook. The area between her forehead and upper lip was obliterated, making a clinical and radiologic diagnosis impossible. The authors review the current diagnostic methods used in maxillofacial trauma, including standard and computed tomography, to emphasize the importance of a correct preoperative diagnosis in the management of maxillofacial injuries.

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917. Cartwright, M. J., et al. (1995). "Intraorbital wood foreign body." Ophthalmic plastic and reconstructive surgery 11(1): 44-48.

It is frequently difficult to identify and localize organic intraorbital foreign bodies despite modern day high-resolution imaging studies. Although there can be grave complications associated with retention of organic intraorbital foreign bodies, many believe that removal of such bodies in most cases is unwarranted. A high clinical suspicion, proper choice of imaging studies, and removal by a skilled orbital surgeon probably make the risk of surgical exploration and foreign body removal less than the risk of foreign body retention. We present a case of an intraorbital wood foreign body that required two separate explorations for retrieval. An initial intraconal exploration failed to locate the foreign body. Although the clinical suspicion was high, the imaging studies were equivocal, complicating the management. A second exploration yielded a large intraorbital wooden foreign body in the inferior extraconal space. The patient fully recovered and regained visual acuity of 20/20. The evaluation of such patients and details of management strategy are discussed.

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918. Casey, A. T. and A. J. Moore (1994). "A traumatic giant posterior cerebral artery aneurysm mimicking a tentorial edge meningioma." British journal of neurosurgery 8(1): 97-99.

Traumatic intracranial aneurysms due to non-penetrating trauma are rare. Commonly they are associated with an overlying fracture or secondary to trauma against the falcine edge in the case of the distal anterior cerebral artery. To date, only one case of traumatic posterior cerebral artery aneurysm has been reported associated with a comminuted depressed occipital fracture and lacerated transverse sinus. We report a case of a giant traumatic aneurysm of the posterior cerebral artery P2 branch directly associated with the tentorial edge. Its mechanism of formation is analogous to the falcine distal anterior cerebral artery aneurysms.

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919. Casey-Trott, T. M., et al. (2014). "Effectiveness of a nonpenetrating captive bolt for euthanasia of 3 kg to 9 kg pigs." Journal of animal science 92(11): 5166-5174.

The objective of this study was to determine the effectiveness of a nonpenetrating captive bolt, Zephyr-E, for euthanasia of suckling and weaned pigs from 3 to 9 kg (5-49 d of age) using signs of insensibility and death as well as postmortem assessment of traumatic brain injury (TBI). The Zephyr-E was used by 15 stock people to euthanize 150 compromised pigs from 4 farrowing and nursery units from commercial farms and 2 research stations. Brainstem reflexes, convulsions, and heartbeat were used to assess insensibility, time of brain death, and cardiac arrest following Zephyr-E application. Skull fracture displacement (FD) was quantified from computed tomography (CT) scans (n = 24), macroscopic scoring was used to assess brain hemorrhage and skull fracture severity (n = 150), and

microscopic scoring was used to assess subdural hemorrhage (SDH) and parenchymal hemorrhage within specific brain regions that are responsible for consciousness and vital function (n = 32). The Zephyr-E caused immediate, sustained insensibility until death in 98.6% of pigs. On average, clonic convulsions (CC) ceased in 82.2 s (+/- 3.4 SE), brain death was achieved in 144.9 s (+/- 5.4 SE), and cardiac arrest occurred in 226.5 s (+/- 8.7 SE). Time of brain death and cardiac arrest differed significantly among stock people (P = 0.0225 and P = 0.0369). Age was positively related to the duration of CC (P = 0.0092), time of brain death (P = 0.0025), and cardiac arrest (P = 0.0068) with shorter durations seen in younger pigs. Average FD was 8.3 mm (+/- 1.0 SE). Macroscopic scores were significantly different among weight classes for subcutaneous (P = 0.0402) and subdural-ventral (P = 0.0037) hemorrhage with the lowest severity hemorrhage found in the 9-kg weight category. Microscopic scores differed among brain sections (P = 0.0070) for SDH with lower scores found in the brainstem compared to the cerebral cortex and midbrain. Parenchymal hemorrhage differed among brain sections (P = 0.0052) and weight categories (P = 0.0128) with the lowest scores in the midbrain and brainstem and the 7- and 9-kg weight categories. The Zephyr-E was highly effective for the euthanasia of pigs up to 9 kg (49 d) based on immediate insensibility sustained until death. Postmortem results confirmed that severe skull fracture and widespread brain hemorrhage were caused by the Zephyr-E nonpenetrating captive bolt.

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920. Casey-Trott, T. M., et al. (2013). "Effectiveness of a nonpenetrating captive bolt for euthanasia of piglets less than 3 d of age." Journal of animal science 91(11): 5477-5484.

The objective of this study was to determine the effectiveness of a nonpenetrating captive bolt (NPCB), the Zephyr-Euthanasia (Zephyr-E), for euthanasia of neonatal piglets<72 h of age using signs of insensibility and death, as well as postmortem assessment of traumatic brain injury (TBI). The Zephyr-E was used by 10 stock people to euthanize 100 low viability neonatal piglets from 3 commercial farrowing units and 1 research farm. Brainstem reflexes, convulsions, and heartbeat were used to assess insensibility, time of brain death, and cardiac arrest after Zephyr-E application. Hemorrhage severity and skull fracture displacement (FD) were quantified from computed tomography scans (n=10), macroscopic scoring was used to assess brain hemorrhage and skull fracture (SK) severity (n=100), and microscopic scoring was used to assess subdural (SDH) and parenchymal (PH) hemorrhage within specific brain regions that are responsible for consciousness and vital function (n=10). All 100 piglets were rendered immediately insensible without return to sensibility. On average, clonic convulsions (CC) ceased in 101 s (+/-7.4 SE), brain death was achieved in 229 s (+/-9.18 SE), and cardiac arrest occurred in 420 s (+/-13.57 SE). Time of cardiac arrest differed significantly among stock people when either body weight (BW: P=0.0053) or body mass index (BMI: P=0.0059) was used as a covariate. The BMI was inversely related to the duration of CC (P=0.0227). Moderate to severe hemorrhage severity was reported in 9 of 10 piglets. There was no relationship between FD and BW (P=0.8408) or BMI (P=0.6439). Macroscopic analyses indicated moderate to severe hemorrhage and SK in all piglets. No differences were found among brain sections for SDH (P=0.2302); PH was greater in the cerebral cortex than in the midbrain and brainstem (P=0.0328). The Zephyr-E NPCB reliably caused immediate, sustained insensibility followed by death in neonatal piglets. Postmortem assessment confirmed that application of the Zephyr-E caused widespread, irreversible brain damage.

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921. Cashion, E. L. (1967). "Delayed intracranial pneumocyst. Report of a case with arteriographic study." Rocky Mountain medical journal 64(1): 57-60.

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922. Castelão, M., et al. (2021). "The epidemiology of pediatric polytrauma and orthopedic injuries: 12-year analysis of a level-1 trauma center (2007-2019)." Pediatric Critical Care Medicine 22(SUPPL 1): 129.

AIMS & OBJECTIVES: We present a retrospective study of pediatric polytrauma patients admitted to the pediatric Intensive Care Unit (ICU) of a tertiary university hospital in Europe. METHODS: Data retrieved from 2007 to 2019 included mechanism and site of injury, pre-hospital and in-hospital trauma care, ICU length-of-stay (LOS), and in-hospital mortality. RESULTS: 217 patients were included (age 10,7 ± 4,86 years; 66% male). Motor vehicle accidents (MVA) (44,4%) and car-pedestrian accidents (25,9%) were the leading mechanisms of injury, followed by falls from height (21,8%; 4,2% sports-related), penetrating trauma (3,3%) and suicide attempts (2,3%). On pre-hospital assessment, 60% of children had documented loss of consciousness; of these, more than half had severe brain injury (GCS<9). The most frequent injury sites were brain (74%) and skeleton (73%). Vertebral fractures were the most common orthopedic injury (19%), followed by pelvic (16,6%) and femur (15,2%) fractures. Patients with orthopedic trauma had significantly longer ICU LOS (5,1 ± 2,76 vs 3,1 ± 1,16; p=0,007); those with 3 or more fracture sites had greater needs for blood transfusion (20 vs 4 mL/kg; p=0,016). MVA were associated with highest incidence of orthopedic severe injuries (p<0,001). Most children involved in MVA were completely unrestrained (37,5%) or using a restraint system inappropriately (6,3%). Overall ICU trauma-related mortality was 1,8% (three cases of severe brain injury and one cervical spine injury). CONCLUSIONS: The great majority of polytrauma children suffer orthopedic injuries, requiring longer ICU admission and higher transfusion volumes. Road traffic accidents remain the leading cause of severe polytrauma. Education-oriented programs are still of crucial importance for prevention.

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923. Castellani, R. J., et al. (2020). Neuropathology in Consecutive Forensic Consultation Cases with a History of Remote Traumatic Brain Injury. 7: 167-175.

Traumatic brain injury (TBI) is widely assumed to be causal in neurodegenerative disease, based on epidemiological surveys demonstrating an increased risk of Alzheimer disease (AD) following TBI, and on recent theories surrounding repetitive head movement. We tested this assumption by evaluating 30 consecutive forensic examinations in which neuropathology consultation was sought, and in which a history of remote TBI was uncovered during the course of the investigation. In this series, there was a high frequency of psychiatric co-morbidities (100%), remote contusion (90%), and seizures (63%). Extent of proteinopathy showed no differences with age-matched controls. A subset of the cases showed focal geographic tauopathy that correlated with older age at autopsy, but had no correlation with clinical signs, and was minimal in comparison with the encephalomalacia secondary to trauma. The results suggest that cerebral contusion and post-traumatic epilepsy may be over-represented in civilian TBI, while structural brain damage from trauma is the predominant cause of morbidity following TBI. We found no evidence that TBI initiates a progressive proteinopathy.

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924. Castellarin, A., et al. (2004). "Iatrogenic open globe eye injury following sinus surgery." American journal of ophthalmology 137(1): 175-176.

PURPOSE: To report a case of iatrogenic open globe eye injury occurring during endoscopic sinus surgery., DESIGN: Case report and literature review., METHODS: A 10-year-old boy presented with periorbital swelling and subconjunctival hemorrhage of the left eye following bilateral nasal adenoidectomy. Funduscopic examination showed evidence of a full-thickness open globe injury at the equator in the inferior nasal midperiphery., RESULTS: The injury most likely was secondary to inadvertent perforation of the lamina papiracea with entrance into the orbit and subsequent penetration of the globe., CONCLUSION: Sinus surgery has been reported previously in association with severe orbital complications. We are unaware of previous reports of open globe injury following sinus surgery.

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925. Castillo-Rangel, C., et al. (2010). "Cranio-thoracic bullet migration over a period of 27 years: case report." Neurocirugia (Asturias, Spain) 21(4): 326-329.

We report the case of a 36 year old woman that was hurt in the head with a lost bullet while walking through the street when she was 9 years old. On admission, the patient was fully conscious with no neurological deficits. Skull radiography showed the intracranial bullet but she was dispatched after 24 hours of observation without neurological deterioration. Six months later she suddenly presented quadriplegia and after one year of rehabilitation she recovered the mobility and strength in all her limbs. 25 years latter she began with thoracic pain (dermatomal sensory changes), constipation, paresthesias and weakness in the lower extremities; the X-Ray showed a bullet caliber 9 mm in the thoracic canal at T4 level. The bullet was removed via posterior laminectomy and dorsal midline mielotomy. 12 hours after surgery, the patient presented signs of medullar shock. The post-operatory MRI showed the trajectory of the bullet through the brain to the spinal cord in FLAIR, and spinal cord edema as well. The patient received steroids as treatment for the spinal cord edema, and with the help of rehabilitation she recovered movement in the lower extremities 30 days after the surgery.

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926. Castro, C., et al. (1989). "[Non-fatal firearm injuries of the head and neck]." Heridas por arma de fuego no mortales a nivel de cabeza y cuello. 16(3): 257-270.

There is depicted the evolutive course of 6 men with gunshot wounds of the neck and head, fortunately not threatening their lives. All victims were men between 18 and 67 years of age. Three times the gun fired a single projectile, whereas the other 3 were multiple projectiles. The latter cases resulted in heavier damages. Etiologically the events were classified as: 3 cases as suspected murder, 2 as attempted suicide and in the last case, an accident. The management has been both medical and surgical under general anesthesia, in order to repair the disorders and/or remove the bullets in 5 occasions. The sixth case did not allow removal of the bullet because of expected risk. All the cases did seemingly well, in spite of 2 who had postoperative complications which delayed healing.

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927. Catapano, J. S., et al. (2021). "Pediatric intracranial arterial injuries by penetrating gunshot wounds: an institutional experience." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery 37(4): 1279-1283.

PURPOSE: Pediatric intracranial injuries due to penetrating gunshot wounds are a rare entity that is often fatal. A subset of patients may experience an intracerebral arterial injury; however, literature on the pediatric population is limited. This study analyzes a large institution's experience with pediatric head gunshot wounds and intracranial arterial injuries., METHODS: All pediatric patients <= 18 years of age who presented to our institution with a penetrating gunshot wound from 2008 to 2018 were retrospectively analyzed., RESULTS: Thirty-seven patients presented with an intracerebral penetrating gunshot injury. There were 18 deaths (49%) in the cohort. A total of 20 patients (54%) had vascular imaging. Of the remaining 17 patients with no vascular imaging, 13 (35%) died before any vascular studies were obtained. Four (20%) of the 20 patients with vascular imaging experienced an intracerebral arterial injury. Three of these 4 patients died before treatment could be administered. One patient with a firearm injury underwent embolization of a distal middle cerebral artery pseudoaneurysm and was discharged home with a Glasgow Outcome Scale score of 5 on follow-up., CONCLUSION: Pediatric patients with penetrating intracranial gunshot wounds often die before vascular imaging can be obtained.

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928. Cato, M. A., et al. (2004). "Assessing the elusive cognitive deficits associated with ventromedial prefrontal damage: a case of a modern-day Phineas Gage." Journal of the International Neuropsychological Society : JINS 10(3): 453-465.

Cognitive deficits following ventromedial prefrontal damage (VM-PFD) have been elusive, with most studies reporting primarily emotional and behavioral changes. The present case illustrates the utility of a process approach to assessing cognitive deficits following VM-PFD. At age 26, C.D. acquired bilateral VM-PFD, more so in the left frontal region, following a penetrating head injury.

Despite exemplary premorbid academic and military performances, his subsequent history suggests dramatic occupational and social changes, reminiscent of Phineas Gage. In fact, lesion analysis revealed similar structural damage to that estimated of Gage. C.D.'s scores on the vast majority of neuropsychological measures were average to superior (e.g., Verbal IQ = 119). However, on several new process measures, particularly those that quantify error rates on multilevel executive function and memory tasks, C.D. exhibited marked impairments. From his pattern of deficits, C.D. appeared to sacrifice accuracy for speed and to adopt liberal response strategies, implicating problems with cognitive inflexibility, impulsivity, and disinhibition. The current findings suggest that VM-PFD may be associated with a wider spectrum of cognitive deficits than previously characterized.

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929. Cato-Addison, W. B., et al. (2007). "Near lethal art--transorbital brain injury." Orbit (Amsterdam, Netherlands) 26(4): 279-281.

Penetrative transorbital injuries put intracranial structures in peril. We present one such case where a low velocity transorbital injury resulted in traumatic temporal lobe injury, but with full recovery. Clinicians should be vigilant of intracranial complications of transorbital injuries.

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930. Caudle, K. L., et al. (2016). "Neuroprotection and anti-seizure effects of levetiracetam in a rat model of penetrating ballistic-like brain injury." Restorative neurology and neuroscience 34(2): 257-270.

PURPOSE: We assessed the therapeutic efficacy of FDA-approved anti-epileptic drug Levetiracetam (LEV) to reduce post-traumatic nonconvulsive seizure (NCS) activity and promote neurobehavioral recovery following 10% frontal penetrating ballistic-like brain injury (PBBI) in male Sprague-Dawley rats., METHODS: Experiment 1 anti-seizure study: 50 mg/kg LEV (25 mg/kg maintenance doses) was given twice daily for 3 days (LEV3D) following PBBI; outcome measures included seizures incidence, frequency, duration, and onset. Experiment 2 neuroprotection studies: 50 mg/kg LEV was given twice daily for either 3 (LEV3D) or 10 days (LEV10D) post-injury; outcome measures include motor (rotarod) and cognitive (water maze) functions., RESULTS: LEV3D treatment attenuated seizure activity with significant reductions in NCS incidence (54%), frequency, duration, and delayed latency to seizure onset compared to vehicle treatment. LEV3D treatment failed to improve cognitive or motor performance; however extending the dosing regimen through 10 days post-injury afforded significant neuroprotective benefit. Animals treated with the extended LEV10D dosing regimen showed a twofold improvement in rotarod task latency to fall as well as significantly improved spatial learning performance (24%) in the MWM task., CONCLUSIONS: These findings support the dual anti-seizure and neuroprotective role of LEV, but more importantly identify the importance of an extended dosing protocol which was specific to the therapeutic targets studied.

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931. Cavalcanti, A. L., et al. (2011). "Violent deaths and maxillofacial injuries in children and adolescents in campina grande, PB, brazil." Acta Stomatologica Croatica 45(4): 268-275.

Objective: In this study, mortality by external causes of children and adolescents and the occurrence of maxillofacial injuries was evaluated in the city of Campina Grande, PB, Brazil in 2003. Methods: 837 forensic medical reports were reviewed, 115 (13.7%) of them belonging to victims aged from 0 to 18 years. The causes were classified according to the Chapter XX of the International Classification of Diseases - CID 10. Data were organized using Epi-Info 3.4.1 software. The association of the variables: type of cause and maxillofacial injuries as dependent variables and sex and age as independent variable was performed by the chi-square and Fisher's exact tests ($p<0.05$). Results: Higher mortality was observed among boys (70.4%) and in the 14-18-year-old age group (50.3%), although without statistically significant difference between the age groups and the genders ($p=0.149$). There was a predominance of traffic accidents (32.2%), most involving pedestrians (37.8%). Males had a 4.6 times greater chance of being victims of firearms than females. Most of the victims had multiple injuries, with predominance of abrasions (39.4%) and wounds (24.5%). The prevalence of injuries to the head and

face was 22.5% and 20.4%, respectively. Maxillofacial injuries were identified in 41.7% of the victims. Six victims (12.5%) exhibited fractures, mainly in the mandible (37.5%). Victims of traffic accidents had a 2.9 times greater chance of suffering injuries to the maxillofacial region. Conclusion: Boys aged between 14 and 18 years were the main victims of fatalities due to external causes, mainly traffic accidents, and the occurrence of multiples injuries to the head and face was frequent.

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932. Ceballos, R. and A. Ronderos (1971). "Shotgun pellet embolus of the middle cerebral artery." The Alabama journal of medical sciences 8(4): 410-413.

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933. Cecchi, R., et al. (2012). "Pulmonary embolisation of bone fragments from penetrating cranial gunshot wounds." International journal of legal medicine 126(3): 473-476.

Bone embolism is a very rare event that usually occurs in trauma-induced septic bone lesions, after bone surgery or after bone marrow transplantation, and normally remains silent. To our knowledge, there are no previous reports of bone embolism after a gunshot to the head. We describe a case of pulmonary embolism associated with bone fragments after a gunshot to the head in which bone fragments surrounded by leukocytes, interstitial and intra-alveolar oedema and haemorrhage around the embolised vessels, leukostasis and fat and bone marrow embolism suggest that the survival time from the gunshot was sufficiently long to allow changes in lung microcirculation and lung tissue.

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934. Cecchini, M. J. and M. J. Shkrum (2019). "A Self-Inflicted Gunshot Wound With an Unusual Hand Injury." The American journal of forensic medicine and pathology 40(1): 47-48.

Self-inflicted gunshot wounds are a common cause of firearm-related deaths. The appearance and location of the entry wound, other concomitant findings at autopsy, and correlation with the scene and circumstances are critical in determining the manner of death. A case of a 72-year-old man with a self-inflicted gunshot wound with an unusual injury pattern is described. There was a contact range gunshot entry in the right temple, and an exit wound was seen in the left parietal region. There was a re-entry with an associated exit wound on the left hand.

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935. Celix, J., et al. (2011). "The association between ICP monitoring and resource level and outcome from severe traumatic brain injury in Latin America." Journal of neurotrauma 28(6): A112.

PURPOSE: In many high-income countries (HICs), the use of invasive intracranial pressure (ICP) monitoring is common in severe traumatic brain injury (sTBI) patients. In most low- and middle-income countries (LMICs) there is unequal access to acute medical care and variable availability and utilization of medical resources to treat TBI, unlike HICs. TBI management guidelines developed in resourcerich settings may not be applicable in resource-limited settings. This study evaluates the association between resource availability and outcomes from sTBI in LMICs in South America. METHODS: We conducted a prospective observational study of 228 patients with severe non-penetrating TBI admitted to one of four metropolitan hospitals in Argentina, Brazil, Ecuador, and Colombia fromAugust 2008 through December 2009. Study hospitals were dichotomized to low (2) or high (2) resource based on the availability of invasive ICP monitoring. Demographic, injury, clinical, and outcome data were compared. RESULTS: Transportation to the hospital via ambulance occurred more frequently at high- than low-resource hospitals (95% vs. 64%). Between the two high resource hospitals, there were significant differences in the use of ICP monitors (74% vs. 14%). The lack of availability of an intensive care unit (ICU) bed was the primary determinant preventing ICP monitoring in the low utilization hospital. Based on this finding, outcomes were compared in patients with and without ICP monitoring as well as by level of resources. Functional outcome assessed by the 6 month Extended Glasgow Outcome Scale (GOS-E) differed by both ICP monitoring and by resource level. CONCLUSION: There are associations between outcomes from sTBI in Latin America and both the use

of ICP monitoring and level of resources; however, one must be concerned about likely confounding. We are optimistic that the ongoing ICP randomized controlled trial in Latin America will help resolve such confounding.

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936. Cellini, L., et al. (2020). "Complex craniomaxillofacial gunshot wounds A step-by-step multidisciplinary approach." Annali italiani di chirurgia 91.

BACKGROUND: Gunshot injuries of the viscerocranium are rarely reported. Penetrating wounds to the cranio-maxillofacial region pose a significant challenge for surgeons as they often comprise serious soft tissue, bone and cerebral defects. We present a case report of a 42-year old female with a gunshot wound to the viscerocranium after suicidal attempt. Series of image of the disease course are available., CASE DESCRIPTION: A 42-year-old female presented with gunshot wound to the viscerocranium after a suicidal attempt. At the arrival GCS was 8/15 and general examination showed the inlet wound in the submental region whereas the outlet one in the left temporal skull area. After first rescue procedures, ICP was monitored before proceeding surgically. Due to massive hemorrhage, embolization of ianternal maxillary artery was performed. Afterwards, tracheostomy, surgical reduction of multiple maxillo-facial fractures and ocular avulsion were performed. In a second time, ICP monitoring and CT scan revealed ICH signs due to intraparenchimal injures. The patient underwent to a second surgical procedure, consisting of bifrontal decompressive craniectomy. The patient was discharged on 20th post-op day to a rehabilitation center. She returned to our department after 4 months to perform a craniomaxillofacial recostruction. She presented 15 in GCS, left ptosis, left VII cranial nerve deficit, decannulated, KPS 100%., CONCLUSION: A step-to-step multidisciplinary approach both with Neurosurgeons and Maxillo-facial surgeons is mandatory in Cranial Gunshot Injuries where extensive damage is linked to a higher mortality., KEY WORDS: Cranial gunshot inuuries, Cranial reconstruction, Maxillofacial reconstruction.

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937. Cemil, B., et al. (2009). "Attempted suicide with screw penetration into the cranium." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 15(6): 624-627.

Intracranial foreign bodies are usually secondary to penetrating injuries. Nails, knives, screwdrivers, sewing needles, bullets, and shrapnel have been described related to penetrating brain injury. In this report, we present a 34-year-old prisoner with an intracranial screw located in the right parietal lobe. The screw was used by prisoner in an attempted suicide. A right parietal craniectomy was performed, and the screw was removed successfully. It is important to know the type of penetrating brain injury preoperatively in order to determine the best surgical approach to remove the foreign body settled in the brain. A long-term radiological assessment should be performed to detect any future complications, such as a cerebral abscess.

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938. Ceniceros, A., et al. (2012). "Brain injury by captive bolt pistol." The Journal of emergency medicine 43(6): e477-478.

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939. Cernak, I. (2005). "Animal models of head trauma." NeuroRx : the journal of the American Society for Experimental NeuroTherapeutics 2(3): 410-422.

Animal models of traumatic brain injury (TBI) are used to elucidate primary and secondary sequelae underlying human head injury in an effort to identify potential neuroprotective therapies for developing and adult brains. The choice of experimental model depends upon both the research goal and underlying objectives. The intrinsic ability to study injury-induced changes in behavior, physiology, metabolism, the blood/tissue interface, the blood brain barrier, and/or inflammatory- and immune-mediated responses, makes in vivo TBI models essential for neurotrauma research. Whereas human TBI

is a highly complex multifactorial disorder, animal trauma models tend to replicate only single factors involved in the pathobiology of head injury using genetically well-defined inbred animals of a single sex. Although such an experimental approach is helpful to delineate key injury mechanisms, the simplicity and hence inability of animal models to reflect the complexity of clinical head injury may underlie the discrepancy between preclinical and clinical trials of neuroprotective therapeutics. Thus, a search continues for new animal models, which would more closely mimic the highly heterogeneous nature of human TBI, and address key factors in treatment optimization.

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940. Cernak, I., et al. (1997). "Relations among plasma prolactin, testosterone, and injury severity in war casualties." World journal of surgery 21(3): 240-246.

Tissue trauma leads to a complex hormonal response of pituitary end-organ axis. This response can be recorded by determining parameters that represent the functional integrity of these systems. The concentrations of serum prolactin (PRL), serum testosterone, and plasma adrenocorticotropin (ACTH) were measured in 62 adult male casualties from the recent war in former Yugoslavia. Patients with brain injury were not included. Venous blood samples were taken as soon as possible (2-18 hours) after admission and at 1, 2, 5, and 14 days after injury. The severity of gunshot/missile wounds was assessed by the Injury Severity Score (ISS). The control group consisted of healthy blood donors. Uninjured subjects who had undergone great stress on the battlefield (explosion in the vicinity without injury) served as the sham-control group. Tissue trauma leads to a severity-dependent decrease in serum testosterone concentrations during the first 5 days following injury. Significant correlations were observed between ACTH, prolactin, and ISS during the first 18 hours after injury. A strong negative correlation between testosterone and prolactin serum concentrations was found during the first 18 hours. In patients with additional complications or unsatisfactory outcome, the prolactin concentrations remained elevated, whereas testosterone concentrations were reduced. Our results support the usefulness of recording hormonal changes for determining trauma severity and monitoring the clinical course. Such monitoring also helps assess the efficacy of therapeutic strategies. The relation between testosterone and prolactin might be helpful for predicting the clinical course and trauma outcome.

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941. Cernak, I., et al. (2000). "Characterization of plasma magnesium concentration and oxidative stress following graded traumatic brain injury in humans." Journal of neurotrauma 17(1): 53-68.

Plasma magnesium, calcium, and oxidative status were investigated in 31 male casualties with traumatic brain injury (TBI) during a 7-day posttraumatic period. The study group consisted of eight patients with mild closed head injury (Glasgow Coma Scale score [GCS] of 13-15), 10 patients with extensive penetrating head injury (GCS 4-6), and 13 patients with blast injuries but without direct head trauma. The latter group was included since previous experimental and clinical data have confirmed the development of indirect brain trauma in patients with blast injuries. Patients with multiple injuries were not included. Significant declines in plasma divalent cations were found in GCS 4-6 patients immediately after TBI and persisting for the entire 7-day study period. Similar changes in magnesium, but not calcium, were present in the GCS 13-15 and the blast injury groups, but only up until day 3 after injury. Alterations in lipid peroxidation products and superoxide anions were also observed following TBI. Increased lipid peroxidation was noted in all three groups over the entire posttraumatic period while increases in superoxide anion generation occurred transiently immediately following TBI. Thereafter, in the GCS 13-15 and blast injury groups, superoxide anions subsequently normalized, whereas in extensive head injury (GCS 4-6), superoxide anion generation significantly declined. A negative correlation between magnesium balance and oxidative stress was observed in all patients immediately after injury persisting in GCS 4-6 patients to the end of the observation period. Our findings suggest an interrelationship between magnesium changes and blood oxidants/antioxidants after TBI, which could be of both diagnostic and prognostic value in patients with neurotrauma.

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942. Cernak, I., et al. (1999). "Neuroendocrine responses following graded traumatic brain injury in male adults." Brain injury 13(12): 1005-1015.

In an effort to characterize thyroid, gonadal and adrenal function following neurotrauma, the present study determined serum concentrations of thyroid-stimulating hormone (TSH), total triiodothyronine (T3), thyroxine (T4), testosterone and cortisol over a 7 day period in 31 patients with traumatic brain injury. The study group consisted of eight patients with mild closed head injury (Glasgow Coma Scale--GCS 13-15), 10 patients with extensive penetrating head injury (GCS 4-6) and 13 patients with blast injuries but without direct head trauma. The latter group was included in the study because the development of indirect brain trauma has previously been implicated in blast injuries. Patients with multiple injuries were not included. Following mild injury (GCS 13-15), TSH was increased up until day 3 after injury. T3 levels were elevated on days 1, 5 and 7 after injury while T4 remained unchanged throughout. While testosterone was decreased over only the first 2 days post-trauma, cortisol was increased over these first 2 days after injury. In contrast, following severe penetrating injury (GCS 4-6), there were significant declines in TSH, T3 and testosterone over the 7 day observation period post-trauma. Serum cortisol also declined in these patients between 1-3 days after injury, before increasing again on days 5 and 7 after injury. Following indirect neurotrauma, TSH was slightly decreased immediately after trauma but increased to above normal levels on days 5 and 7 post-trauma. Similarly, T3 initially declined after injury, but then increased to above normal levels between 5 and 7 days after injury. T4 and testosterone remained unchanged over the entire post-traumatic period. Serum cortisol was significantly increased after indirect neurotrauma but only up to day 2 post-trauma. In summary, patients with both direct and indirect traumatic brain injury demonstrated endocrine alterations after trauma, the dynamics of which may be a reflection of the severity of brain damage.

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943. Cernak, I., et al. (2014). "A novel mouse model of penetrating brain injury." Frontiers in neurology 5.

Penetrating traumatic brain injury (pTBI) has been difficult to model in small laboratory animals, such as rats or mice. Previously, we have established a non-fatal, rat model for pTBI using a modified air-rifle that accelerates a pellet, which hits a small probe that then penetrates the experimental animal’s brain. Knockout and transgenic strains of mice offer attractive tools to study biological reactions induced by TBI. Hence, in the present study, we adapted and modified our model to be used with mice. The technical characterization of the impact device included depth and speed of impact, as well as dimensions of the temporary cavity formed in a brain surrogate material after impact. Biologically, we have focused on three distinct levels of severity (mild, moderate, and severe), and characterized the acute phase response to injury in terms of tissue destruction, neural degeneration, and gliosis. Functional outcome was assessed by measuring bodyweight and motor performance on rotarod. The results showed that this model is capable of reproducing major morphological and neurological changes of pTBI; as such, we recommend its utilization in research studies aiming to unravel the biological events underlying injury and regeneration after pTBI.

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944. Cetinkaya, E. A., et al. (2006). "Transnasal, intracranial penetrating injury treated endoscopically." The Journal of laryngology and otology 120(4): 325-326.

Intracranial penetrating injury through the nose is uncommon. We present the case of a four-year-old girl who sustained a transnasal, intracranial penetrating injury with a sharp wooden object. We performed endoscopic removal of the foreign body and repair of the associated cerebrospinal fluid fistula.

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945. Cetira Filho, E. L., et al. (2019). "Early Reconstruction of Gunshot Mandible Fracture: A Modified Approach." The Journal of craniofacial surgery 30(7): e653-e655.

The management of victims of gunshot fractures is a challenge for surgeons, mainly due to the complexity of the injury itself and degree of bone comminution. The titanium functionally dynamic bridging plate has often been used in reconstructive surgery after mandibular fractures. The classic indication for bridge plate use is comminuted fractures with or without associated substance losses. The aim of this article is report the case of gunshot victim and to discuss the bridge plate technique utilized for treatment. A 21 years-old, melanoderma, male patient was victim of a firearm-related assault, with comminutive fracture of the mandibular body. The protocol for the bridging plate technique was performed. The patient is in postoperative follow-up of eight months, not present aesthetic or functional complaints, stable occlusion, satisfactory mouth opening and no clinical signs of infection.

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946. Chae, R., et al. (2018). "The influence of presenting characteristics on outcomes in moderate to severe pediatric traumatic brain injury: Penetrating versus blunt mechanisms." Neurology 90(15).

Objective: 1) Evaluate whether the clinical presenting features of known prognostic value in adult traumatic brain injury (TBI) have prognostic value in pediatric TBI; 2) Assess for differences in how these clinical presenting features correlate with outcomes when comparing pediatric patients with blunt or penetrating TBI. Background: TBI is a leading cause of injury, death, and disability. Often, due to a lack of literature, the basis for guidelines on pediatric TBI have been drawn from adult studies including an overwhelming number of blunt injury patients. It is unknown if these guidelines are appropriate for penetrating TBI. Design/Methods: Patients 0-18 years with moderate to severe blunt or penetrating TBI presenting to the local level 1 trauma centers were included. Outcomes were mortality, Pediatric Functional Independence Measures (wee- FIM), and the Glasgow Outcome Scale- Extended Pediatric Version (GOS-E Peds) at 12-18 mo post-injury. Results: Records from 52 patients were reviewed. Patients with hypotension on arrival had a higher mortality rate (67% vs 6.9%; $p<0.0001$). They also had a higher mean GOS-E Peds score (7.7 vs 4.3; $p<0.0001$). Patients with coagulopathy on presentation had a higher mortality rate (76% vs none; $p=0.0002$). Patients without pupil reactivity on arrival had a mortality rate of 94.7% compared to 8% for those who had bilateral pupil reactivity ($p<0.0001$). Initial GCS scores were negatively correlated with GOS-E Peds ($p=0.002$) and Rotterdam scores were positively correlated with GOS-E Peds ($p=0.0003$). Penetrating TBI had a higher mortality rate than blunt TBI (56% vs 22%; $p=0.02$), but significantly higher mean wee-FIM scores on admission for rehabilitation (32.6 vs 19.3; $p=0.002$). Conclusions: This study supports the findings of previously published adult TBI literature that hypotension, lack of pupil reactivity and coagulopathy are associated with poor outcomes. The data also support that pediatric penetrating TBI has higher mortality, but the survivors have better functional status on admission for rehabilitation.

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947. Chagnaud, C., et al. (2003). "[Imaging of paranasal sinus trauma]." Traumatismes des sinus de la face. 84(7-8 Pt 2): 923-940.

UNLABELLED: The role of imaging in the management of maxillofacial trauma is to describe anatomical lesions and to detect complications and associated injuries. Plain films are still useful for minimal trauma, but CT-scan is the gold standard for complex trauma. Helical CT and multidetector row CT simplify the emergency imaging of horizontal struts (skull base, orbital floor, alveolar ridge and palate). The diagnosis, and sometimes the treatment of complications may require CT cisternography, MRI and angiography., LEARNING OBJECTIVES: review mechanisms and classification of paranasal sinuses trauma; present the imaging techniques with special emphasis on CT; describe paranasal sinuses trauma features and pseudo-fracture patterns; describe complications and associated injuries.

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948. Chahidi, A., et al. (2014). "Post traumatic epilepsy due to traumatic brain injury by traffic accidents in neurophysiological explorations laboratory of Marrakesh University Hospital." Clinical Neurophysiology 125: S260.

Introduction: Post traumatic epilepsy (PTE) is defined by two or more unprovoked seizures after a brain traumatic injury (BTI). PTE after TBI can be secondary to traffic accidents. Its prevalence of 4% increases after penetrating brain injury. Cortical lesions play a role of the genesis of the PTE. Morocco face a real" Road War" and Marrakesh city and its region is especially known by traffic accidents of motorcyclists. Aim of the study: Was to analyze some characteristics of PTE cases secondary to TBI caused by traffic accidents in the area of Marrakesh city. Patients and methods: Retrospective study on the cases of PTE registered over one year in the laboratory of neurophysiological explorations of Marrakesh university hospital. All cases had an electroencephalography (EEG) with selection of the cases associating epileptic seizure caused by TBI. Results: Among 385 patients with epilepsy who had an EEG, 11 cases were associated with a TBI caused by a traffic accident (Among a total of 20 cases with TBI). TBI was severe in 9 cases. The average age of patients was of 27.5 years (ranged from 17 to 72 years) with a male predominance (10 cases). PTE diagnostic delay was of 4 years after the accident. Epilepsy seizures were mainly partial (9 cases). The neurological examination was normal in 5 cases. Elsewhere we found confusion (2 cases), a limb motor paralysis (2 cases), pyramidal signs (1case) and multifocal lesions (1 case). The EEG confirmed partial paroxystic abnormalities in 8 cases and was normal in 3 cases. All patients have a cerebral CT scan showing hemorrhagic contusions (3 cases), depressed skull (2 cases), frontal hematoma (2 cases). Five patients were treated by valproate at the time of the realization of the EEG. Discussion: Traffic accidents constitute a significant cause of deaths and disabilities in Morocco with 3000 victims dying and almost 62 222 injuries every year. PTE caused by traffic accidents constitute 55% of all PTE secondary to TBI in our series over one year which is similar to rate of some other African countries less developed than Morocco (62% in Tanzania for example). The incidence is known to increase with the severity of the TBI and the presence of hemorrhagic contusions and depressed skulls. AED prophylaxis seems not to be effective in preventing the late unprovoked seizures and PTE. Most used AED are phenytoin, valproate and carbamazepine. Conclusion: PTE due to traffic accidents was seen in 55% of all TBI cases seen in our neurophysiologic laboratory. The majority of victims of this "road war" are young active males with severe consequences in Marrakesh region. In spite of the deployed efforts to decrease road deaths, more prevention is needed with an early diagnostic and treatment of the PTE victims.

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949. Chalaye, J. C., et al. (1982). "[2 unusual intra-orbital, extra-ocular foreign bodies]." Deux corps etrangers "insolites" intra-orbitaires, extra-oculaires. 83(4): 226-231.

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950. Chalkley, D., et al. (2008). ""I was stabbed in the head 11 days ago"." Emergency medicine journal : EMJ 25(8): 539.

A case is presented in which a knife wound to the head was initially assessed as inconsequential and later proved to be significant. This case illustrates the necessity of exploring scalp wounds to assess for possible skull fractures and of using the history to direct management. It also highlights the requirement for thorough guidelines for use by junior staff and for the staff to apply them with some degree of latitude.

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951. Chaloupka, J. C., et al. (1999). "Recurrent carotid blowout syndrome: diagnostic and therapeutic challenges in a newly recognized subgroup of patients." AJNR. American journal of neuroradiology 20(6): 1069-1077.

BACKGROUND AND PURPOSE: To our knowledge, recurrent carotid blowout syndrome (rCBS) has not been well described. Our purpose was to review our institution's recent experience with patients who presented with multiple episodes of carotid blowout syndrome (CBS), and who were referred for emergent diagnostic angiography and endovascular therapy., METHODS: We retrospectively reviewed the last 46 consecutive patients who had a clinical diagnosis of CBS. All patients were examined and treated prospectively according to a standardized protocol. Most patients

(43 of 46) had undergone extensive primary and salvage radical surgery with intraoperative brachytherapy or external beam radiation or both. The remaining three patients had either traumatic or iatrogenic CBS., RESULTS: Twelve patients (26%) in our series had more than one episode of CBS in which a total of 32 (20 recurrent) events were observed (average 2.7, range 2-4). Intervals of rCBS ranged from 1 day to 6 years. Thirteen (65%) of 20 recurrent events were attributed to progressive disease (PD), and seven (35%) of 20 to treatment failures (TFs). In the PD group, seven (54%) of 13 had recurrent ipsilateral disease, and six (46%) of 13 had recurrent contralateral disease. Etiologies of rCBS were as follows: seven exposed carotids; seven carotid pseudoaneurysms; eight small-branch pseudoaneurysms; five tumor hemorrhages; three hyperemic/ulcerated wounds; and one aortic arch rupture. Twenty-seven of 32 events were treated with endovascular therapy, which included the following: nine carotid occlusions; 11 small-branch embolizations; three transarterial tumor embolizations; one carotid stent; and two direct-puncture embolizations. Four of six TFs were retreated successfully with endovascular therapy; the remaining two TFs were managed successfully by surgery. In the PD group, hemorrhagic complications of rCBS were managed successfully in all but one patient, who died. No permanent neurologic or ophthalmologic complications occurred., CONCLUSION: Recurrent CBS is a frequently encountered problem in which most cases are caused by PD resulting from both multifocal iatrogenic arteriopathy and occasional wound complications that are characteristic of aggressively managed head and neck surgical patients. Initial TFs are encountered often as well. Despite the diagnostic and therapeutic challenges of rCBS, most cases can be retreated effectively.

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952. Chalya, P. L., et al. (2011). "Aetiological spectrum, injury characteristics and treatment outcome of head injury patients at Bugando Medical Centre in north-western Tanzania." Tanzania journal of health research 13(1): 74-81.

Head injury is considered as a major health problem that is a frequent cause of death and disability and makes considerable demands on health services. A cross-sectional study was conducted to determine the etiological spectrum, injury characteristics and treatment outcome of head injury patients at Bugando Medical Centre (BMC) in North-western Tanzania. Data were collected using a pre-tested, coded questionnaire and analyzed using SPSS programme. A total of 260 head injury patients (mean age=26.84 years) were studied. Males outnumbered females by a ratio of 1.5:1. Road traffic accidents (RTAs) were the most common cause of injury accounting for 49.2% of patients. Scalp injuries, cerebral concussion and skull fractures were the most common type of head injuries. Fifty-six (21.5%) patients had associated injuries of which musculoskeletal region (36.1%) was commonly affected. Most of patients (66.1%) sustained mild head injury. The majority of patients (75.8%) were treated conservatively and only 24.2% of patients needed surgical interventions. Most of patients (85.4%) had good recovery. The mean hospital stay (LOS) was 24.56 days and the mortality rate was 11.2%. Patients who had RTAs, penetrating head injuries, associated long bone fractures and those who were treated surgically were found to have significantly longer LOS (P< 0.001). Mortality was found to be significantly associated with extreme of age, presence of pre-morbid illness and associated injuries, admission Glasgow Coma Score < 9, systolic blood pressure < 90mmHg, injury severity core > or =16, longer duration of loss of consciousness, the need for intensive care unit admission and finding of space occupying lesion on computed tomography scan (P < 0.001). Head injuries resulting from RTAs remain a major public health problem in this part of Tanzania. Urgent preventive measures targeting at reducing the occurrence of RTAs is necessary to reduce the incidence of head injuries in this region.

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953. Chambres, O., et al. (2003). "[A detailed examination of injuries to the head and neck caused by bullfighting, and of their surgical treatment; the role of the cervico-facial surgeon]." Specificites lesionnelles et chirurgicales des traumatismes de la tete et du cou en tauromachie. Role du chirurgien cervico-facial. 124(4): 221-228.

Bullfighting (corrida) dates back to the 13th century in France, especially in the Camargue and the South-West, even if this fight between man and wild bull had been described before in other

countries. The current modern bullfight, as an artistic interpretation, was codified in Spain during the 18th century into 3 tercios (parts): the tercio of the lance, of the bandillera, and of the muletta, which end with the death of the bull. Celebrated by our Spanish neighbours as a national fiesta, the corrida represents a confrontation between the intelligence of man and the power of the bull. Injuries are the heavy cost of this art paid by each bullfighter. Most of them have been injured seriously, or even gored to death inside the bullring. Goring is a single injury, a mix of wound, burn, contusion and infection. Its treatment calls for an expert, which makes this type of surgery highly specialised. Head and neck trauma represents 16% of the total wounds in bullfighting. Its not very often that this type of injury happens, but each time it is serious. This study is based on 1450 case reports, deals with causes and accident circumstances, together with the type of injuries and their early management in the bullring's infirmary. The seriousness of these wounds would justify a head and neck surgeon being part of the medical staff during the corrida.

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954. Chan, B. S., et al. (1989). "Urban trauma: an analysis of 1,116 paediatric cases." The Journal of trauma 29(11): 1540-1547.

Over a 2-year period 1,116 children admitted to an urban teaching hospital were studied prospectively. The overall group was analysed as to the nature of the injury and a subgroup of seriously injured children was identified and further analysed. All deaths were examined as to their cause and possible preventable as well as salvageable factors. The predictive value of the Trauma Score (T.S.) and Method of Injury (M.O.I.) were evaluated for their prospective prediction of serious injury as determined by the Injury Severity Score and outcome. Most of the children were not seriously injured, with the most common injury being due to a fall (57%) and involving a single injury to the upper limb. With the subgroup of 143 children (13% of the total) who suffered serious injuries, the cranial cavity (90%) was the most common site of injury, occurring most often in pedestrians (31% of the total injured). There were 16 deaths in the series, representing 1.4% of all paediatric trauma admissions and 11% of the admissions who were seriously injured. All deaths were related to motor vehicle accidents and associated with serious head injury. A Trauma Score less than or equal to 12 accurately included all deaths but when correlated with the I.S.S., the Trauma Score had a specificity of 99% and a positive predictive value of 86%; its sensitivity was only 27%. The Method of Injury was associated with an overtriage rate of 300% in relation to the I.S.S.. Of children admitted following pedal cycle accidents only 9% were wearing helmets. Of car occupants injured, 39% were unrestrained.(ABSTRACT TRUNCATED AT 250 WORDS)

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955. Chan, S. K., et al. (2014). "Transnasal penetrating intracranial injury with a chopstick." Hong Kong medical journal = Xianggang yi xue za zhi 20(1): 67-69.

We report the first case of a transnasal penetrating intracranial injury in Hong Kong by a chopstick. A 49-year-old man attempted suicide by inserting a wooden chopstick into his left nose and then pulled it out. The chopstick caused a transnasal penetrating brain injury, confirmed by contrast magnetic resonance imaging of the brain. He was managed conservatively. Later he developed meningitis without a brain abscess and was prescribed antibiotics for 6 weeks. He enjoyed a good neurological recovery. This case illustrates that clinician should have a high index of suspicion for penetrating intracranial injury due to a nasally inserted foreign body, even though it had already been removed. In such cases moreover, brain magnetic resonance imaging is the imaging modality of choice, as it can delineate the path of penetration far better than plain computed tomography.

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956. Chan, W., et al. (2019). "Complications of ocular tattooing: a Canadian case series." Canadian journal of ophthalmology. Journal canadien d'ophtalmologie 54(6): e273-e277.

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957. Chandler, J. A., et al. (2017). "Online public reactions to fMRI communication with patients with disorders of consciousness: Quality of life, end-of-life decision making, and concerns with misdiagnosis." AJOB empirical bioethics 8(1): 40-51.

BACKGROUND: Recently, the news media have reported on the discovery of covert awareness and the establishment of limited communication using a functional magnetic resonance imaging (fMRI) neuroimaging technique with several brain-injured patients thought to have been in a vegetative state. This discovery has raised many ethical, legal, and social questions related to quality of life, end-of-life decision making, diagnostic and prognostic accuracy in disorders of consciousness, resource allocation, and other issues. This project inquires into the public responses to these discoveries., METHODS: We conducted a thematic analysis of online comments (n = 779) posted in response to 15 news articles and blog posts regarding the case of a Canadian patient diagnosed for 12 years as in a vegetative state, but who was reported in 2012 as having been able to communicate via fMRI. The online comments were coded using an iteratively refined codebook structured around 14 main themes., RESULTS: Among the most frequent public reactions revealed in the online comments were discussions of the quality of life of patients with disorders of consciousness, whether life-sustaining treatment should be withdrawn (and whether the fMRI communication technique should be used to ask patients about this), and misgivings about the accuracy of diagnosis in disorders of consciousness and brain death., CONCLUSIONS: These public perspectives are relevant to the obligations of clinicians, lawyers, and public policymakers to patients, families, and the public. Future work should consider how best to alleviate families' concerns as this type of research shakes their faith in diagnostic accuracy, to clarify the legal rules relating to advance directives in this context, and to address the manner in which public messaging might help to alleviate any indirect impact on confidence in the organ donation system.

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958. Chandran, R., et al. (2013). "Serum microrna signatures as potential biomarkers of traumatic brain injury: A comparative study of three different rodent models of TBI." Journal of neurotrauma 30(15): A65.

Introduction Mild to moderate traumatic brain injury can often go undiagnosed due to the lack of reliable diagnostic markers. Diagnosis is further complicated by the heterogeneous nature of the cause and severity of injury. Circulating microRNAs found in serum are fast emerging as useful diagnostic biomarkers for various diseases. Methods In this study, three different rodent models of TBI ± weight drop injury model, controlled cortical impact (CCI) injury model and blast overpressure (BOP) injury model were used to replicate three different types of TBI ± closed head injury, penetrating TBI and blast TBI respectively. A weight-drop device was used to induce a single closed head injury (CHI) to the left parietal lobe in mice. Two different rod weights (246 and 333 g) and fall heights (2 and 3 cm) were used to simulate different injury severities within the mTBI spectrum. For the CCI model, a 1mm deep injury after craniotomy was performed on the left parietal lobe in mice. In the blast model, animals were exposed to three serial blasts of 120 kPa at an interval of 2 hours. Serum was collected at 3 hours following brain injury. MicroRNA expression profiles were carried out using TaqMan MicroRNA Array cards. Data analysis was done using RealTime StatMiner software. Results In the weight drop injury model, 7, 5, 10 and 20 microRNAs were significantly modulated in 246 g/2cm, 246g/3cm, 333g/2 cm and 333g/ 3 cm respectively. Five microRNAs (one up- and 4 down regulated) were significantly modulated in all the four injury groups. In the case of CCI model, 35 microRNAs were differentially expressed post injury and among them seven microRNAs were highly significant (2 up and 5 down regulated). In case of blast TBI model, 123 microRNAs were differentially modulated in serum at 3 hours post injury. Comparison of the microRNA expression profiles of the three TBI models showed that two microRNAs (mmu-miR-297c and mmu-miR-652) were common between the blast and CCI models whereas another two microRNAs (mmu-miR-875-5p and mmu-miR-450a-5p) were common between the blast and weight drop injury model. Further validation of the selected microRNAs and studies on their targets are in progress. Conclusions Serum microRNA signatures of the three different TBI models were found to be distinct and indicate that these may be useful in diagnosing mild to moderate TBI along with identifying the nature and cause of the injury. Common microRNAs between

the injury types can be an indication of the common molecular pathways being affected following the injury. Detailed studies on the selected micro- RNAs and their targets can also elucidate the pathophysiology of TBI.

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959. Chandran, V., et al. (2022). "Penetrating Head Injury to Intact Skull with a Ball Point Pen: A Rare Case." Neurology India 70(1): 466.

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960. Chang, C. C. and H. C. Wang (2021). "Emboli stroke following migration of carotid foreign body: A case report." eNeurologicalSci 22.

Foreign body embolization can cause intracranial artery occlusion with ischemic stroke. Reported etiologies include post cerebrovascular interventions, migration of esophageal foreign body and neck trauma. We reported a case with punctured wound at left neck, X-ray and computed tomography revealed a foreign body located in the carotid region. The patient eventually developed stroke symptoms in the next day after operation. Non-contrast brain Computer tomography at that time revealed that porcelain fragment located at the suprasellar area, and infarction of the left anterior basal ganglion. Our patient is the first reported case having an embolic stroke secondary to distal migration of a foreign body from the carotid artery after neck trauma. We call attention to this rare neurologic complication of neck trauma with foreign body retention. Appropriate and prompt identification of concurrent vascular injuries with retention of foreign body is strongly advised in neck trauma patients.

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961. Chang, C.-J., et al. (2002). "Oral wooden stick injury complicated by meningitis and brain abscess." Chang Gung medical journal 25(4): 266-270.

Meningitis is rarely seen following oral injury. We describe a 3-year-old boy developing meningitis and brain abscess following a penetrating oral wooden stick injury. There was no cerebrospinal fluid rhinorrhea noted. A cerebrospinal fluid culture yielded viridans streptococcus. Brain magnetic resonance imaging and computed tomography revealed a multiloculated ring-enhancing mass. This patient underwent surgical drainage and completed 8-week antibiotic therapy. The patient demonstrated a late and dismal complication of a penetrating oral injury. At 2-year follow-up the patient was in good condition. A penetrating oral wooden stick inury should be regarded as potentially serious.

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962. Chang, L., et al. (2003). "Persistent brain abnormalities in antiretroviral-naive HIV patients 3 months after HAART." Antiviral therapy 8(1): 17-26.

BACKGROUND: Proton magnetic resonance spectroscopy (1H-MRS) and neuropsychological tests may be useful for monitoring the effectiveness of highly active antiretroviral therapy (HAART) in HIV-associated brain injury. We aimed to evaluate whether brain abnormalities will improve 3 months after HAART., METHOD: Thirty-three HIV patients naive to antiretroviral medications were evaluated before and 3 months after HAART using 1H-MRS and neuropsychological tests; results were compared with those of 26 seronegative control subjects., RESULTS: Despite significant improvement in CD4 counts, and suppression of plasma and cerebrospinal fluid (CSF) viral loads, elevated brain metabolites (choline compounds and myoinositol in the frontal lobes) and neuropsychological tests abnormalities (including the computerized tests [CalCAP]) persisted after 3 months of HAART. In the basal ganglia, choline and myoinositol became elevated only after treatment. No interaction effect was observed between the number of CSF-penetrating drugs (one vs two) and changes (baseline vs 3 months) in any of the brain metabolites, cognitive performance or CSF viral load., CONCLUSIONS: The persistent brain abnormalities suggest ongoing repair or reactive inflammatory processes in the brain after 3 months of HAART. Regimens with two CSF-penetrating antiretroviral medications do not appear to be more effective than those with one CSF-penetrating drug in treating HIV brain injury at 3 months.

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963. Chang, R., et al. (2020). "Characteristics of trauma mortality in patients with aortic injury in Harris County, Texas." Journal of Clinical Medicine 9(9): 1-9.

Background: The National Academies of Science have issued a call for zero preventable trauma deaths. The mortality characteristics in all patients with aortic injury are not well described. Methods: All prehospital and hospital medical examiner records for deaths occurring in Harris County, Texas in 2014 were retrospectively reviewed, and patients with traumatic aortic injury were selected. The level of aortic injury was categorized by zone (0 through 9) and further grouped by aortic region (arch, zones 0 to 2; descending thoracic, zones 3 to 5; visceral abdominal, zones 6 to 8; infrarenal, zone 9). Multiple investigators used standardized criteria to categorize deaths as preventable, potentially preventable, or non-preventable. Results: Of 1848 trauma deaths, 192 (10%) had aortic injury. There were 59 (31%) aortic arch, 144 (75%) descending thoracic, 19 (10%) visceral abdominal, and 20 (10%) infrarenal aortic injuries. There were 178 (93%) non-preventable deaths and 14 (7%) potentially preventable deaths, and none were preventable. Non-preventable deaths were associated with blunt trauma (69%) and the arch or thoracic aorta (93%), whereas potentially preventable deaths were associated with penetrating trauma (93%) and the visceral abdominal or infrarenal aorta (79%) (all $p < 0.05$). Half of potentially preventable deaths ($n = 7$) occurred at the scene, and half occurred at a trauma center. Conclusion: Potentially preventable deaths after aortic injury were associated with penetrating mechanism and injury to the visceral abdominal and/or infrarenal aorta. Optimal prehospital and ED treatment include temporizing hemorrhage control, hemostatic resuscitation, and faster transport to definitive treatment.

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964. Chang, S. E., et al. (1998). "Successful removal of traumatic tattoos in Asian skin with a Q-switched alexandrite laser." Dermatologic surgery : official publication for American Society for Dermatologic Surgery [et al.] 24(12): 1308-1311.

BACKGROUND: Traumatic tattoos result from mechanical penetration of the skin by foreign-body particles associated with puncture, abrasive, or explosive trauma. Until the recent development of the Q-switched lasers, it was not possible to remove tattoo pigments without scar and pigmentary changes., OBJECTIVE: The objective of this study was to determine the effectiveness of the Q-switched alexandrite laser (wavelength, 755 nm; pulsewidth, 100 ns), in treating the 27 cases of Asian skin with 36 traumatic tattoos and to observe any side effects such as scarring or pigmentary change., METHODS: The results of treatments on 16 patients with 19 penetrant tattoos, 10 patients with 16 abrasive tattoos and 1 patient with bomb explosion were clinically analyzed., RESULTS: Greater than 76% removal of tattooed pigments required an average of 1.7 treatment sessions in penetrant tattoos in contrast with 2.4 sessions in abrasive tattoos. The excellent removal of traumatic tattoos required 7.5 J/cm2 except the scarred region of one explosive tattoo and one abrasive tattoo on soil. There were no permanent side effects such as scar or permanent pigmentary changes., CONCLUSION: In conclusion, the Q-switched alexandrite laser is a safe and highly effective modality for removal of various traumatic tattoos without scar or permanent pigmentary change in Asian skin.

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965. Chang, Y.-S., et al. (2002). "Severe stab injury of the eyelid can mimic eyeball perforation." Archives of ophthalmology (Chicago, Ill. : 1960) 120(10): 1410-1411.

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966. Channar, K. A., et al. (2011). "Comparison of open reduction and internal fixation versus closed reduction and fixation of maxillomandibular joint for the treatment of gunshot injuries of mandible." Journal of the Liaquat University of Medical and Health Sciences 10(3): 168-173.

Objectives: To determine the early and late outcome of two treatment options by open reduction and internal fixation versus closed reduction and Maxillomandibular fixation (MMF) in treatment of gunshot injuries of Mandible. Study Design: Prospective descriptive study. Place and Duration:Department of Oral and Maxillofacial Surgery King Edward Medical University/ Mayo

hospital Lahore from November 2008 to November 2009. Methodology: Sixty patients of gunshot injury were randomly allocated in two groups. In group A, 30 patients were treated by open reduction and internal fixation and in group B, 30 patients were treated by closed reduction and Maxillomandibular fixation. Postoperative complications were evaluated fortnightly and the outcome between two group were assessed Postoperatively infection, malocclusion, nonunion/ malunion of fracture fragments, facial asymmetry, exposed plate and sequestration of devitalized bone were checked. Patients were discharged as the treatment completed and recalled for post operative follow up. Results: Patients treated by open reduction were having fewer complications as compared to closed reduction i.e. 36.6%, and 50%. P-value (P>0.05) is significant in nonunion, mal union and facial asymmetry. Conclusion: Based on this study open reduction and internal fixation is the best available method for the treatment of gunshot injuries to the mandibular fractures after gunshot injuries.

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967. Chanut, G., et al. (1981). "[Report on 22 cases of perforating orbital wounds recorded in Africa (author's transl)]." A propos de 22 cas de plaies penetrantes de l'orbite observees en Afrique. 41(5): 477-485.

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968. Chapman, A. J. and J. McClain (1984). "Wandering missiles: autopsy study." The Journal of trauma 24(7): 634-637.

Five cases of firearm missile emboli are reported. Three were not unusual arterial bullet emboli. One, however, was a single shotgun pellet embolus which produced death from cerebral infarction. The fifth case appears to be the first known to embolize within the portal system and was associated with a 'wandering bullet' within the pericardial space.

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969. Charlier, P., et al. (2012). "Unusual death by rubber bullet: should these guns be reclassified as lethal weapons?" The American journal of forensic medicine and pathology 33(1): e4.

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970. Charlier, P., et al. (2014). "[Broncho-pulmonary aspiration of brain and cartilage tissue in a context of gasping]." Inhalation broncho-pulmonaire de matieres cerebrales et cartilagineuses au cours d'une respiration agonique. 34(6): 474-476.

Evidence of post-mortem breath movements are rarely reported. We present two cases of broncho-pulmonary aspiration of brain and cartilage tissue following two fatal suicidal gunshots to the head. We also discuss the physiopathological implications for the agony.

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971. Charlier, P., et al. (2014). "Maori heads (mokomokai): the usefulness of a complete forensic analysis procedure." Forensic science, medicine, and pathology 10(3): 371-379.

Based on an analysis of 19 mummified Maori heads (mokomokai) referred to our forensic laboratory for anthropological analysis prior to their official repatriation from France to New Zealand, and data from the anthropological and medical literature, we propose a complete forensic procedure for the analysis of such pieces. A list of 12 original morphological criteria was developed. Items included the sex, age at death, destruction of the skull base, the presence of argil deposits in the inner part of the skull, nostrils closed with exogenous material, sewing of eyelids and lips, pierced earlobes, ante-mortem and/or post-mortem tattoos, the presence of vegetal fibers within nasal cavities, and other pathological or anthropological anomalies. These criteria were tested for all 19 mokomokai repatriated to New Zealand by the French authorities. Further complementary analyses were limited to fiberscopic examination of the intracranial cavities because of the taboo on any sampling requested by the Maori authorities. In the context of global repatriation of human artifacts to native communities, this type of anthropological

expertise is increasingly frequently requested of forensic anthropologists and other practitioners. We discuss the reasons for and against repatriating non-authentic artifacts to such communities and the role played by forensic anthropologists during the authentication process.

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972. Charry, J. D., et al. (2016). "Damage control of civilian penetrating brain injuries in environments of low neuro-monitoring resources." British journal of neurosurgery 30(2): 235-239.

INTRODUCTION: Gunshot wounds to the head are more common in military settings. Recently, a damage control (DC) approach for the management of these lesions has been used in combat areas. The aim of this study was to evaluate the results of civilian patients with penetrating gunshot wounds to the head, managed with a strategy of early cranial decompression (ECD) as a DC procedure in a university hospital with few resources for intensive care unit (ICU) neuro-monitoring in Colombia., MATERIALS AND METHODS: Fifty-four patients were operated according to the DC strategy (<12 h after injury), over a 4-year period. Variables were analysed and results were evaluated according to the Glasgow Outcome Scale (GOS) at 12 months post injury; a dichotomous variable was established as 'favourable' (GOS 4-5) or 'unfavourable' (GOS 1-3). A univariate analysis was performed using a chi(2) test., RESULTS: Forty (74.1%) of the patients survived and 36 (90%) of them had favourable GOS. Factors associated with adverse outcomes were: Injury Severity Score (ISS) greater than 25, bi-hemispheric involvement, intra-cerebral haematoma on the first CT, closed basal cisterns and non-reactive pupils in the emergency room., CONCLUSION: DC for neurotrauma with ECD is an option to improve survival and favourable neurological outcomes 12 months after injury in patients with penetrating traumatic brain injury treated in a university hospital with few resources for ICU neuro-monitoring.

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973. Chatrath, V., et al. (2015). "Fluid management in patients with trauma: Restrictive versus liberal approach." Journal of Anaesthesiology Clinical Pharmacology 31(3): 308-316.

Trauma is a leading cause of death worldwide, and almost 30% of trauma deaths are due to blood loss. A number of concerns have been raised regarding the advisability of the classic principles of aggressive crystalloid resuscitation in traumatic hemorrhagic shock. Some recent studies have shown that early volume restoration in certain types of trauma before definite hemostasis may result in accelerated blood loss, hypothermia, and dilutional coagulopathy. This review discusses the advances and changes in protocols in fluid resuscitation and blood transfusion for treatment of traumatic hemorrhage shock. The concept of low volume fluid resuscitation also known as permissive hypotension avoids the adverse effects of early aggressive resuscitation while maintaining a level of tissue perfusion that although lower than normal, is adequate for short periods. Permissive hypotension is part of the damage control resuscitation strategy, which targets the conditions that exacerbate hemorrhage. The elements of this strategy are permissive hypotension, minimization of crystalloid resuscitation, control of hypothermia, prevention of acidosis, and early use of blood products to minimize coagulopathy.

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974. Chattha, A., et al. (2018). "An Algorithmic Approach to the Management of Ballistic Facial Trauma in the Civilian Population." The Journal of craniofacial surgery 29(8): 2010-2016.

Annual incidence of non-fatal ballistic civilian has been increasing for the last decade. The aim of the present study was to clarify the optimal reconstructive management of civilian ballistic facial injuries. A systematic review of PubMed was performed. Articles were evaluated for defect type and site, reconstructive modality, complications, and outcomes. A total of 30 articles were included. Most common region of injury was mandibular with a 46.6% incidence rate. All-cause complication rate after reconstruction was 31.0%. About 13.3% of patients developed a postoperative infection. Gunshot wounds had overall lower complication rates as compared with shotgun wounds at 9.0% and 17.0%. By region, complications for gunshot wounds were 35% and 34% for mandible and maxilla, respectively. Immediate surgical intervention with conservative serial debridement is recommended. However, for

patients with pre-existing psychiatric disorders, secondary revisions should be delayed until proper psychiatric stabilization. When there is extensive loss of soft tissue in the midface, aesthetic outcomes are achieved with a latissimus dorsi or anterolateral thigh free flap. Radial forearm flap is favored for thin lining defects. Open reduction is suggested for bony-tissue stabilization. The fibula flap is recommended for bony defects >5 cm in both midface and mandible. For bony defects, <5 cm bone grafting was preferred. Delaying bone grafting does not worsen patient outcomes. Surgical treatment of ballistic facial trauma requires thorough preparation and precise planning. An algorithm that summarizes the approach to the main decision points of surgical management and reconstruction after ballistic facial trauma has been presented in this study.

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975. Chattopadhyay, S. (2008). "Accidental low velocity atypical missile injury to the head." The American journal of forensic medicine and pathology 29(4): 334-336.

Missile injuries on the head are mostly due to firearms. Atypical missiles may be encountered in case of shrapnel of bomb explosions but rarely because of stones. The present case is a rare case where a stone propelled by the pressure from the rear wheel of a speeding truck on the highway, struck the head of a 7-year-old girl resulting in fatality. Reconstruction of the incident on the basis of history and postmortem findings throws some light on the mechanism. The case is unique as it is the first reported case of an accidental missile injury to the head resulting in fatality without any direct human involvement for propulsion of the projectile.

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976. Chattopadhyay, S., et al. (2013). "Fatal crocodile attack." Journal of forensic and legal medicine 20(8): 1139-1141.

Attacks on human beings by various animals leading to varied types of injuries and even death in some cases are not uncommon. Crocodile attacks on humans have been reported from a number of countries across the globe. Deaths in such attacks are mostly due to mechanical injuries or drowning. Bites by the crocodiles often cause the limbs to be separated from the body. The present case refers to an incident of a fatal attack by a crocodile on a 35 years old female where only the mutilated head of the female was recovered. Multiple lacerated wounds over the face and scalp along with fracture of the cranial bones was detected on autopsy. Two distinct bite marks in the form of punched in holes were noted over the parietal and frontal bones. Injuries on the head with its traumatic amputation from the body were sufficient to cause death. However, the presence of other fatal injuries on the unrecovered body parts could not be ruled out.

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977. Chattopadhyay, S., et al. (2009). "Fatal transorbital head injury by bicycle brake handle." Journal of forensic and legal medicine 16(6): 352-353.

Accidental transorbital head injuries are quite rare. Penetrating head injuries by blunt objects are possible when the site of penetration is through the orbit or the thin temporal bone. The present case is a rare case of transorbital penetrating head injury by a blunt object - bicycle brake handle. Minor external wounds may be misleading and fatal consequences may ensue if cerebral damage is missed on diagnosis. Proper antibiotic coverage to prevent meningitis and neurosurgical intervention can reduce mortality in such cases.

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978. Chau, A., et al. (2015). "The effect of claustrum lesions on human consciousness and recovery of function." Consciousness and cognition 36: 256-264.

Crick and Koch proposed that the claustrum plays a crucial role in consciousness. Their proposal was based on the structure and connectivity of the claustrum that suggested it had a role in coordinating a set of diverse brain functions. Given the few human studies investigating this claim, we decided to

study the effects of claustrum lesions on consciousness in 171 combat veterans with penetrating traumatic brain injuries. Additionally, we studied the effects of claustrum lesions and loss of consciousness on long-term cognitive abilities. Claustrum damage was associated with the duration, but not frequency, of loss of consciousness, indicating that the claustrum may have an important role in regaining, but not maintaining, consciousness. Total brain volume loss, but not claustrum lesions, was associated with long-term recovery of neurobehavioral functions. Our findings constrain the current understanding of the neurobehavioral functions of the claustrum and its role in maintaining and regaining consciousness.

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979. Chaudhary, R., et al. (2015). "The role of computerised tomography in predicting visual outcome in ocular trauma patients." Eye (London, England) 29(7): 867-871.

PURPOSE: Ocular blast injuries in the military setting are particularly associated with significant maxillofacial trauma and/or brain injury. The opportunity to perform a comprehensive ophthalmic evaluation is frequently limited in the acute multiple trauma scenario. We aim to describe the relationship between the clinical effects of acute ocular and orbital blast trauma with the findings on computerised tomography (CT)., METHODS: This was a retrospective consecutive case series of all soldiers with facial and/or suspected ocular injuries. A total of 80 eyes that had suffered blast injuries of varying severity were studied. Assessment of orbital and ocular CT images were performed by military consultant radiologists. A comparison was made with actual clinical findings. Statistical analysis was performed using Fisher's exact test., RESULTS: No pathological findings were described in 37 of the 80 eyes imaged by orbital and ocular CT scans. Clinically, these eyes and orbits were all found to be intact, or had minor trauma. All foreign bodies and penetrating eye injuries were successfully diagnosed by CT. Absence of an orbital fracture did not rule out a globe injury. However, a corneal or scleral defect was less likely when an orbital fracture was absent., CONCLUSION: The eye is a delicate structure prone to injury that requires urgent repair if breached. It is difficult to assess thoroughly in the unconscious or distressed patient. In this context, CT imaging is invaluable to be able to make a relatively confident prediction of clinical findings and decide upon the necessity for acute ophthalmic surgical intervention.

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980. Chaudhri, K. A., et al. (1994). "Penetrating craniocerebral shrapnel injuries during "Operation Desert Storm": early results of a conservative surgical treatment." Acta neurochirurgica 126(2-4): 120-123.

A follow-up study is presented of the initial neurosurgical treatment of 20 patients who sustained penetrating craniocerebral injuries during "Operation Desert Storm". Fifteen of these patients had received intracranial debridement through a craniectomy and five patients had received care of scalp wounds only. Following treatment and stabilisation in a frontline hospital, these patients were transferred to the Riyadh Armed Forces Hospital for further evaluation and management. On admission, all the patients received a computerised tomographic scan which revealed shrapnel fragments inside their brain. No attempt had been made to remove the metal fragments. A patient with an infected scalp wound was treated with a course of appropriate antibiotics and the wound dressed. Dexamethasone was not used. Anticonvulsants were used only in one patient who had been treated for a presumed cerebral abscess. The neurological status of the patients improved along with the reduction of oedema and the swelling of the brain as shown in the follow-up CT scans. No patient died or developed a seizure disorder. These results suggest that re-operation for removal of retained fragments is unnecessary. It is concluded that the initial treatment of shrapnel wounds of the brain should be to preserve maximal cerebral tissue and function either by limiting the wound debridement performed through a craniectomy or by care of scalp wounds only.

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981. Chaudhry, H., et al. (2017). "Sagittal sinus stenosis as a cause of increased intracranial pressure." Neurology 88(16).

Objective: To report a case of medical therapy for elevated intracranial pressure (ICP) secondary to venous sinus stenosis. Background: Venous sinus injury has been described after trauma, often in the setting of surgical intervention following failed medical management for venous sinus thrombi. Venous sinus stenosis following depressed occipital skull fracture is a rare but described phenomenon. Although successful surgical management has been reported, successful medical management has not. Design/Methods: Case report. Literature review (PubMed). Results: A 41 year-old male presented with a gunshot wound to the back of the head. CT head showed bullet fragments in the occipital bone with multiple depressed skull fractures with minimal surrounding edema and extraaxial hemorrhage. Initial CT venogram revealed a distorted posterior superior sagittal sinus but both proximal and distal flow were patent. Patient was discharged home day 6 with reportedly normal neurologic exam. Day 14 posttrauma, patient reported worsening of his headache, blurry vision and new binocular diplopia. Formal ophthalmologic exam showed 20/40 visual acuity bilaterally with complete color vision loss in his left eye, bilateral 6th nerve palsies and 2+ bilateral papilledema. Patient also was noted to have a mild left facial droop and left lower extremity weakness. Repeat CT venogram was again stable but limited. Conventional angiogram revealed severe stenosis in the superior sagittal sinus without thrombosis. Patient was medically managed with acetazolamide 250mg BID and symptoms improved. On follow-up 2 weeks later, subtle improvement was noted in his color vision, visual acuity and papilledema as well as facial droop. Patient was started on aspirin 81mg to help prevent the formation of thrombi with plan to follow up again in 3 months. Conclusions: In cases of traumatic superior sagittal sinus stenosis, increased ICP may present remotely from initial injury and medical management may be an option.

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982. Chaudhry, I. A., et al. (2005). "Severe ocular injuries from pointed door handles in children." Ophthalmology 112(10): 1834-1837.

OBJECTIVE: To report severe ocular injuries caused by pointed door handles in children., DESIGN: Noncomparative, interventional, retrospective case series., METHODS: Clinical records of 15 patients who sustained severe ocular injuries from door handles were reviewed for place of trauma, presenting symptoms and signs, surgical procedures performed, and final outcome., MAIN OUTCOME MEASURES: Trauma caused by complications from the door handle injury, such as loss of vision and ocular and adnexal injuries, and treatment rendered., RESULTS: There were 12 boys and 3 girls with an average age of 7.8 years (range, 6-10 years). Place of trauma was at home in 12 children and in school in 3 children. Presenting visual acuity (VA) was 4/200 in 1 patient, light perception (LP) in 5 patients, and no light perception (NLP) in 9 patients. There were 9 eyelid or canalicular lacerations, 4 ruptured globes, and 14 optic nerve avulsions. All ruptured globes were repaired initially and eyelid and canalicular lacerations were repaired primarily within 24 hours of presentation. Average follow-up was 21 months (range, 1 month-8 years). Final VA was 20/30 in 1 patient, LP in 1 patient, and NLP in 13 patients. Eight eyes required enucleation for painful blind eye or to achieve optimal cosmesis., CONCLUSIONS: Pointed door handles installed at current heights may pose a significant risk of ocular and periocular injuries among young children.

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983. Chauhan, M., et al. (2017). "Fatal orbito-cerebral penetration by industrial grease viscous: Rare case report." The Medico-legal journal 85(2): 100-102.

Assorted projectiles including shrapnel, sling shots, stones, metal and rock fragments and other missiles cause fatal penetrating skull injuries. In this case, a 34-year-old foreman suffered a fatal penetrating orbito-cerebral injury while lubricating a hydraulic rock-splitting machine with industrial grease viscous.

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984. Chauhan, R., et al. (2018). "Anesthesia for Emergency Preservation and Resuscitation (EPR) for Traumatic Cardiac Arrest: a Brief Review." Current Anesthesiology Reports 8(1): 59-62.

Purpose of Review: We present the anesthesia management protocol currently in development at our institution for those patients enrolled into the Emergency Preservation and Resuscitation for Cardiac Arrest from Trauma (EPR-CAT) Clinical Trial. Recent Findings: Emergency preservation and resuscitation (EPR) utilizing saline and deep hypothermia is a novel approach for management of trauma patients who present with life threatening non-compressible hemorrhage. This pioneering technique has transitioned from laboratory animal studies to human clinical trials. Summary: Patients who experience witnessed cardiac arrest from penetrating trauma and fail conventional therapy are eligible for enrollment in the EPR-CAT trial. This concept involves replacing the patient's blood volume with cold saline to rapidly induce hypothermia and drastically reduce the metabolic rate of the heart, brain, and other vital organs. It is expected that this approach should give surgeons up to 1 hour to operate and gain surgical hemostasis before hypoxic brain damage would otherwise occur. After surgical control of hemorrhage, patients are reperfused via cardiopulmonary bypass (CPB) with balanced blood products and rewarmed back to near normal temperatures. During cooling and CPB, the patients are anticoagulated with heparin with the goal of restoring normal coagulation after liberation from CPB. The primary outcome measure is survival to hospital discharge with minimal neurologic deficits.

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985. Chaushu, G., et al. (1997). "Infraorbital abscess from orthodontic headgear." American journal of orthodontics and dentofacial orthopedics : official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics 112(4): 364-366.

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986. Chavali, S., et al. (2014). "Traumatic subclavian arterial thrombosis presenting with cerebral infarct--a case report." Heart, lung & circulation 23(10): e202-206.

Subclavian artery thrombosis is a rare complication of sternoclavicular fractures. Also, cerebral infarcts caused by subclavian artery thrombosis, post trauma, is very unusual. We report the case of a 49 year-old female patient presenting with traumatic subclavian arterial thrombosis and cerebral infarction secondary to a fractured manubrium with posteriorly displaced right clavicle and retrograde thromboembolisation.

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987. Chebotareva, N. M. and V. P. Vovk (1967). "[Changes of cerebrospinal and venous pressure in experimental penetrating cranio-cerebral trauma]." Izmeneniia likvornogo i venoznogo davleniia pri pronikaiushchei cherepno-mozgovoi travme v eksperimente. 31(2): 25-30.

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988. Chedid, M. K., et al. (1989). "Major cerebral vessels injury caused by a seatbelt shoulder strap: case report." The Journal of trauma 29(11): 1601-1603.

Major cerebral arterial injury may result from penetrating or blunt trauma. In blunt trauma, clinical suspicion of such injury may not be raised, especially if the cranial CT scan is negative. We report a case of a seatbelt shoulder strap to the neck resulting in injury to three major cerebral vessels as demonstrated by cerebral angiography. Although the initial cranial CT scans were negative, a cerebral infarction ultimately developed. The patient was managed conservatively and recovered most of her functions. The importance of clinical suspicion and cerebral angiography is stressed.

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989. Chedid, M. K., et al. (2001). "Delayed appearance of a traumatic intracranial aneurysm. Case report and review of the literature." Journal of neurosurgery 94(4): 637-641.

Giant traumatic intracranial aneurysms are rare, and thus their incidence and clinical behavior are poorly understood. In most cases, traumatic aneurysms develop and become symptomatic within months

following injury. The authors present the case of a 46-year-old war veteran, in whom a giant internal carotid artery aneurysm developed as a result of a penetrating cranial shrapnel injury sustained 25 years earlier during the Vietnam war. The aneurysm had not been evident on previous imaging studies. At surgery, a piece of shrapnel was found embedded in the dome of the aneurysm. The presentation, diagnosis, management, and treatment options related to this lesion are discussed.

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990. Cheema, A., et al. (2020). "A CASE OF AN EMBOLIZING BULLET." Chest 158(4): A905.

SESSION TITLE: Medical Student/Resident Critical Care Posters SESSION TYPE: Med Student/Res Case Rep Postr PRESENTED ON: October 18-21, 2020 INTRODUCTION: Pulmonary bullet embolism arising from gunshot wounds are relatively rare and therefore have no clear guidelines for treatment. Management options include removal of the bullet fragments through endovascular approach or thoracotomy versus conservative approach with anticoagulation. We present a case of bullet embolism in bilateral lungs with hemorrhagic complication requiring emergent surgery. CASE PRESENTATION: 19 years old African American male was admitted to the trauma service following a gunshot wound (GSW) to the right upper chest. On presentation, the gunshot wound was not bleeding and the patient was hemodynamically stable. CT angiography showed bullet fragments within the segmental pulmonary arteries within the left upper lobe and right lower lobe. These fragments entered through the injured superior vena cava and embolized to pulmonary arteries. Upper GI endoscopy was done to rule out oesophagal injury. Post-procedure, patient coughed resulting in dislodgement of the clot and subsequent bleeding from the wound site. He was rushed emergently to the OR to control the bleeding. The patient underwent median sternotomy with the repair of vessels injured by the bullet. During the procedure, the patient had a cardiac arrest that was successfully resuscitated with open heart massage. He was transiently placed on cardiopulmonary bypass. He was subsequently transferred to the critical care unit (CCU) where targeted temperature management was initiated to minimize post-cardiac arrest brain injury. He was extubated 2 days following admission to CCU. The decision was made not to remove the bullet fragments and treat patient conservatively with observation and anticoagulation. Warfarin was therefore started with goal INR of 2-3. The patient was discharged to rehab in stable condition. After 1 year, the patient remains asymptomatic and compliant to therapy. DISCUSSION: Pulmonary embolism arising from GSWs is a rare occurrence with less than 200 case reports in the literature1. In our case, it is presumed that the fragments travelled from the right subclavian area, superior vena cava, right heart and to the pulmonary arteries. Fragmented venous bullet emboli are usually managed with retrieval or conservative management. Risks of leaving the bullet fragment emboli include pulmonary infarct, dislodgement and vascular damage, haemorrhage and death. Risks of emboli removal include thrombus formation, vessel damage and complications related to the surgery2 CONCLUSIONS: Although consensus on management of bullet emboli remains unclear, our case argues that conservative management with anticoagulation should take precedence over surgical/invasive approach in the management of bilateral or multiple bullet emboli. Reference #1: 1. Honig EL, Fransman R, Alvin M, et al Shotgun wound to the leg: strategies in managing acute arterial injury and bullet emboli to the heart and lungs Case Reports 2017;2017:bcr-2017-222985 Reference #2: 2. Imbert PY, Goin G, Goudard Y, De La Villeon B, Bonnet PM, Sockeel P, Pauleau G. Pulmonary Artery Bullet Embolism Following Cardiac Gunshot Wound; Annals of Vascular Surgery, 2016-10-01, Volume 36, Pages 290.e11-290.e14, DISCLOSURES: No relevant relationships by Muhammad Aamir, source=Web Response No relevant relationships by Muhammad Afzal, source=Web Response No relevant relationships by Adil Cheema, source=Web Response No relevant relationships by Muhammad Talha Khan, source=Web Response No relevant relationships by Luna Khanal, source=Admin input

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991. Cheema, M., et al. (2018). "A rare case of orbital granulomatous inflammation from explosive hydraulic oil masquerading as orbital cellulitis." Orbit (Amsterdam, Netherlands) 37(2): 154-156.

The differential diagnosis for acute orbital inflammation is broad. We report a case of granulomatous orbital inflammation due to high-pressure oil injury to the orbit presenting as an atypical orbital cellulitis. Here we review the presentation and treatment of orbital inflammation from oil.

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992. Chegini, S., et al. (2014). "5 year review of a tertiary multispecialty craniofacial trauma unit. The oxford experience." British Journal of Oral and Maxillofacial Surgery 52(8): e46-e47.

Introduction: There is a trend towards care in multispecialty tertiary centres with evidence of improved outcomes. The Oxford University Hospitals Craniofacial Trauma unit was set up 5 years ago as a joint Oral & Maxillo-facial and Neurosurgical service. We present our experience to date in the treatment of patients with Frontal Sinus (FS) and Nasoorbito- ethmoid fractures (NOE). Method: The study included 97 patients (average followup time 8 years) with a 83% data capture rate which was collected from a prospective database and retrospectively from medical records using a pre-designed proforma. Recorded data included method of treatment and clinical and radiological outcomes. Results: Data (60% FS, 3% NOE, 19% FS & NOE) showed male:female ratio 7:1 with mean admission age of 35. Data included mechanisms of injury (36% RTA, 25% fall from a height, 11% assault, 4% gunshot), 14% presented with GCS<8 and 15% required preoperative ITU admission. Patients commonly presented with other injuries (18% Le Fort fractures, 18% skull fracture, 25% intra-cranial haemorrhage, 13% thoracic, 27% limb, 6% spine). FS fractures were treated conservatively (44%), by cranialisation (44%) or ORIF with sinus preservation (13%) with mean time to theatre of 8 days.We report treatment outcomes on CSF leak & duration, infections, late contour irregularity and need for further surgery. Conclusion: There are no agreed national guidelines for the treatment of FS/NOE. We present outcomes from one dedicated multi-specialist Craniofacial Trauma Unit in the UK which may inform benchmarking for care of patients with this specific group of injuries.

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993. Chegini, S., et al. (2016). "Outcomes of treatment of fractures of the frontal sinus: review from a tertiary multispecialty craniofacial trauma service." The British journal of oral & maxillofacial surgery 54(7): 801-805.

There are no agreed national guidelines for the treatment of fractures of the frontal sinus and the naso-orbitoethmoid complex. The Oxford University Hospitals Craniofacial Trauma unit was set up five years ago as a joint oral and maxillofacial, ENT, and neurosurgical service, and we present our experience to date in the treatment of patients with such fractures. The study includes 91 patients with data collected from a prospective database. Patients underwent cranialisation if they met the criteria of persistent leak of cerebrospinal fluid (CSF), displaced fracture of the posterior wall or obstruction of the nasofrontal outflow tract. The mean follow-up time was 42 months (range 1-10 years). Three groups of patients were analysed. Group 1 met the criteria for, and were treated by, cranialisation (n=50). Group 2 met the criteria for cranialisation, but were treated conservatively because of coexisting conditions (n=8). Group 3 did not match the criteria for treatment, and were managed conservatively (n=33). The numbers of patients with complications or who required further operation were: group 1 (4/50), group 2 (3/8), and group 3 (3/33). There were significantly fewer complications among those patients who met the operative criteria and were treated by cranialisation than among those treated conservatively (p=0.04). These outcomes from one dedicated multispecialist craniofacial trauma unit in the UK may help surgeons who care for patients with this specific group of injuries. Our morbidity was in keeping with published figures.

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994. Chehade, L. K., et al. (2019). "Traumatic intraorbital wooden foreign body: Lessons learnt." Clinical & experimental ophthalmology 47(4): 543-545.

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995. Chen, C. P. C., et al. (2011). "Accidental chopstick injury resulting in internal capsule lesion and intracerebral hemorrhage." American journal of physical medicine & rehabilitation 90(11): 959.

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996. Chen, C. S., et al. (2002). "Orbital foreign body misdiagnosed as superior orbital rim fracture." Clinical & experimental ophthalmology 30(4): 295-296.

Orbital foreign bodies may be difficult to diagnose clinically and radiologically. In cases where a foreign body is suspected, both the mechanism of injury and the composition of the offending material need to be taken into account. A case is described of an orbital foreign body misdiagnosed as a superior orbital rim fracture, resulting in persistent ptosis and diplopia, and leading to delayed recovery for the patient, a commercial airline pilot.

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997. Chen, C. Y. and J. P. Peng (2011). "Esophageal fish bone migration induced thyroid abscess: case report and review of the literature." American journal of otolaryngology 32(3): 253-255.

A thyroid abscess is a rare condition, and it is so infrequently encountered. A migrated fish bone is a rare otolaryngologic emergency indicated when the foreign body penetrates through the esophageal mucosa into the thyroid gland space of the neck after several weeks of swallowing. We present the case of a 50-year-old woman who had fever and anterior neck painful mass. An intrathyroid abscess was diagnosed; and she underwent thyrotomy with transcervical approach. A foreign body, which proved to be a fish bone and which fortunately did not cause any adverse effects, was removed.

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998. Chen, J. W. Y., et al. (2009). "Posttraumatic epilepsy and treatment." Journal of rehabilitation research and development 46(6): 685-696.

Posttraumatic epilepsy (PTE) is a major long-term complication of traumatic brain injury (TBI). PTE usually develops within 5 years of head injury. The risk for developing PTE varies with TBI type. Both Korean and Vietnam war veterans with penetrating TBI had a 53% risk of developing PTE. The risk of developing PTE is between 10% and 25% in combat-associated closed-head trauma with positive brain imaging and about 5% in moderately severe closed-head injury without imaging finding. We do not know the risk of PTE among Operation Iraqi Freedom/Operation Enduring Freedom veterans with minimal TBI because of blast exposure.Partial seizures may manifest with subtle behavioral alterations that can be mistaken for manifestations of posttraumatic stress disorder and improperly treated. Accidents and medical complications commonly occur during seizures. Sudden unexpected death in epilepsy is most frequent among 20- to 40-year-olds. Seizures increase the likelihood of refractory seizures years after TBI. Seizures are also a social stigma that compromise veterans' reintegration into society. People with uncontrolled epilepsy are not allowed to drive and have difficulty obtaining or maintaining employment. Optimal seizure control is essential to the physical and emotional health of veterans with TBI and to their ability to lead productive lives.

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999. Chen, L., et al. (2007). "Retransplantation of fetal olfactory ensheathing cells for chronic spinal cord injury in 1 case." Journal of Clinical Rehabilitative Tissue Engineering Research 11(33): 6690-6692.

Aim: To explore the efficacy of olfactory ensheathing cell (OEC) on neural function after intraspinal retransplantation on the treatment of chronic spinal cord injury (SCI). Methods: 1 One 27-year-old man of Kazakstan with chronic complete spinal cord injury at thoracic vertebrae 12 (T12), who had suffered from paraplegia, urinary and fecal incontinence, and severe pain in right lower limb following a emergency operation due to a gunshot wound on September 20th, 2001, was selected as subject. It was A-level injury according to the standard of America Spinal Injury Association. The subject was treated with two OEC intraspinal transplantations in September 30th, 2002 and February

5th, 2007, respectively. Therapeutic scheme was known by the patient. 2 Olfactory bulb of 4-month aborted fetus was obtained with the agreement of pregnant women and their family members and trypsinized to single OECs, and then cultured for 2 weeks with concentration of 2×1010 L-1. A keyhole with the diameter of 3 cm was made on T11. 100 μL(the first operation) and 50 μL (the second operation) OEC suspension were injected into avascular area along median line of juncture between injured spinal cord and normal spinal cord with No. 4.5 fine needle (1×106 each time), respectively. Donor and receptor HLA zygosity was done before the second transplantation. The patient took orally FK506 capsule 2 mg, twice a day for 42 days after operation. Results: 1 The patient was able to control his urination well for 6 hours at month 3 after the first transplantation. His both ankles moved freely and his sexual function involved penis erection ameliorated. The pain relieved. 2 10.days after the second transplantation, the sweating in his both feet increased, the pain in his lower limb reduced, skin of abdomen was better and the sensation to pin prick improved from absent to decreased at the dermatome of T10. The findings of paraspinal somatosensory evoked potentials (PSSEPs) showed that the sensory level declined from T10 to T12, bilaterally. Conclusion: The patient achieved some new improvements of neurologic function after OEC retransplantation. The issues on the amount and volume of the transplanted cells and injection site need to be further studied.

1000. Chen, L. L. K., et al. (2014). "Posttraumatic epilepsy in Operation Enduring Freedom/Operation Iraqi Freedom veterans." Military medicine 179(5): 492-496.

Penetrating traumatic brain injury (TBI) is a well-established risk factor for post-traumatic epilepsy (PTE). However, many veterans in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) who suffer from TBI do so from blast injury, and its consequences are not fully known. Two neurologists performed a chart review to describe patterns of injury and health care among all 16 OEF/OIF veterans at the VA Greater Los Angeles Healthcare System who were assigned an outpatient diagnosis of both epilepsy and TBI in 2008-2009. All Veterans were male, and the mean age was 30 years. Blast exposure was the most common mechanism of TBI (81%). Although all Veterans were assigned a diagnosis code of seizures, the diagnosis of PTE was clinically confirmed in only 3 veterans. On the other hand, the diagnosis of post-traumatic stress disorder was confirmed in 81% of the sample and a diagnosis of nonepileptic seizures was suspected in 44% of the sample. Researchers who study PTE among the OEF/OIF population using administrative data also should perform chart reviews to account for the prevalence of psychogenic nonepileptic seizures. Reprint & Copyright © 2014 Association of Military Surgeons of the U.S.

1001. Chen, P., et al. (2010). "Penetrating cranionasal injury in a child caused by a bicycle spoke." Pediatric emergency care 26(11): 837-839.

Penetrating cranionasal injuries are relatively rare, usually occur in young children, and can be caused by a variety of unusual objects. The mortality and disability rates are high without appropriate treatment. We report a penetrating cranionasal injury caused by a bicycle spoke. Some fundamental principles in the diagnosis and treatment of penetration injuries are emphasized from this case and the surrounding literature reviewed.

1002. Chen, P. C., et al. (2014). "Post-traumatic cerebral infarction following low-energy penetrating craniocerebral injury caused by a nail." Journal of Korean Neurosurgical Society 55(5): 293-295.

Post-traumatic cerebral infarction (PTCI) is a secondary insult which causes global cerebral hypoxia or hypoperfusion after traumatic brain injury, and carries a remarkable high mortality rate. PTCI is usually caused by blunt brain injury with gross hematoma and/or brain herniation. Herein, we present the case of a 91-year-old male who had sustained PTCI following a low-energy penetrating craniocerebral injury due to a nail without evidence of hematoma. The patient survived after a decompressive craniectomy, but permanent neurological damage occurred. This is the first case of

profound PTCI following a low-energy penetrating craniocerebral nail injury and reminds clinicians of possibility this rare dreadful complication for care of head-injured patients.

1003. Chen, P. Y., et al. (2014). "A shocking craniofacial penetrating injury by a steel bar." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 20(5): 382-384.

Owing to the diversity in cause and damage, there is no standard surgical treatment method for a complicated penetrating craniofacial injury. The treatment of a complicated penetrating head injury caused by a steel bar is presented here. A 66-year-old woman fell onto a steel bar at a construction site and it penetrated the mandible, entered the sinus and orbital cavities, and reached the base of the frontal bone. A multi-disciplinary team including a neurosurgeon, otolaryngologist, and plastic surgeon was involved in removing the steel bar. The patient survived without sequelae except for blindness in the right eye. Despite the lack of standardized surgical treatment for a complicated penetrating craniofacial injury, aggressive treatment by a multidisciplinary team can result in good outcomes.

1004. Chen, T., et al. (2009). "The CT characteristics of orbital blowout fracture and its medicolegal expertise." Journal of forensic and legal medicine 16(1): 1-4.

To explore the CT characteristics of orbital blowout fracture, we reviewed 76 cases with orbital blowout fracture and analyzed their clinical forensic characteristics. The missed diagnosis rate of cranial CT was 26.3%, and plain X-ray was 47.4%. The orbital CT examination has advantages in diagnosing orbital blowout fracture. In 42 cases fractures were simple medial orbital wall fracture, 30 cases were inferior orbital fractures. Loss of clinical signs included local haematoma, bone continuity, and displacement of bone fragments were mostly seen in CT image. Clinical signs and symptoms included local haematoma, whilst diplopia as the most common clinical symptom. Visual acuity was rarely affected after fracture. It is concluded that orbital blowout fracture may be misdiagnosed if only cranial CT and plain X-ray are used. Diagnose the orbital blowout fracture only by craniocerebral CT and head X-ray. Orbital CT should be done if the clinical signs are suggestive of orbital blowout fracture Visual acuity was affected and diplopia may be present.

1005. Chen, T. A., et al. (2018). "Bioengineered dermal substitutes for the management of traumatic periocular tissue loss." Orbit (Amsterdam, Netherlands) 37(2): 115-120.

PURPOSE: Traumatic periocular injuries occasionally result in significant soft tissue loss, for which there are limited management options that provide satisfactory cosmetic and functional outcomes. The authors describe the use of a bioengineered dermal substitute (Integra R Dermal Regeneration Template [DRT], Integra LifeSciences, Plainsboro, NJ) as an alternative to immediate flap reconstruction or skin grafting., METHODS: Retrospective interventional case series of patients who underwent DRT placement for periocular tissue loss at the time of trauma. In each case, primary closure or immediate flap reconstruction was deemed impractical or undesirable due to the size and location of the primary and associated secondary defects. One to four weeks later, the outer silicone layer was removed and healing assessed. Additional reconstructive techniques were performed as needed., RESULTS: Three patients were treated at Bascom Palmer Eye Institute and one at Byers Eye Institute at Stanford. The defects healed completely in two patients, and by 79.2% in a third, with no need for additional reconstructive surgery. In the remaining patient, the defect was significantly downsized by 56.1%, allowing for a simpler flap reconstruction., CONCLUSIONS: Bioengineered dermal substitutes should be considered as a viable alternative to traditional reconstructive techniques for large periocular defects resulting from trauma. The outer silicone layer prevents desiccation and serves as a protective barrier, while the inner collagen matrix organizes the growth of neo-dermis and minimizes wound contraction. The dimensions of cutaneous defects can therefore be reduced dramatically, potentially eliminating the need for skin grafting and/or reducing the ultimate complexity of flap reconstruction.

1006. Chen, Y. and M. J. DeVivo (2005). "Epidemiology of extraspinal fractures in acute spinal cord injury: Data from the model spinal cord injury care systems, 1973-1999." Topics in Spinal Cord Injury Rehabilitation 11(1): 18-29.

Because of the high-energy force of the event, injuries to the spinal cord are often associated with fractures of bone. Analyzing data on 18,087 patients with spinal cord injury (SCI) receiving initial hospital care from the 24 Model SCI Care Systems from 1973 through 1999, we documented that the incidence of extraspinal fractures was 27.8 per 100 patients, with rib/sternum being the most common site of fractures. Injury etiology and level of neurologic deficit were the most important factors determining the presence and location of fractures. The incidence varied by age, gender, race, injury year, and completeness of neurologic deficit. This study establishes a baseline for future investigations.

1007. Chen, Z., et al. (2013). "Characterizations of post-traumatic epilepsy in experimentalmodels of penetrating ballisticlike brain injury." Journal of neurotrauma 30(15): A131.

Introduction Patients suffering severe traumatic brain injury experience increased risk of post-traumatic epilepsy (PTE). There is currently no drug proven clinically-effective for reducing the risk or effects of PTE, underscoring the need for pre-clinical research focused on developing PTE animal models that can be used to screen potential therapeutics. Methods Rats were randomly assigned to one of 6 groups categorized by: (1) the PBBI injury track (frontal or lateral PBBI), (2) injury severity (10% or 12.5% PBBI) and (3) survival time (3 or 6 months post-injury). At three weeks post-PBBI, all rats received skull EEG electrodes for seizure detections. Continuous EEG monitoring (5 consecutive days) was performed at 12, and 24 weeks post PBBI. At the end of EEGrecording time, each rat was subjected to a “seizure threshold” test induced by a single intraperitoneal injection of 30mg/kg pentylenetetrazole (PTZ). Seizure susceptibility was visually monitored for 30 min after PTZ injection and PTZ-induced convulsive behaviors were scored: 0 = no symptoms; 1 = body jerk; 2 = generalized seizure; 3 = “pop-corn” convulsion; and 4 = death following convulsion. For control purposes, a separate group of naïve (non-injured) rats were exposed to the PTZ challenge. Results Sporadic nonconvulsive seizure was detected by EEG in < 10% of all PBBI rats, regardless of injury severity, tract, or post-injury survival time. However, 38-100% of the animals across all PBBI groups displayed significant increases in their susceptibility to the PTZ challenge as compared to naïve animals. The degree of increased seizure susceptibility was positively correlated with PBBI severity, anatomical orientation, and survival time. In naïve rat group, only 14% displayed increased seizure sensitivity to PTZ challenge. At 3 months post-injury, PTZ induced seizures were detected in 38% of animals receiving 10% frontal PBBI, 67% of rats exposed to 10% lateral PBBI, and 100% of rats exposed to 12.5% PBBI (both frontal and lateral). At 6 months post injury, PTZ-induced seizures were detected in 83-100% of PBBI rats, indiscriminative of injury severity or orientation. The severity of PTZinduced seizures also correlated with PBBI severity, injury orientation, and post-injury duration. Mean seizure scores were: naïve rats = 0.2 ± 0.2; at 3 month, 10% frontal PBBI = 1.0 ± 0.5; 10% lateral PBBI = 1.7 ± 0.5; 12.5% frontal PBBI = 3.0 ± 0.5; 12.5% lateral PBBI = 2.5 ± 0.5. At 6 month, 10% frontal PBBI = 2.5 ± 2.1; 10% lateral PBBI = 2.2 ± 0.4; 12.5% frontal PBBI = 2.4 ± 0.3; 12.5% lateral PBBI = 2.0 ± 0.4. Conclusions Previously we reported that 10% and 12.5% frontal PBBI triggered NCS in 60-70% of animals during the acute 72 h post-injury period. These NCS were only detected by continuous EEG monitoring and occurred spontaneously without being challenged by PTZ. In this study, although intermittent EEG recording confirmed sporadic occurrence of spontaneous NCS, the intensity of seizure activities appeared to be subsiding during the much later recovery phases of PBBI. However, PBBI significantly lowered seizure threshold to the PTZ challenge at 3-6 months post PBBI. Interestingly, this increased seizure susceptibility was positively associated not only with the injury severity, but also with the anatomical orientation of the injury as well as the post-injury duration.

1008. Chen, Z., et al. (2011). "Synergism of human amnion-derived multipotent progenitor (AMP) cells and a collagen scaffold in promoting brain wound recovery: pre-clinical studies in an experimental model of penetrating ballistic-like brain injury." Brain research 1368: 71-81.

One of the histopathological consequences of a penetrating ballistic brain injury is the formation of a permanent cavity. In a previous study using the penetrating ballistic-like brain injury (PBBI) model, engrafted human amnion-derived multipotent progenitor (AMP) cells failed to survive when injected directly in the injury tract, suggesting that the cell survival requires a supportive matrix. In this study, we seated AMP cells in a collagen-based scaffold, injected into the injury core, and investigated cell survival and neuroprotection following PBBI. AMP cells suspended in AMP cell conditioned medium (ACCS) or in a liquefied collagen matrix were injected immediately after a PBBI along the penetrating injury tract. Injured control rats received only liquefied collagen matrix. All animals were allowed to survive two weeks. Consistent with our previous results, AMP cells suspended in ACCS failed to survive; likewise, no collagen was identified at the injury site when injected alone. In contrast, both AMP cells and the collagen were preserved in the injury cavity when injected together. In addition, AMP cells/collagen treatment preserved some apparent brain tissue in the injury cavity, and there was measurable infiltration of endogenous neural progenitor cells and astrocytes into the preserved brain tissue. AMP cells were also found to have migrated into the subventricular zone and the corpus callosum. Moreover, the AMP cell/collagen treatment significantly attenuated the PBBI-induced axonal degeneration in the corpus callosum and ipsilateral thalamus and improved motor impairment on rotarod performance. Overall, collagen-based scaffold provided a supportive matrix for AMP cell survival, migration, and neuroprotection. Copyright Published by Elsevier B.V.

1009. Chen, Z., et al. (2009). "Synergism of human Amnion-derived Multipotent Progenitor (AMP) cells and a collagen scaffold in promoting brain wound recovery: Pre-clinical studies in an experimental model of PBBI." Journal of neurotrauma 26(8): A60.

One of the histopathological consequences of a penetrating ballistic-like brain injury (PBBI) is the formation of a permanent brain cavity that becomes unsalvageable once it develops. In a previous study, when AMP cells were injected directly in the injury tract and observed 2 weeks post injury, they failed to survive in the brain cavity, suggesting that the cells survival require a supportive matrix. In this study, we suspended undifferentiated AMP cells in a collagen-based scaffold and investigated cell survival and neuroprotection in the rat PBBI model. AMP cells, labeled with the fluorescent dye PKH26, were suspended in AMP Cell Conditioned Medium (Spell out ACCS) or in a fluorescein labeled liquefied collagen matrix and were injected immediately after injury (2× 106 cells/150µ1/rat, n = 5/grp) along the injury tract (from the frontal cortex through the dorsal striatum). Injured control rats received only the fluorescein liquefied collagen matrix (150µ1/rat, n = 5). All animals survived two weeks after surgery. Serial brain sections were collected. Consistent with our previous results, AMP cells suspended in ACCS alone failed to survive at the injury site; likewise, collagen alone, which normally solidifies at 37°C, was not identified at the injury site in control rats. In contrast, aggregated AMP cells suspended in the collagen survived in the lesion cavity, and the fluorescein-labeled collagen was preserved in the injury cavity. Critically, the labeled AMP cells were also found to have migrated into the subventricular zone of the lateral ventricle and into the corpus callosum. Moreover, similar to i.c.v. injections of AMP cells without collagen support, the AMP cell/collagen treatment in this study also significantly attenuated the PBBI-induced axonal degeneration (silver staining) measured in the corpus callosum and ipsilateral thalamus. In conclusion, a solidified collagen-based scaffold provided a supportive matrix for AMP cell survival, migration, and neuroprotection when injected into the injury tract immediately after the PBBI trauma.

1010. Chen, Z., et al. (2009). "Human amnion-derived multipotent progenitor cell treatment alleviates traumatic brain injury-induced axonal degeneration." Journal of neurotrauma 26(11): 1987-1997.

To identify a viable cell source with potential neuroprotective effects, we studied amnion-derived multipotent progenitor (AMP) cells in a rat model of penetrating ballistic-like brain injury (PBBI). AMP cells were labeled with fluorescent dye PKH26 and injected in rats immediately following right hemispheric PBBI or sham PBBI surgery by ipsilateral i.c.v. administration. At 2 weeks post-injury, severe necrosis developed along the PBBI tract and axonal degeneration was prominent along the corpus callosum (cc) and in the ipsilateral thalamus. Injected AMP cells first entered the subventricular zone (SVZ) in both sham and PBBI rats. Further AMP cell migration along the cc only occurred in PBBI animals. No significant difference in injury volume was observed across all treatment groups. In contrast, treatment with AMP cells significantly attenuated axonal degeneration in both the thalamus and the cc. Interestingly, PKH26-labeled AMP cells were detected only in the SVZ and the cc (in parallel with the axonal degeneration), but not in the thalamus. None of the labeled AMP cells appeared to express neural differentiation, as evidenced by the lack of double labeling with nestin, S-100, GFAP, and MAP-2 immunostaining. In conclusion, AMP cell migration was specifically induced by PBBI and requires SVZ homing, yet the neuroprotective effect of intracerebral ventrical treatment using AMP cells was not limited to the area where the cells were present. This suggests that the attenuation of the secondary brain injury following PBBI was likely to be mediated by mechanisms other than cell replacement, possibly through delivery or sustained secretion of neurotrophic factors.

1011. Chen, Z. Y., et al. (2014). "Application of an active avoidance task in detecting cognitive deficits following penetrating ballistic-like brain injury." Journal of neurotrauma 31(12): A43.

In this study we used a modified active avoidance (AA) task to characterize cognitive deficits associated with emotional distress in rats following penetrating ballistic-like brain injury (PBBI). The AA device consists of a revolving arena covered by shock pads that are electrically charged only when rotating into a designated shock zone (SZ) (1/6 of the arena area). The goal of AA is for animals to learn to use environmental cues to avoid entering the SZ. Anaesthetized rats received PBBI (5% or 10% injury severity) or sham surgery. At 7 days post-injury (DPI), each rat was habituated to the arena (10-min) with the SZ turned off. On post-injury days 8 and 9, the rats received two avoidance acquisition trials per day (5 min/trial; 1 h ITI) in the revolving arena with the SZ turned on. At 10 DPI, the SZ was shifted 180 and the animals were exposed to a reversal learning test (4 trials; 5 min/trial; 1 h ITI). No significant injury-induced alterations in spontaneous locomotor behavior were detected during the habituation trial. However, results of AA acquisition trials and reversal tasks revealed significant injury-severity dependent deficits. More specifically, compared to sham controls, PBBI animals made more entries into the SZ (Sham: 1.9 ± 1.1; 5% PBBI: 3.5 ± 2.1; 10% PBBI: 9.9 ± 2.9) and displayed significantly longer escape latencies (Sham: 2.1 ± 1.5s; 5% PBBI 10.9 ± 8.7s, 10% PBBI: 22.9 ± 8.8s) on the last day of acquisition. Similar deficits associated with injury severity were also detected on the reversal test for entry frequency: (Sham: 2.0 ± 0.8; 5% PBBI: 7.0 ± 3.1; 10% PBBI: 10.8 ± 3.6), and escape latency (Sham: 20.6 ± 6.8s; 5% PBBI: 31.8 ± 6.9s; 10% PBBI: 42.0-12.6s). Overall, these results indicate that the AA task provides a sensitive measure for detecting cognitive dysfunction in the PBBI model. While ongoing work will determine whether this task would be sensitive to mild TBI, the current results suggest this may provide a useful measure for detecting efficacy of promising pharmacotherapeutics in the PBBI model.

1012. Cheng, A. L. and E. S. Lang (2014). "Pseudopancreatitis on computed tomography in a patient with isolated blunt head trauma: A case report." Journal of medical case reports 8(1).

Introduction. Computed tomography is commonly used to exclude occult injuries in patients with trauma, but imaging can reveal findings that are of uncertain etiology or clinical significance. We present a case of unsuspected pancreatic abnormality in a female patient with trauma who sustained an isolated blunt head injury. Case presentation. A 25-year-old female Caucasian patient sustained massive blunt and penetrating head trauma, secondary to a large object penetrating through the vehicle windshield. Based on the mechanism of injury and clinical evaluation, it was felt to be an isolated head

injury. However, computed tomography of her abdomen revealed an occult, intra-abdominal finding of significant pancreatic enlargement and peripancreatic fluid. There was no computed tomography evidence of parenchymal pancreatic laceration. The appearance of her pancreas on computed tomography was identical to that of acute pancreatitis or low-grade pancreatic injury, but her clinical history and laboratory values were not consistent with this, hence the term 'pseudopancreatitis'. Later surgery for organ donation confirmed diffuse pancreatic and peripancreatic edema, but no hematoma, contusion or other evidence for direct traumatic injury. This was an isolated intra-abdominal abnormality. Conclusion: The routine use of computed tomography in patients who have sustained trauma has led to increasing detection of unexpected findings. Clinical information such as mechanism of injury and blood work, along with careful evaluation of ancillary imaging findings (or lack of), is important for the provision of an appropriate differential diagnosis. We discuss the possible mechanism and differential diagnosis of an isolated pancreatic abnormality in the setting of non-abdominal trauma, which includes shock pancreas, overhydration, traumatic pancreatic injury and pancreatitis secondary to other etiologies.

1013. Cheng, D. Y. (1980). "[Management of 91 cases of penetrating craniocerebral injuries due to missiles (author's transl)]." Zhonghua wai ke za zhi [Chinese journal of surgery] 18(6): 536-538.

1014. Cheng, J., et al. (2017). "Long-term outcome of allogeneic cultivated limbal epithelial transplantation for symblepharon caused by severe ocular burns." BMC ophthalmology 17(1): 8.

BACKGROUND: The therapeutic effects of allogeneic cultivated limbal epithelial transplantation (CLET) for symblephara at different degrees caused by ocular burns were evaluated in this study., METHODS: A series of interventional cases were involved in this retrospective study. Eighty eyes (80 patients) with symblephara underwent CLET and the success rates of surgical treatment as well as corneal conditions and risk factors for recurrent symblepharon were analyzed., RESULTS: The average age of patients was 32.4 +/- 13.7 years (ranged from 4 to 60 years). The average follow-up time was 26.4 +/- 13.6 months (ranged from 12 to 60 months). Symblepharon cases were caused by chemical burns (36 eyes) or thermal burns (44 eyes). The first surgical intervention achieved complete success in 40 eyes (50%), partial success in 25 eyes (31.3%), and failure in 15 eyes (18.8%). The rate of complete success was 85.0% in eyes with grade I/II symblephara, 51.5% in eyes with grade III eyes and 22.2% in eyes grade IV symblephara (P = 0.001). The treatment was completely successful in 23.1% of eyes with moderate or severe preoperative inflammatory action and 63.0% of eyes with mild or no inflammation (P = 0.000). The corneal conditions were improved in 43 eyes (53.8%), of which 21 eyes had improved visual acuity. The recurrence of symblepharon after the first CLET was positively correlated with symblepharon length (P = 0.003), preoperative inflammatory activity (P = 0.016) as well as postoperative cicatricial entropion and trichiasis (P = 0.038)., CONCLUSIONS: CLET was effective on the recovery of anatomically deep fornixes in eyes caused by symblephara and corneal surface condition could be improved simultaneously. The success of surgical treatment was dependent on the effective control of inflammation and timely management of eyelid abnormalities.

1015. Cheng, J. S., et al. (2012). "Delayed acute spinal cord injury following intracranial gunshot trauma: case report." Journal of neurosurgery 116(4): 921-925.

The authors report the case of a patient who presented with a hoarse voice and left hemiparesis following a gunshot injury with trajectory entering the left scapula, traversing the suboccipital bone, and coming to rest in the right lateral medullary cistern. Following recovery from the hemiparesis, abrupt quadriparesis occurred coincident with fall of the bullet into the anterior spinal canal. The bullet was retrieved following a C-2 and C-3 laminectomy, and postoperative MR imaging confirmed signal change in the cord at the level where the bullet had lodged. The patient then made a good neurological recovery. Bullets can fall from the posterior fossa with sufficient momentum to cause an acute spinal

cord injury. Consideration for craniotomy and bullet retrieval should be given to large bullets lying in the CSF spaces of the posterior fossa as they pose risk for acute spinal cord injury.

1016. Cherednichenko, T. V. and A. V. Popov (2012). "[Optimization of medical-diagnostic process in patients with traumatic brain injury during early rehabilitation]." Likars'ka sprava(7): 194-197.

The problem of cardiovascular disease and cancer, the effects of traumatic brain injury is now one of the major health and social problems. Every year in Ukraine registered 200 thousand cases of the victims of traumatic brain injury. Of these, 30% of people then have persistent signs of disability that results in a disability, sometimes painful existence the patient and his relatives. Therefore, in order to bring man back into society after a traumatic brain injury, to the rehabilitation phase of treatment, immediately after the stabilization of the patient.

1017. Chermisin, V. M., et al. (2002). "[Significance of computer tomography and diagnosis of gunshot craniocerebral injuries at the stage of specialized medical care]." Znachenie komp'iuternoi tomografii v diagnostike ognestrel'noi cherepno-mozgovoi travmy na etape okazaniia spetsializirovannoi meditsinskoi pomoshchi. 323(1): 28-31.

1018. Cherry, R. A., et al. (2010). "Outcome assessment of blunt trauma patients who are undertriaged." Journal of Surgical Research 158(2): 421.

Objectives: Factors leading to undertriage (UT) include insufficient or inaccurate prehospital information, failure to upgrade care upon arrival, physician experience with triage protocols, and medical judgment. We investigated the outcomes of UT patients and compared them with those who met criteria for a full TTA at our Level 1 trauma center. Methods: Blunt trauma patients were retrospectively identified who met full or partial TTA from 7/02-1/08 using the trauma registry. Patients who met the criteria for a full TTA and had a partial TTA were considered UT. Data was collected on demographics (age, gender), injury severity, delays to OR, resource utilization (hospital and ICU LOS, ventilator days), and outcomes (complications, mortality, disposition, and functional independence measure score or FIM). Excluded: penetrating trauma, interfacility transfers, burn patients, age < 18 years old. Statistical analysis: chi square, $p< 0.05$, mean ± SD. Results: There were 1,424 full TTA with 318 (22.3%) in the UT group (UTG) and 1,106 in the correctly triaged group (CTG). The CTG was 70.4% male with a mean age of 41.5 years 6 19.8. The UTG was 67.1% male with a mean age of 45.8+ 20.5. The CTG had a higher ISS (24.7 vs 17.0, $p < 0.0001$). The CTG was more likely to undergo intubation upon arrival to the ED (34.9% vs 8.2%, $p < 0001$) and require ICU admission (49.0% vs 37.1%, $p <0.0001$). There were no differences in delay to OR for laparotomies, craniotomies, or open fractures between groups. The CTG group had a longer ICU and hospital LOS and spent more days on the ventilator ($p < 0.0001$). There was a higher incidence of ARDS, pneumonia, and infectious complications in the CTG ($p < 0.03$). The UTG had a lower mortality rate (6.0% vs 16.7%, $p < 0.0001$) and was more likely to be discharged home (65.3% vs 52.2%, $p = 0.02$). FIM scores were better among the UTG ($p < 0.01$). Conclusions: The UTG had a lower ISS and improved outcomes compared to the CTG with no differences in delays to OR. Despite the inherent challenges in TTA protocols, patients who were UT at our institution appear to have satisfactory outcomes.

1019. Cherry, R. L., et al. (2019). "Migration of retrobulbar wooden foreign body between diagnostic imaging and surgical extraction in a German shepherd dog." Veterinary ophthalmology 22(3): 353-359.

A 2-year-old, male castrated German shepherd dog was presented to the University of Tennessee Veterinary Medical Center (UTVMC) with periorbital swelling and conjunctival mucopurulent discharge 2 days following removal of a twig from the medial canthus by the owner. Diagnostic imaging was pursued due to the suspicion of a retrobulbar foreign body (FB). A cylindrical FB approximately 3.0

cm in length and 1.0 cm in diameter with concentric rings, suspected to be wooden material, was identified on computed tomography (CT) imaging. An attempt to remove the FB via a stab incision using ultrasound guidance was unsuccessful, and postmanipulation ultrasound confirmed the FB position was unchanged. An exploratory orbitotomy was performed, using the acquired CT images for guidance in locating the FB; however, the FB was not present at the predicted site. The CT imaging was repeated and showed that the FB had migrated rostrally approximately 3.0 cm, compared to the originally acquired study and its same location during attempted ultrasound-guided removal. A combination of CT-guided needle placement and contrast injection was then used with repeat imaging in an attempt to better localize the FB and its soft tissue tract. The dog was taken back into the operating room, and the wooden FB was successfully removed.

1020. Chhabra, L., et al. (2014). "A nail in the head." Lancet (London, England) 383(9915): e10.

1021. Chibbaro, S. and L. Tacconi (2006). "Orbito-cranial injuries caused by penetrating non-missile foreign bodies. Experience with eighteen patients." Acta neurochirurgica 148(9): 937-932.

BACKGROUND: Penetrating non-missile orbito-cranial injuries are uncommon civilian injuries which have some special features. Only limited case-reports are available in the international literature., METHOD: We present a retrospective review of 18 such in presumed trivial orbital injury. Early identification and removal of retained foreign body fragments was achieved within 36 hours., FINDINGS: Patients were operated on and followed up for at least of 3 years. The final clinical outcome was excellent: 16 had a Glasgow Outcome Scale (GOS) of 5 while in the remaining 2 it was 4., CONCLUSION: The present report indicates that good results, in managing such injuries, can be achieved by a high index of suspicion and early diagnosis of intracranial injury in presumed trivial wounds and by the removal of every possible retained foreign body.

1022. Chiquet, C., et al. (2002). "[Risk factors for secondary retinal detachment after extraction of intraocular foreign bodies]." Facteurs de risque de decollement de retine apres extraction de corps etrangers intraoculaires. 37(3): 168-176.

BACKGROUND: Better identification of patients at risk for retinal detachment after intraocular foreign body removal would guide management as well as help prevent this complication. We performed a study to identify risk factors for secondary retinal detachment in eyes with retained intraocular foreign bodies., METHODS: We reviewed the records of 102 consecutive patients (95 males and 7 females with a mean age of 31.6 years) seen between 1990 and 1995 at one ophthalmology service for intraocular foreign body after penetrating ocular injury. All eyes underwent primary surgical repair and foreign body removal (via electromagnet or vitrectomy). The mean length of follow-up was 2 years (range 6 months to 6 years). Survival analysis (Kaplan-Meier, Cox regression) was performed to determine predictors of retinal detachment., RESULTS: The foreign body was metallic in 95% of cases and magnetic in 60%. The largest diameter was 3 mm or more in 35% of cases (range 1 mm to 25 mm, mean 3.6 mm). The foreign body was preretinal or intraretinal in 24 patients (24%), intravitreal in 47 (46%), located in the sclera in 16 (16%) and located in the anterior segment in 15 (15%). A secondary retinal detachment developed in 25 patients (24%) after foreign body removal, with a mean delay of 4.6 (standard deviation 7.6) months (range 7 days to 31 months). The posterior pole was detached in 15 patients (60%). The retinal detachment was total in 13 patients (52%). Proliferative vitreoretinopathy was noted in 13 cases (grade B in 3, grade CI in 3, grade CI in 1, grade C3 in 1, and grade C4 in 5). Univariate analysis using Kaplan-Meier survival showed that firearm injuries, visual acuity less than 20/200, presence of hyphema, presence of tissue prolapse and presence of vitreous hemorrhage at the initial examination were significantly associated with the occurrence of secondary retinal detachment. On multivariate analysis (Cox regression), two independent and combined factors were predictive of

retinal detachment: initial visual acuity less than 20/200 (odds ratio 5.5, p = 0.02) and presence of vitreous hemorrhage (odds ratio 2.2, p = 0.05)., INTERPRETATION: Patients at risk for secondary retinal detachment after penetrating ocular injury with retained intraocular foreign body can be identified at the initial examination.

1023. Chirichella, T. J., et al. (2011). "Lingual artery pseudoaneurysm with arteriovenous fistula formation following a gun shot wound." Journal of Surgical Radiology 2(2): 166-169.

1024. Chiu, R. G., et al. (2019). "Gunshot wounds to the head: racial disparities in inpatient management and outcomes." Neurosurgical focus 47(5): E11.

OBJECTIVE: Several studies have indicated that racial disparities may exist in the management and outcomes of acute trauma care. One segment of trauma care that has not been as extensively investigated, however, is that of cranial trauma care. The goal of this study was to determine whether significant differences exist among racial and ethnic groups in various measures of inpatient management and outcomes after gunshot wounds to the head (GWH)., METHODS: In this study, the authors used the Nationwide (National) Inpatient Sample (NIS) to investigate all-cause mortality, receipt of surgery, days from admission to initial intervention, discharge disposition, length of hospital stay, and total hospital charges of those with GWH from 2012 to 2016. A 1:1 propensity score-matched analysis was conducted to evaluate the effect of race on these endpoints, while controlling for baseline demographics and comorbidities., RESULTS: A total of 333 patients met the inclusion and exclusion criteria: 148 (44.44%) white/Caucasian, 123 (36.94%) black/African American, 54 (16.22%) Hispanic/Latinx, and 8 (2.40%) Asian. African American patients were sent to immediate care and rehabilitation significantly less often than Caucasian patients (RR 0.17 [95% CI 0.04-0.71]). There were no significant differences in mortality, length of stay, rates of surgical intervention, or total hospital charges among any of the racial groups., CONCLUSIONS: The authors' findings suggest that racial disparities in inpatient cranial trauma care and outcomes may not be as prevalent as previously thought. In fact, the disparities seen were only in disposition. More research is needed to further elucidate and address disparities within this population, particularly those that may exist prior to, and after, hospitalization.

1025. Cho, M. J., et al. (2019). "Rapidly growing pediatric trampoline-related injuries in Korea: A 10-year single center retrospective study." Korean Journal of Pediatrics 62(3): 90-94.

Purpose: Several published policy statements have warned against the risks associated with trampoline use and recommended safety guidelines. However, few studies have focused on trampoline-related injuries in Korea. This study aimed to assess the incidence and characteristics of pediatric trampoline-related injuries presented to Ulsan University Hospital. Methods: We retrospectively reviewed the medical records of children aged <16 years with trampoline-related injuries who visited our Emergency Department between 2008 and 2017. Results: Over the 10-year period, 178 trampoline-related injuries were reported, which represented a significant increase (P=0.016). Most (87.6%) of the injuries occurred during the last 5 study years, and a rapid increase in injuries was observed in children aged <6 years. Lower extremity injuries (62.4%) were the most common, followed by injuries of the upper extremities, head and face, and trunk, including injuries to the neck and spine. Sixty-seven children (37.6%) had fractures, and proximal tibia fractures were the most common. Fractures were significantly more common in younger children (<6 years old) than in older children (P=0.026). Conclusion: In Korea, the mechanism of trampoline injury is similar to that of injuries incurred in indoor trampoline parks but is characterized by smaller spaces and multiple users. Trampoline use and the incidence of trampoline-related injuries in children aged <6 years are increasing rapidly. Prohibiting the use of trampolines for children aged <6 years, restricting simultaneous use by multiple children, and

ensuring adult supervision should be strictly emphasized. Public awareness and policy guidelines are needed to reduce the incidence of trampoline-related injuries.

1026. Cho, R. A., et al. (2019). "Diagnostic Yield of Computed Tomography Angiography in Mandibular Fractures Caused by Blunt Force Trauma: A 10-Year Retrospective Study." Journal of oral and maxillofacial surgery 77(9): e19-e20.

Background: Mandibular fracture is the second most common (17.1%) maxillofacial fracture observed in the emergency departments (ED) in the US followed by nasal fracture (58.6%)1. Although computed tomography angiogram (CTA) has been indicated for penetrating head and neck (H&N) injury and for any suspicion of blunt vascular injury, there has been no studies on its diagnostic yield on blunt force trauma2. The purpose of this study is to examine diagnostic yield of CTA in the evaluation of patients presenting to the ED with acute mandible fracture due to blunt force trauma and to propose practical and rational guideline for proper usage of CTA. Methods: An IRB approved (4269) retrospective study was conducted of 1204 consecutive patients who presented to our hospital ED with acute mandible fractures over a period of 9 years. Medical records were reviewed for mechanism of injury (MOI) and demographics. Inclusion Criteria: Patients with mandible fractures due to acute blunt H&N trauma that obtained panorex and CT scan with or without CTA. Exclusion Criteria: Certain MOI with penetrating injuries such as stab and gunshot wounds and pediatric patients under the age of 18. Descriptive statistics were used to describe sample injury characteristics. Unadjusted odds ratios with 95% confidence intervals were performed to identify independent predictors of an increased risk of H&N vascular injury. Results: Total of 1086 patients, ages 18 to 96 years were included in this study (mean age 37.16 ± SD 18.75). In total, 919 patients obtained CT and orthopantomogram (panorex) while 167 patients obtained additional CTA. Among those patient that has obtained CTA, only 6.6% (11/167) revealed positive findings with H&N vascular injuries. Among those with positive CTA findings the following results were observed: the majority (45%) were motorcycle crashes, followed by motor vehicle crash (27%), assault (18%), and 1 from a fall (9%). Further analysis of mandibular fracture patterns failed to demonstrate statistical significance when compared to positive findings in CTA except for bilateral fractures: Bilateral (82%; p = 0.03), coronoid (27%; p = 0.06), ramus (27%; p = 0.12), symphyseal (18%; p = 0.34), condylar/subcondylar (27%; p = 0.36), parasymphyseal (27%; p = 0.57), angle (27%; p = 0.71), and body (18%; p = 0.74) fractures. Maxillary and mandibular edentulation status failed to demonstrate statistical significance (p = 0.15 and p = 0.25, respectively). The following vascular injuries were noted in the 11 patients with positive CTA findings: internal carotid artery (55%), common carotid artery (27%), internal jugular vein (9%), and lingual artery (9%). When looking at other H&N injuries, 2 patients had isolated cervical spine fractures, 2 had tracheal injury and cervical spine fractures, 1 had skull base fractures, 1 had occipital bone fracture, and 1 patient had frontal bone, temporal bone, and skull base fractures. When looking at other maxillofacial injuries, 1 patient suffered palatal fracture (9%), 1 patient suffered zygomatic fracture (9%), 1 patient suffered Le Fort type I fracture (9%), 2 patients suffered nasal fractures (18%), 2 patients suffered Le Fort type III fractures (18%), and 3 patients suffered orbital floor fractures (27%). Conclusions: Positive CTA findings were 4.9 times more likely to be bilateral (95% CI 1.05-22.80) versus unilateral fractures. Positive CTA findings were 4.01 times more likely to be with coronoid fractures (95% CI 1.05-15.36) versus without coronoid fractures. A similar pattern was observed in patients with ramus fractures: 11.3% (122/1075) without CTA versus 27% (3/11) with CTA. The findings of this study provides an opportunity to reexamine the current protocol at each hospital of ordering CTA for patients with mandibular fractures to provide effective and financially responsible care for the patients. [Figure presented] [Figure presented]

1027. Cho, S. H., et al. (2007). "CT angiography with 3D reconstruction for the initial evaluation of penetrating neck injury with retained knife." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery 136(3): 504-505.

1028. Cho, W.-K., et al. (2017). "Orbital and Orbitocranial Trauma From Pencil Fragments: Role of Timely Diagnosis and Management." American journal of ophthalmology 180: 46-54.

PURPOSE: To emphasize the importance of early detection and radiologic evaluation of retained organic foreign bodies (FBs) in orbital or orbitocranial penetrating injuries by pencil., DESIGN: Retrospective case series., METHODS: A retrospective chart review of patients who had penetrating orbital or orbitocranial trauma at 2 tertiary hospitals was conducted. Patients whose mechanism of injury was penetrating trauma by pencil were included. The patients' demographics, time between initial trauma and detection of foreign body, radiologic images, and resulting sequelae were reviewed., RESULTS: Four patients were included in this study. All patients were male; 3 were less than 2 years of age and 1 was 34 years old. Accidents were witnessed in 2 cases, and initial detections of FBs were delayed in 3 cases, from 2 days to 7 weeks. Three cases involved the right orbit. Computed tomography (CT) imaging of the head demonstrated penetration of the orbital walls in 3 cases. Three-dimensional CT scans were used to differentiate the penetrating graphite pencil fragments from the orbital wall, and catheter angiography was used in 1 case of suspected orbital apex penetration. Vision was lost in 1 patient while other severe neurologic deficits were fully recovered after removal of FB., CONCLUSIONS: Penetrating injury by pencils to the periorbital structures and delayed detection of retained pencil fragments can result in threat to life and vision. Radiologic examinations are essential to the detection of these retained FBs. Prompt detection and removal of the FBs within 48 hours and treatment with antibiotics can save vision and life.

1029. Choi, C. S., et al. (1994). "The missing link. An unusual case of embolization." The American journal of forensic medicine and pathology 15(3): 211-212.

Embolization is a well-recognized phenomenon in medicine and forensic pathology and generally involves formed blood elements, bone, air, amniotic fluid, or more exotic items such as bullets. We report the embolization of a chain-saw link. The case demonstrates how, without complete autopsy and investigation, a penetrating sharp-force injury could be misdiagnosed and a false conclusion as to the commission of a crime could occur. Although the forensic literature is replete with examples of bizarre emboli, from bullets to suspected crystals of methylmethacrylate, a literature review failed to find a single case of penetrating chain-saw-link injury as a cause of traumatic death. Most reports of chain-saw incidents cite accidental injuries to hands and arms or dramatic facial injuries due to entrapment and recoil (1,2). One fatality occurred from a skull fracture and cerebral injury when a 19-year-old man fell onto a saw.

1030. Choi, E., et al. (1994). "Deaths due to firearms injuries in children." Journal of forensic sciences 39(3): 685-692.

There has been a marked increase in firearms-related deaths in this country over the past several decades. Especially in urban areas this increase has been correlated with a greater availability of handguns. Children have become more common victims of gunfire. Both accidental and homicidal shooting deaths have increased in the lower age groups. We examined deaths due to gunfire in children ten years and younger in Cook County, Illinois, which contains the large city of Chicago. Homicidal shootings predominated in this age group with the most common circumstances being a child struck by a stray bullet. Accidental shooting deaths always occurred when one or more children were playing with a gun they found in the home.

1031. Choi, I. (2020). "Awareness and expectations of the role of the neurotrauma society about child abuse: Abusive head traumas in 4 infants, case series." Korean journal of neurotrauma 16(2): 111-112.

1032. Choi, J. J., et al. (2011). "Paradoxical herniation in wartime penetrating brain injury with concomitant skull-base trauma." The Journal of craniofacial surgery 22(6): 2163-2167.

A case of the syndrome of the trephined progressing to paradoxical herniation is presented in a patient with a penetrating brain injury, postdecompressive craniectomy, and a delayed cerebral spinal fluid leak from a skull base defect. The patient had a penetrating head trauma from a high-velocity ballistic projectile during military wartime operations. The patient's clinical course, which demonstrates a rare presentation of central sleep apnea syndrome or Ondine's curse, is reviewed. Radiographic imaging includes sequential computed tomography (CT) scans with and without intrathecal contrast. Medical management was directed at increasing the intracranial pressures (ICPs) by placing the patient into Trendelenburg position and increasing hydration. Surgical intervention involved correction of the skull base defect by intranasal endoscopic repair. A literature review of paradoxical herniation and delayed neurologic decline in postcraniectomy patients is conducted, and the surgical and neurocritical care management is discussed.

1033. Choi, K. J., et al. (2017). "Penetrating Craniomaxillofacial Injury Caused by a Pneumatic Nail Gun." Craniomaxillofacial Trauma and Reconstruction 10(2): 159-161.

Craniomaxillofacial injuries can be complex, requiring a multidisciplinary approach. The primary survey is always the first step in trauma management prior to proceeding with further evaluation and treatment. A 26-year-old man presented with a penetrating nail gun injury through the oral and nasal cavities. He did not present in extremis but required elective endotracheal intubation for intraoperative assessment and treatment. Airway management was enhanced by the use of lingual nerve and inferior alveolar nerve blocks via the Vazirani-Akinosi technique to maintain spontaneous respiration while the tongue was distracted from the palate. The nail was removed and rapid sequence induction initiated for orotracheal intubation. Local nerve blocks can be an effective tool in the armamentarium of the craniomaxillofacial trauma surgeon in managing blunt and penetrating injuries. We demonstrate its utility in airway management when a penetrating foreign body in the upper airway precludes orotracheal or nasotracheal intubation.

1034. Choi, M., et al. (2012). "A 10-year review of frontal sinus fractures: clinical outcomes of conservative management of posterior table fractures." Plastic and reconstructive surgery 130(2): 399-406.

BACKGROUND: Frontal sinus cranialization is commonly indicated for posterior table fractures with significant comminution, displacement, or cerebrospinal fluid leaks. This study assessed the clinical outcomes of conservative management., METHODS: A 10-year retrospective review of all frontal sinus fractures treated at a level 1 trauma center was performed using medical records and radiographic images., RESULTS: A total of 875 patients with frontal sinus fractures were identified, and 68 had posterior table involvement. Nine died within the first 48 hours from other injuries. The remaining 59 patients constituted the study population. Average follow-up approached 1 year (342 days). The more common mechanisms of injury were blunt interpersonal violence (29 percent) and motor vehicle accidents (27 percent). Concurrent central nervous system injury was common (73 percent), and the average Glasgow Coma Scale score was 12.7. Posterior wall fracture pattern was nondisplaced and noncomminuted in 33 patients (54 percent) and comminuted and/or displaced in 27 (46 percent). Cerebrospinal fluid leak was recorded in 11 patients (19 percent). Conservative management was the more common strategy (78 percent), followed by open reduction and internal fixation with sinus preservation (12 percent), obliteration (8 percent), and cranialization (2 percent). Of the 27 patients with comminuted and/or displaced fractures, 16 (59 percent) underwent conservative management, and 11 (41 percent) underwent surgical management, but only one patient (2 percent) underwent cranialization. There was no incidence of intracranial infection, except for one patient who died from encephalitis secondary to a gunshot wound to the head., CONCLUSION: The vast majority of

frontal sinus fractures involving the posterior table, including those with comminution, displacement, or cerebrospinal fluid leaks, can be safely managed without cranialization., CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

1035. Choi, W. C., et al. (2016). "The Efficacy of Bioabsorbable Mesh in Craniofacial Trauma Surgery." Archives of craniofacial surgery 17(3): 135-139.

BACKGROUND: The ultimate goal of craniofacial reconstructive surgery is to achieve the most complete restoration of facial functions. A bioabsorbable fixation system which does not need secondary operation for implant removal has been developed in the last decade. The purpose of this study is to share the experience of authors and to demonstrate the efficacy of bioabsorbable mesh in a variety of craniofacial trauma operations., METHODS: Between October 2008 and February 2015, bioabsorbable meshes were used to reconstruct various types of craniofacial bone fractures in 611 patients. Any displaced bone fragments were detached from the fracture site and fixed to the mesh. The resulting bone-mesh complex was designed and molded into an appropriate shape by the immersion in warm saline. The mesh was molded once again under simultaneous warm saline irrigation and suction., RESULTS: In all patients, contour deformities were restored completely, and bone segments were fixed properly. The authors found that the bioabsorbable mesh provided rigid fixation without any evidence of integrity loss on postoperative computed tomography scans., CONCLUSION: Because bioabsorbable meshes are more flexible than bioabsorbable plates, they can be molded and could easily reconstruct the facial bone in three dimensions. Additionally, it is easy to attach bone fragments to the mesh. Bioabsorbable mesh and screws is effective and can be easily applied for fixation in various craniofacial trauma reconstructive scenarios.

1036. Chong, C. L., et al. (1998). "Is cervical spine imaging indicated in gunshot wounds to the cranium?" The Journal of trauma 44(3): 501-502.

BACKGROUND, MATERIALS AND METHODS: Because there is no consensus regarding the necessity of imaging the cervical spine of patients who sustain a gunshot wound to the cranium, the cervical spinal radiographs of 53 consecutive patients with gunshot wounds to the cranium admitted to Hermann Hospital, a Level I trauma center, from January of 1993 to January of 1996, were reviewed., RESULTS: The cervical spine radiographs of all 53 patients were negative., CONCLUSIONS: Cervical spine injury is not associated with gunshot wound to the cranium. Therefore, patient management decisions/procedures, including endotracheal intubation, should not be delayed pending cervical spine imaging.

1037. Chong, S. G., et al. (2014). "A deceptive pneumothorax." Archivos de bronconeumologia 50(11): 496.

1038. Chopra, N., et al. (2017). "Ophthalmic outcomes following gunshot wound to head." Investigative Ophthalmology and Visual Science 58(8).

Purpose: There has been limited research on gun trauma over the past two decades, despite the fact that firearm injuries in the U.S. account for a significant percentage of all injury deaths each year (16.8% in 2014). In particular, there have been few studies on ophthalmic outcomes following gunshot wounds to the head. The purpose of this retrospective cohort study was to assess how often patients who survive gunshot wounds to the head suffer permanent visual loss. Methods: The Elmhurst City Hospital Trauma Registry and Mount Sinai Data Warehouse were queried for International Classification of Diseases, Ninth Revision (ICD-9) and Tenth Revision (ICD-10) codes for gun trauma resulting in ocular injury, and paper charts were obtained to evaluate ophthalmology notes. Between January 1, 2000 and May 8, 2016, we identified 31 patients who suffered a gunshot wound to the head and resultant ocular

trauma, including orbital fracture, ruptured globe, foreign body, and optic nerve injury. Gun types included all firearms, air guns, and explosives. Of the 31 patients queried, four patients were excluded due to incorrect coding upon chart review, and five patients were excluded because their charts were missing. Data from the 22 remaining patients were then assessed. Results: Of 915 patients presenting to the Elmhurst and Mount Sinai Hospital Emergency Departments with injuries due to gun trauma, 27 (3.0%) sustained ocular injuries. Of the 22 patients whose records were accessible, four were noted to have ocular injury on presentation but then died in the operating room. Of the surviving 18 patients, 2 (11%) were shot directly in the eye, 5 (28%) were shot in the orbit, and 11 (61%) were shot elsewhere in the head. Neither location of injury (p =.243) nor type of gun used (p =.296) predicted visual loss outcome. Eight of the 18 surviving patients (44%) suffered permanent visual loss, defined as open globe injury requiring enucleation/evisceration or loss of vision due to traumatic optic neuropathy. Conclusions: Loss of life from gun trauma is an issue that continues to attract national attention. However, even if one survives a gunshot wound to the head, we find that there is a high likelihood of suffering permanent visual loss. Though our dataset was limited, we found that visual loss outcome is not predicted by the location of gunshot wound or gun type used. Further research is needed to understand the full impact of gun trauma on ophthalmic outcomes.

1039. Chopra, N., et al. (2018). "Gun trauma and ophthalmic outcomes." Eye (London, England) 32(4): 687-692.

Purpose This retrospective cohort study assesses the visual outcomes of patients who survive gunshot wounds to the head. Methods The Elmhurst City Hospital Trauma Registry and Mount Sinai Data Warehouse were queried for gun trauma resulting in ocular injury over a 16-year period. Thirty-one patients over 16 years of age were found who suffered a gunshot wound to the head and resultant ocular trauma: orbital fracture, ruptured globe, foreign body, or optic nerve injury. Gun types included all firearms and air guns. Nine patients were excluded due to incorrect coding or unavailable charts. Statistical analysis was performed using a simple bivariate analysis (chi2). Results Of the 915 victims of gun trauma to the head, 27 (3.0%) sustained ocular injuries. Of the 22 patients whose records were accessible, 18 survived. Eight of the 18 surviving patients (44%) suffered long-term visual damage, defined as permanent loss of vision in at least one eye to the level of counting fingers or worse. Neither location of injury (P=0.243), nor type of gun used (P=0.296), nor cause of gun trauma (P=0.348) predicted visual loss outcome. The Glasgow Coma Scale eye response score on arrival to the hospital also did not predict visual loss outcome (P=0.793). Conclusion There has been a dearth of research into gun trauma and even less research on the visual outcomes following gun trauma. Our study finds that survivors of gun trauma to the head suffer long-term visual damage 44% of the time after injury.

1040. Chou, C. K., et al. (1993). "Management of windshield facial injuries." Gaoxiong yi xue ke xue za zhi = The Kaohsiung journal of medical sciences 9(3): 153-161.

Between Jan. 1986 and Dec. 1990, 99 patients with automobile windshield facial injuries were hospitalized in Kaohsiung Medical College hospital. All patients were injured by old type windshields in car accidents. Seventy-three patients (74%) were male and twenty-six (26%) were female. Ages ranged from 6 to 62 years (mean age 31 years). Fifty-seven patients (58%) were car drivers and forty-two (42%) were front seat passengers. All patients had typical multiple U-shaped lacerations on the face. The major injury sites were localized to the upper one third of the face. The wounds were repaired immediately after careful debridement. A total of 21 facial bone fractures were noted. All were open fractures with large, deep avulsion wounds. Displaced and comminuted fractures received reduction and fixation before wound closure. Three patients had cranial bone fracture with no displacement. Brain edema and subarachnoid hemorrhage were found by brain CT scan in two and one patients respectively. They were treated conservatively. In one patient with frontal sinus fracture the glass pieces penetrated into the brain. The foreign bodies were removed from the brain and frontal sinus. Eyeball rupture was found in 16 patients, including two patients in whom both eyes were involved. Eight eyeballs needed immediate

evisceration and ten eyeballs received reparation. Blindness occurred in all these patients. Of the 99 patients in this study, 15% sustained additional injury. Most were wounds on the extremities. Because serious injuries can be caused by the old type of windshields, it should be abandoned. Driving with the seat belt fastened is the best way to insure safety.

1041. Chou, E.-K., et al. (2009). "Epistaxis as the only initial symptom in pediatric naso-orbital-ethmoid fracture complicated with meningitis." The Journal of craniofacial surgery 20(3): 953-955.

Epistaxis is a frequent finding in patients with facial trauma. Herein, we report an unusual presentation of pediatric naso-orbital-ethmoid (NOE) fracture with epistaxis as the only initial symptom. The course of the patient's condition was later complicated by meningitis, related in part to the delay in diagnosis. A 3-year-old girl with preexisting upper respiratory symptoms was involved in a traffic accident, sustaining blunt trauma to the right side of her face. During the initial examination, only right-sided epistaxis was noted. Five days later, she developed febrile convulsion and was admitted to the intensive care unit with other signs of meningitis such as mental status change and neck stiffness. Her craniofacial computed tomographic scan showed a right-sided NOE fracture with minimal displacement and without dura tear. The cerebrospinal fluid culture grew Streptococcus pneumoniae, which may be due to ascending infection as a result of cribriform plate fracture. Intravenous antibiotic therapy was initiated with good response, and she was discharged from the hospital after 2 weeks. The presence of epistaxis and periorbital bruise, together with other symptoms and signs, helps in the identification of NOE and cribriform plate fracture. A high index of suspicion with repetitive computed tomographic scans is necessary to achieve correct early diagnosis. Parental antibiotic therapy is indicated if ascending cerebrospinal fluid infection develops.

1042. Choudhary, D. S. and N. Agrawal (2018). "New Surgical Modality for Management of Corneal Perforation Using Bowman Membrane." Cornea 37(7): 919-922.

PURPOSE: To describe a new surgical modality, "Bowman membrane tuck-in," for management of small to medium sized corneal perforation of a noninfectious etiology., METHODS: Two patients with corneal perforation of a noninfectious etiology and less than 4 mm in size underwent Bowman membrane tuck-in, a new surgical procedure. In this technique, Bowman membrane harvested from the donor cornea was tucked inside the stromal pocket of host tissue, which was prepared by 360-degree anterior stromal lamellar dissection. Patients were followed up for 6 months and were examined for best-corrected visual acuity, epithelialization time, anterior chamber stability, and graft-related complications., RESULTS: During 6-month follow-up, best-corrected visual acuity improved from PL+ (positive) to 20/120 and 20/200 in patient 1 and patient 2, respectively, and epithelialization was completed within a 2-week period in both patients. Surgery was uneventful in both cases; however, anterior chamber re-formation and graft repositioning were performed in patient 1. None of the patients showed signs of rejection or graft failure at 6-month follow-up., CONCLUSIONS: Bowman membrane tuck-in is an effective sutureless and glueless technique for management of corneal perforation of a noninfectious etiology, which may be used in emergency settings for the management of noninfectious corneal perforation of size less than 4 mm.

1043. Choulakian, A., et al. (2011). "Emergent cavernous carotid stenting for iatrogenic and skull base injuries." Skull Base 21.

Objective: Traumatic injury to the cavernous carotid artery (CCA) may be difficult to manage because it often requires emergent treatment due to the potential for life-threatening hemorrhage. Because this segment of the artery is difficult to access surgically, endovascular treatment by either parent artery occlusion or stent grafting is frequently necessary. Methods: This is a prospective case series of 29 patients who had traumatic CCA injury or spontaneous hemorrhage who had placement of one or more stent grafts in the CCA for treatment. Patients were loaded with either 300 mg or 600 mg of

clopidogrel and 325 mg of aspirin either a few hours before the endovascular procedure or via an oral gastric tube at the time of the procedure. Patients also received intraprocedural intravenous heparin. They were then maintained on clopidogrel and aspirin for 6 months, then aspirin alone from then on. Follow-up imaging was performed at 6 months postintervention, and patients were then followed up clinically on an annual basis. Results: Of the 29 patients who had treatment, 14 had a traumatic direct carotid cavernous fistula, 10 had iatrogenic injury to the CCA from surgery resulting in epistaxis, and 2 had epistaxis or subarachnoid hemorrhage from a gunshot wound. Three patients had prior malignant skull base tumor resection with subsequent radiation therapy that developed acute epistaxis in a delayed manner. Two patients developed thromboembolic events within the first 30 days of treatment. With an average imaging follow-up of 2.7 years, two patients had asymptomatic occlusion of their stent grafts, 22 patients had patent stent grafts, and 5 patients had no imaging follow-up. Conclusion: Stent grafts provide a safe alternative to deliberate parent artery occlusion in patients with spontaneous hemorrhage or trauma to the CCA. With aggressive antiplatelet therapy, a long-term symptomatic thromboembolic rate of 7% was seen.

1044. Chovanes, G. and R. M. Richards (2013). "Pressure is only part of the story in traumatic brain injured patients; Focal cerebral blood flow goes to zero in some patients with adequate cerebral perfusion pressure." Clinical neurosurgery 60: 176.

INTRODUCTION: The pathophysiology of traumatic brain injury (TBI) is still not clearly understood. Recently, a decompressive craniec-tomy trial (1) and a trial of intracranial pressure (ICP) treatment with ICP monitoring vs no monitoring (2) failed to support the concept that increases in ICP are exclusively responsible for TBI mortality and morbidity. To analyze the role ICP, cerebral perfusion pressure (CPP = BP-ICP), and cerebral blood flow (CBF) play in head injury, we monitored brain injured patients' ICP, blood pressure (BP), CPP, and focal cerebral blood flow (fCBF), recording the real-time data for computer analysis. METHODS: 20 patients with severe brain injury were monitored with recordings of ICP, BP, CPP, and fCBF every minute. 17 patients had severe closed TBI, 1 gunshot wound, and 2 intracerebral hemorrhages. 13 patients lived (GCS 3-9, average 5), 7 died (GCS 3-7, average 5). Of the 7 patients who died, 5 had technically adequate recordings before and as death supervened. Graphs were prepared of time vs CPP, ICP and fCBF and reviewed for the time course of fCBF deterioration vs CPP elevation. If CPP obviously and substantially decreased before fCBF decreased, that was termed a pressure death. However, if CPP stayed adequate and fCBF still decreased to zero, that was termed a non-pressure death. RESULTS: Three patients had a pressure death (Fig 1), and 2 patients had a non-pressure death (Fig 2). CONCLUSION: This may be the first real-time documentation of non-CPP dependent brain death as expressed by fCBF. There are pathological processes in the injured brain that do not directly involve increases in ICP and decreases in CPP. Heretofore clinical treatment efforts in brain injury have focused on ICP: other mechanisms are also extant and should be further investigated so as to more successfully treat brain injury.

1045. Chow, F. (2018). "Brain and Spinal Epidural Abscess." Continuum (Minneapolis, Minn.) 24(5, Neuroinfectious Disease): 1327-1348.

PURPOSE OF REVIEW: Brain abscesses and spinal epidural abscesses are serious, potentially life-threatening infections of the central nervous system. This article outlines the clinical presentation, evaluation, and management of brain abscesses and spinal epidural abscesses, with a specific focus on bacterial infections., RECENT FINDINGS: The overall incidence of brain abscesses has declined, in part because of fewer brain abscesses associated with otogenic infections. However, emerging patient populations at high risk for brain abscess include those with a history of penetrating head trauma, neurosurgery, or immunodeficiency. Improved mortality rates for brain abscess are attributable to modern diagnostic imaging, stereotactic-guided aspiration, and newer antimicrobials that readily penetrate into the central nervous system and abscesses. Brain MRI is more sensitive than CT for brain abscess, particularly in the early stages, but CT remains more widely available and can adequately

identify potential abscesses and confirm response to treatment. With the advent of minimally invasive neurosurgical techniques, surgical excision is often employed only for posterior fossa, multiloculated, or superficial well-circumscribed abscesses. In select clinical scenarios, conservative medical management may be a safe alternative to a combined surgical and medical approach. Unlike brain abscess, the incidence of spinal epidural abscess is on the rise and has been attributed to higher prevalence of predisposing factors, including spinal procedures and instrumentation., SUMMARY: Successful diagnosis and management of brain abscess and spinal epidural abscess requires a collaborative approach among neurologists, neurosurgeons, radiologists, and infectious disease physicians. The foundation of management of brain abscess includes surgical intervention for diagnostic purposes if a pathogen has not been identified or for decompression of larger abscesses or those with mass effect and significant surrounding edema; appropriate dosing and adequate duration of an antimicrobial regimen tailored to the presumptive source of infection and available culture data, and eradication of the primary source of infection. For spinal epidural abscesses, neurologic status at the time of presentation is directly related to outcomes, underscoring the importance of prompt recognition and intervention.

1046. Chow, L. Q., et al. (2015). "Ceritinib in patients (PTS) with anaplastic lymphoma kinase (ALK)-rearranged (ALK+) non-small cell lung cancer (NSCLC) metastatic to the brain and/or leptomeninges: The phase II ascend-7 study." Annals of Oncology 26: i42.

Background: Although the ALK inhibitor (ALKi) crizotinib (CRZ) achieves high responses in pts with ALK+ NSCLC, disease progression within 1 year often occurs, with the brain/central nervous system (CNS) as a common site of progression and relapse. Ceritinib is a novel oral ALKi with 20-fold greater potency than CRZ in enzymatic assays that crosses the blood-brain barrier with good CNS penetration in preclinical studies. In the pivotal phase I study (NCT01283516), ceritinib was highly active in ALK+ NSCLC pts (regardless of prior CRZ exposure) and achieved intracranial responses in 7 of 14 pts with measurable baseline brain lesions. The adverse events profile in these pts was similar to that of the full study population. Trial design: This international prospective phase II open-label study is designed to evaluate the antitumor activity of ceritinib in pts with ALK+ NSCLC metastatic to the brain or leptomeninges (ASCEND-7; CLDK378A2205). Eligible pts must have centrally assessed ALK+ NSCLC metastatic to the brain and ≥1 extracranial measurable lesion using Response Evaluation Criteria in Solid Tumors (RECIST) version 1.1. Pts must be neurologically stable ≥1 week prior to study drug and will be allocated to 1 of 5 cohorts depending on prior treatment:.

1047. Chow, L. Q., et al. (2015). "Ceritinib in ALK+ NSCLC metastatic to brain and/or leptomeninges: The ASCEND-7 study." Journal of Thoracic Oncology 10(9): S550-S551.

Background: Although the anaplastic lymphoma kinase inhibitor (ALKi), crizotinib achieves high responses in patients with ALK-rearranged (ALK+) non-small cell lung cancer (NSCLC), disease progression within 1 year can occur, with the brain/central nervous system (CNS) as a common site of progression and relapse. Ceritinib is a novel oral ALKi with 20-fold greater potency than crizotinib in enzymatic assays and crosses the blood-brain barrier with good CNS penetration in preclinical studies. In the pivotal phase 1 study (NCT01283516), ceritinib was highly active in ALK+ NSCLC patients (regardless of prior crizotinib exposure) and achieved intracranial responses in 7 of 14 patients with measurable baseline brain lesions. The adverse events profile in these patients was similar to that of the full study population. Methods: This international, prospective, phase 2, open-label study is designed to evaluate the antitumor activity of ceritinib in patients with ALK+ NSCLC metastatic to the brain or leptomeninges (ASCEND-7; CLDK378A2205). Eligible patients must have ALK+ (centrally assessed) NSCLC metastatic to the brain and ≥ 1 extracranial measurable lesion using Response Evaluation Criteria in Solid Tumors (RECIST) version 1.1. Patients must be neurologically stable ≥ 1 week prior to study drug administration and will be allocated to 1 of 5 arms depending on prior treatment: ∗Lesion free of local treatment (stereotactic or WBRT) or lesions in unequivocal progression after radiotherapy. Oral ceritinib 750 mg/d will be dosed on a continuous schedule and study assessments are consistent

across arms. The primary and key secondary objectives are to evaluate overall response rate and disease control rate, respectively. Other secondary objectives include assessment of intracranial and extracranial responses for all patients and for each of arms 1-4; overall survival and safety for all patients and for each of arms 1-5; and ceritinib pharmacokinetics in all patients. Enrollment is ongoing. Results: This study is in the activation phase. Conclusion:This study will demonstrate the efficacy of ceritinib in ALK+ NSCLC brain metastases and leptomeningeal metastases, in both WBRT-naive patients and prior irradiated patients. (Table Presented).

1048. Chowdhury, F. H., et al. (2016). "Nonmissile Penetrating Injury to the Head: Experience with 17 Cases." World neurosurgery 94: 529-543.

BACKGROUND: Penetrating nonmissile injuries to the head are far less common than missile penetrating injuries. Here we describe our experience in managing 17 cases of nonmissile injury to the head, likely the largest such series reported to date. We also highlight the surgical steps and techniques used to remove in situ objects (including weapons) in the penetrating wounds that have not been described previously., METHODS: We conducted a retrospective study of cases of nonmissile, low-velocity penetrating injuries of the head managed in our department. The recorded data of patients with penetrating head injuries were studied for the cause of the injury, type of object, type and extent of penetration, Glasgow Coma Scale score on admission, other clinical issues, evaluation and assessment, interval from penetration to operation, surgical steps and notes, difficulty during the operation, major and minor complications, follow-up, and ultimate outcome., RESULTS: Our 17 cases included 6 cases of accidental penetration and 11 cases of penetration as the result of violence. Weapons and other foreign objects causing injury included a teta (a pointed metal weapon with a wooden handle and a barb near the tip, used for hunting and fishing) in 4 cases, a dao (a sharp metal cutting instrument with a wooden handle used for cutting vegetables, fish, meat, bamboo, wood, etc.) in 3 cases, a bamboo stick in 3 cases, a metal rod in 2 cases, a knife in 2 cases, a sharp stone in 1 case, a metal steam chamber cover in 1 case, and a long peg in 1 case. GCS on admission was between 13 and 15 in 15 cases. Only 1 patient exhibited limb weakness. Four patients with an orbitocranial penetrating injury had 1-sided vision loss; 2 of these patients had orbital evisceration, and 1 of these patients died. In 14 patients, the foreign object was in situ at presentation and was removed surgically. Computed tomography scan and plain X-ray of the head were obtained in all patients. Postoperatively, 2 patients (11.7%) needed support in the intensive care unit but died early after surgery. One patient developed late osteomyelitis. The remaining patients were doing well at the most recent follow-up., CONCLUSIONS: The presenting picture of nonmissile penetrating injury to head may be daunting, but these cases can be managed with very good results with proper (clinical and radiologic) evaluation and simple neurosurgical techniques.

1049. Chowdhury, R. K., et al. (2009). "An unusual case of total ophthalmoplegia." Indian journal of ophthalmology 57(5): 389-391.

An eight-year-old male child presented with drooping of the left eyelid with a history of penetrating injury of hard palate by an iron spoon seven days ago, which had already been removed by the neurosurgeon as the computed tomography scan revealed a spoon in the left posterior ethmoid and sphenoid bone penetrating into the middle cranial fossa. On examination, visual acuity was 20/20 in each eye and left eye showed total ophthalmoplegia. Oral cavity revealed a hole in the left lateral part of the hard palate. We managed the case with tapering dose of systemic prednisolone. The total ophthalmoplegia was markedly improved in one month. Cases of foreign bodies in the orbit with intracranial extension are not unusual, but the path this foreign body traveled through the hard palate without affecting the optic nerve, internal carotid artery or cavernous sinus makes an interesting variation.

1050. Chrcanovic, B. R. (2012). "Open versus closed reduction: mandibular condylar fractures in children." Oral and maxillofacial surgery 16(3): 245-255.

PURPOSE: The purpose of the study was to review the literature regarding the evolution of current thoughts on management of mandibular condylar fractures (MCFs) in children., METHODS: An electronic search in PubMed was undertaken in May 2012. The titles and abstracts from these results were read to identify studies within the selection criteria. Eligibility criteria included studies published in English or German from the last 20 years (from 1992 onwards) reporting clinical series of MCFs in children and adolescents until the age of 18., RESULTS: The search strategy initially identified 542 studies. The references from 1992 onwards totaled 339 articles. Twenty-seven studies were identified without repetition within the selection criteria. Additional hand-searching yielded two additional papers., CONCLUSIONS: Pediatric MCFs require thoughtful consideration in management to avoid significant growth disturbance. Early treatment is indicated in order to improve the chances for favorable development. Long-term follow-up is required, in order to properly treat late complications that may appear. Coronal computed tomography is helpful in substantiating the correct final diagnosis. Many studies show that conservative treatment (CTR) has satisfactory long-term outcome of jaw function, occlusion, and facial esthetics, despite a high frequency of radiological aberrations. Surgery before puberty should be reserved for exceptional cases such as missile injuries, in cases with extensive dislocation and lack of contact between the fragments, in cases with multiple midfacial fractures, in which the mandible has to serve as a guide to reposition the midfacial bones, and in cases which the dislocation of the fractured stump creates a functional impediment that cannot be resolved by CTR. As the craniofacial skeleton becomes more adult-like in its form at about 12 years of age, the decreased remodeling capacity in the adolescents may occasionally result in abnormally shaped condylar heads or shortened ramus heights that may lead to persistent malocclusion. Thus, the indication of open reduction and internal fixation increases with age.

1051. Chrcanovic, B. R., et al. (2009). "Migration of tip knife blade through middle-third facial tissues." Oral and maxillofacial surgery 13(1): 41-44.

PURPOSE: The aim of this paper is to report a case of knife aggression with a spontaneous migration of a tip blade lodged in deep tissues 6 months after trauma., PATIENT: An 18-year-old woman that was a victim of impalement injury with a knife by her boyfriend on the glabella region with a blade fracture and tip lodging into middle-third facial tissues., RESULTS: After conservative management of a knife tip, a spontaneous migration occurred with its exposition on the zygomatic area, possibly due to a functional treatment to improve mouth opening., CONCLUSION: Fracture of knife blade with a tip retained deeply into the tissues is considered foreign body, and its removal must be considered. Nevertheless, the basis for this removal takes account the cost-benefit ratio, and if a conservative management was chosen, the clinical and radiological accompanying is mandatory to prevent and to treat its possible complications.

1052. Christensen, J., et al. (2015). "High-Energy Traumatic Maxillofacial Injury." The Journal of craniofacial surgery 26(5): 1487-1491.

High-energy blunt or penetrating impact leads to great variability in facial injury patterns. Although the mechanism, pattern, and distribution of forces vary, the resultant damage to hard and soft tissues requires dedicated planning and execution of debridement and reconstructive procedures. This article evaluates the initial management of patients sustaining high-energy facial impact injuries resulting in one or more comminuted or displaced facial fractures, with accompanying severe facial lacerations and/or soft tissue defects and avulsion injuries. Seventy-three patients met the criteria for high-energy traumatic injuries at Jackson Memorial/University of Miami Medical Center between 2003 and 2013 and are included in this article. Thirty-nine patients sustained one or more gunshot wounds to the face, and 34 patients were involved in high-speed motor vehicle collisions; all patients met our criteria for high-energy trauma. The treatment protocol for these injuries involves meticulous surgical

exploration and assessment, aggressive debridement, early definitive reduction/fixation, and reconstruction as necessary.

1053. Christopherson, L. K. and D. T. Lunde (1971). "Heart transplant donors and their families." Seminars in psychiatry 3(1): 26-35.

1054. Chu, A. and M. R. Levine (1989). "Gunshot wounds of the eye and orbit." Ophthalmic surgery 20(10): 729-736.

Gunshot wounds to the globe and orbit require careful evaluation and management. This article highlights five cases of penetrating gunshot injuries, each demonstrating different points to consider when managing the severely traumatized patient. Immediate and late complications are described. Missile velocities of different weapons are detailed, and the mechanism of injury is discussed. Careful preoperative evaluation is stressed as a means of avoiding complications.

1055. Chui, M., et al. (2002). "Suicidal stab wound with a butter knife." CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 167(8): 899.

1056. Chun, H., et al. (2022). "Inhibition of monoamine oxidase B prevents reactive astrogliosis and scar formation in stab wound injury model." Glia 70(2): 354-367.

Reactive astrocytes manifest molecular, structural, and functional alterations under various pathological conditions. We have previously demonstrated that the reactive astrocytes of the stab wound injury model (STAB) display aberrant cellular gamma-aminobutyric acid (GABA) content and tonic GABA release, whereas the active astrocytes under enriched environment (EE) express high levels of proBDNF. However, the role of monoamine oxidase B (MAO-B) in reactive astrogliosis and hypertrophy still remains unknown. Here, we investigate the role of MAO-B, a GABA-producing enzyme, in reactive astrogliosis in STAB. We observed that the genetic removal of MAO-B significantly reduced the hypertrophy, scar formation, and GABA production of reactive astrocytes, whereas the MAO-B overexpression under glial fibrillary acidic protein (GFAP) promoter enhanced the levels of GFAP and GABA. Furthermore, we found that one of the by-products of the MAO-B action, H2 O2 , but not GABA, was sufficient and necessary for the hypertrophy of reactive astrocytes. Notably, we identified two potent pharmacological tools to attenuate scar-forming astrogliosis-the recently developed reversible MAO-B inhibitor, KDS2010, and an H2 O2 scavenger, crisdesalazine (AAD-2004). Our results implicate that inhibiting MAO-B activity has dual beneficial effects in preventing astrogliosis and scar-formation under brain injury, and that the MAO-B/H2 O2 pathway can be a useful therapeutic target with a high clinical potential.

1057. Chunhua, Q. and W. Qun (2014). "A late-onset seizure due to a retained intracranial foreign body--pencil lead: a case report and review." The Journal of craniofacial surgery 25(2): e109-110.

A 40-year-old man presented with recent recurrent seizures. He was operated on to resect the right temporal mass with a foreign body, a pencil lead. The foreign body had entered the brain parenchyma for an accident in a child without apparent head injury, sustained for 30 years. He was asymptomatic for the intervening 30 years. It is rare that a pencil lead totally penetrated with an inapparent transtemporal closed head injury. The case may caution neurosurgeons to make the complete diagnosis of retained intracranial foreign bodies and thinking of need for early surgical exploration, to avoid chronic and potentially life-threatening neurological complications.

1058. Churojana, A., et al. (2011). "Cerebro-facial vascular injury: Outcome of endovascular management." Interventional Neuroradiology 17: 93.

Purpose: To review endovascular treatment outcome in patients with cerebro-facial vascular injury. Method: Excluding carotid-cavernous fistulas, forty-four patients with vascular injury in the head and neck region during 2000-2010 at Siriraj Hospital, Thailand, were retrospectively reviewed. A variety of devices including detachable balloons, coils, arylic glue and stents were used for interventional neurovascular treatment with the goal to eradicate the lesions completely. Result: Mechanisms of injury were motor vehicle accident 52.3%, penetrating injury 18.2%, falling 6.8%, blunt injury 13.6% and iatrogenic 9.1%. These resulted to extracranial vascular injury at 68.2% and intracranial at 31.8%. The injuries were classified angiographically as the followings; arteriovenous fistula 34.1%, false aneurysm 45.5%. dissection 15.9% and arterial tear 4.5%. Treatments were achieved by intervention at 75%, surgery at 9.1% (due to large intracranial hematoma) and conservation at 15.9%. By mean of endovascular technique, 90.9% had parent artery sacrifice and 9.1% had parent artery preservation. Endovascular treatment was successful in 97% without procedure-related complication. Seven selected patients for conservative treatment, included 6 arterial dissections and one small non-bleed cavernous false aneurysm. Five deaths occurred because of primary brain injury. Conclusion: Endovascular procedure is effective and safe in bleeding and symptom control of patients with cerebro-facial vascular injury. Parent artery occlusion should not be reluctant in life threatening hemorrhage or impending rupture false aneurysm. However, stent is eligible in selected patients.

1059. Chute, D. J., et al. (2017). "Case Report of a Migrating Bullet: An Unusual Cause of Postmortem Confusion." Journal of forensic sciences 62(5): 1386-1388.

Migrating bullets are rare sequelae of penetrating gunshot wounds. Such cases have been described in the neurosurgical literature because they can produce complications in the management of patients such as decline in neurologic status, delays in rehabilitation, and difficulties in bullet removal. In contrast, few postmortem reports have described this phenomenon. We report a case of a gunshot wound in which the projectile entered the left side of the head and traversed to the right frontal area as documented by CT scan on hospital admission. At autopsy, the bullet was noted to have migrated back to the left side of the head from where it was recovered. Medical examiners need to be aware of this unusual phenomenon of retained intracranial projectiles.

1060. Cianchetti, J. A. and G. F. Carroll (1980). "Traumatic pneumomediastinum resulting from facial trauma." Annals of emergency medicine 9(4): 218-221.

Pneumomediastinum is an uncommon complication of blunt or penetrating trauma to the head, neck, thorax, or abdomen. Air in the mediastinum can indicate a serious penetrating injury but may also represent a benign finding associated with relatively insignificant neck or facial trauma. We present a case demonstrating the correlation between facial trauma and pneumomediastinum. Echocardiographic and phonocardiographic data are offered as adjuncts in the diagnosis, and were utilized by us. Treatment is directed toward the factors responsible for leakage of air. Only in the rare instance of tension pneumomediastinum are invasive procedures warranted. Our patient, who was treated only with antibiotics, improved.

1061. Ciappetta, P., et al. (1990). "Cruciate hemiplegia: a clinical syndrome, a neuroanatomical controversy. Report of two cases and review of the literature." Surgical neurology 34(1): 43-47.

1062. Cifu, D. X., et al. (1996). "Functional outcomes of older adults with traumatic brain injury: a prospective, multicenter analysis." Archives of physical medicine and rehabilitation 77(9): 883-888.

OBJECTIVE: To investigate improvement rates and medical services costs in older brain injured adults relative to younger patients., DESIGN: Descriptive statistics were computed in a prospective comparative study of 50 patients 55 years and older and 50 patients 18 to 54 years old matched for gender and injury severity (number of days in coma, admission Glasgow Coma Score, intracranial pressure). Independent t tests were performed to examine differences between the two samples on specific variables., SETTING: Five medical centers in the federally sponsored Traumatic Brain Injury Model Systems Project that provide emergency medical services, intensive and acute medical care, inpatient rehabilitation, and a spectrum of community rehabilitation services., PARTICIPANTS: Patients were selected from a national database of 531 rehabilitation inpatients admitted to acute care within 8 hours of traumatic brain injury between 1989 and 1994., MAIN OUTCOME MEASURES: Disability Rating Scale, Functional Independence Measure, Rancho Los Amigos Levels of Cognitive Functioning Scale, length of stay, acute care and rehabilitation charges, and discharge disposition., RESULTS: Older persons averaged a significantly longer rehabilitation length of stay, higher total rehabilitation charges, and a lower rate of change on functional measures. No significant differences between groups were found for acute care length of stay, daily rehabilitation charges, acute care charges (daily or total), or discharge disposition., CONCLUSIONS: Although older persons demonstrated functional changes, the cost of change was substantially higher than for younger patients, coincident with longer lengths of stay. These higher overall charges and slower rates of change may effect changes in referral and management patterns.

1063. Cikatricis, P., et al. (2008). "Iatrogenic lateral rectus transection secondary to dental implantation surgery." Orbit (Amsterdam, Netherlands) 27(4): 305-307.

A 48-year-old patient noted right subconjunctival hemorrhage and double vision immediately following dental implant surgery. CT scan confirmed implant screw misplaced into the right orbit, and exploration revealed transection of right lateral rectus muscle belly. Diagnostic and management challenges are discussed.

1064. Cina, S. J., et al. (1995). "A rock in a hard place. A brief case report." The American journal of forensic medicine and pathology 16(4): 333-335.

Radiographs are often of assistance in locating foreign bodies, particularly bullets, at autopsy. It must be remembered, however, that all bullet-shaped radioopacities that appear to be within the skull are not necessarily projectiles. Described is a radiographic conundrum caused by a piece of gravel that pierced the scalp when the victim of a gunshot wound to the head fell to the ground. The stone, although bullet shaped, differed in radiodensity to metal and could have been recognized for what it was prior to much consternation on the part of the prosecutors. This case serves as a reminder of two pitfalls in the interpretation of gunshot wounds to the head. First, the radiodensity of a foreign body must be considered as important as its shape. Second, a foreign body outside of the convex surface of the skull may appear intracranial on both anteroposterior and lateral radiographs. Last, the prosecutor is encouraged to remain open minded and not to simply "see what he/she wants to see."

1065. Cinar, K., et al. (2015). "Outcomes and demostration of cranial firearm injuries: A multicenter retrospective study." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 21(4): 291-296.

BACKGROUND: Cranial firearm injuries (CFAI) are associated with significant morbidity and mortality. This study was aimed to determine the factors affecting mortality of CFAI cases managed in our institution by a retrospective analysis of CT scans and clinical data., METHODS: This multicenter retrospective study examined two hundred and nineteen patients presenting to neurosurgery clinics after CFAI between January 2012 and November 2014. Age, sex, Glasgow Coma Score (GCS), CT findings, and mortality and morbidity rates of the patients were analyzed to determine the factors affecting

mortality., RESULTS: Mean age of the study population was 24.19+/-12.25 years, 85.8% of them were male. The most common CT findings were fracture (100%), intracranial hemorrhage (61.2%), and an intracranially located foreign body (44.3%). A cranial operation was performed in 64.8% of the victims. Mean GCS on admission was 8+/-3.9, which increased in survivors ($p<0.05$)., CONCLUSION: CFAIs are associated with increased mortality and morbidity. We determined that many factors affected morbidity and mortality rates, and patient age, presence of intracranial hemorrhage, GCS, and treatment protocols were significantly associated with mortality.

1066. Ciocca, L., et al. (2011). "Computer-aided design and manufacturing construction of a surgical template for craniofacial implant positioning to support a definitive nasal prosthesis." Clinical oral implants research 22(8): 850-856.

AIM: To design a surgical template to guide the insertion of craniofacial implants for nasal prosthesis retention., MATERIALS AND METHODS: The planning of the implant position was obtained using software for virtual surgery; the positions were transferred to a free-form computer-aided design modeling software and used to design the surgical guides. A rapid prototyping system was used to 3D-print a three-part template: a helmet to support the others, a starting guide to mark the skin before flap elevation, and a surgical guide for bone drilling. An accuracy evaluation between the planned and the placed final position of each implant was carried out by measuring the inclination of the axis of the implant (angular deviation) and the position of the apex of the implant (deviation at apex)., RESULTS: The implant in the glabella differed in angulation by 7.78degree, while the two implants in the premaxilla differed by 1.86 and 4.55degree, respectively. The deviation values at the apex of the implants with respect to the planned position were 1.17 mm for the implant in the glabella and 2.81 and 3.39 mm, respectively, for those implanted in the maxilla., CONCLUSIONS: The protocol presented in this article may represent a viable way to position craniofacial implants for supporting nasal prostheses.

1067. Cipriani, R., et al. (1998). "Mandibular reconstruction with revascularized free flap." Rivista Italiana di Chirurgia Plastica 30(1): 19-26.

Microsurgery has revolutionized the problem of mandibular reconstruction after segmental resection for endo-oral carcinoma. Revascularized flaps not only ensure the best possible functional results, but also allow for an ample choice adapt to the single patient's needs. Nowadays, there are five or six sites with suitable bone structure, from which a free flap may be removed for this type of reconstruction. Therefore, thanks to specific anatomic studies carried out by various authors, these flaps are now the first choice. They allow for immeidate reconstruction as they eliminate the common complications of the past and give functional results that can improve patients' quality of life. This applies to the cases involving resectioning of the anterior mandibular arch, whilst, for lateral resectioning (ascending corner and branch) the choice is to be evaluated according to each single case, depending on age, motivation and prognosis. The indications for a marginal resectioning (conservative approach) or segmental (demolitive approach) of the mandible or the immediate reconstruction after segmental resectioning, bearing in mind the various solutions available with osteo-myo-cutaneous revascularized free flaps are to be evaluated for each individual case. Over the past four years, (at time of writing), we have carried out, in collaboration with the E.N.T., Clinic of our Hospital, 87 revascularized free flaps in complex reconstruction cases of the head. Mandibular reconstruction, with a revascularized osteo-myo-cutaneous flap, was carried out in 11 patients. Surgery was performed for neoplastic pathologies in most cases where reconstruction was immediate, whilst a small percentage underwent surgery on various lateral parts of the mandiboular after firearm injures.

1068. Cirak, B., et al. (2000). "[Cranial gunshot injuries and treatment approaches]." Kranyal atesli silah yaralanmalari ve tedavi yaklasimlari. 6(4): 241-243.

21 patients with gunshot wounds were retrospectively evaluated. They were 19 male and 2 female, age range was 9-24. All of the patients underwent a plain x-ray and computed tomography evaluation. 9 patients had intracerebral hematoma, 4 had subdural hematoma, 1 had epidural hematoma and 1 had intraventricular hematoma. 9 patients were observed to have bullet in the cranium. All the patients with glasgow coma scale 3-5 at the admittance died. 15 patients underwent surgical treatment. 3 patients had cerebrospinal fluid fistula postoperatively and underwent reoperation. Extensivity of the lacerated brain, localization of the lesion and the glasgow coma scale at the admittance affect the outcome in gunshot wounds.

1069. Cirak, B., et al. (2004). "Spinal injuries in children." Journal of pediatric surgery 39(4): 607-612.

BACKGROUND/PURPOSE: Traumatic spinal injury (TSI) is an uncommon source of morbidity and mortality in children. The aim of this study was to describe childhood TSI in a single level 1 urban pediatric trauma center., METHODS: The authors retrospectively analyzed all children younger than 14 years with TSI, treated at a level I pediatric trauma center between 1991 and 2002 (n = 406, 4% total registry). All children were stratified according to demographics, mechanisms, type and level of injury, radiologic evaluations, associated injuries, and mortality., RESULTS: The mean age was 9.48 +/- 3.81 years. The most common overall mechanism of injury was motor vehicle crash (MVC; 29%) and ranked highest for infants. Falls ranked highest for ages 2 to 9 years. Sports ranked highest in the 10 to 14 year age group. Paravertebral soft tissue injuries were 68%. The most common injury level was the high cervical spine (O-C4). The incidence of spinal cord injury without radiologic abnormality (SCIWORA) was 6%. Traumatic brain injury (37%) was the most common associated injury. Overall mortality rate was 4% in this urban catchment., CONCLUSIONS: TSI in children requires a different preventive and therapeutic logarithm compared with that of adults. The potential devastating nature of TSI warrants that the health care team always maintains a high index of suspicion for injury. Future prospective studies are needed to further elucidate injury patterns.

1070. Ciurea, A. V., et al. (2011). "Traumatic brain injury in infants and toddlers, 0-3 years old." Journal of medicine and life 4(3): 234-243.

OBJECT: Children 0-3 years old present a completely different neurotraumatic pathology. The growing and the development processes in this age group imply specific anatomical and pathophysiological features of the skull, subarachnoid space, CSF flow, and brain. Most common specific neurotraumatic entities in children 0-3 years old are cephalhematoma, subaponeurotic (subgaleal) hematoma, diastatic skull fracture, grow skull fracture, depressed ('ping-pong') skull fracture, and extradural hematoma., METHODS: We present our 10 years experience in neuropediatric traumatic brain injuries, between 1999 and 2009, in the First Department of Neurosurgery and Pediatric Intensive Care Unit. Including criteria were children, 0-3 years old, presenting only traumatic brain injury. We excluded patients with politrauma, who require a different management., RESULTS: We present the incidence of these specific head injuries, clinical and imagistic features, treatment, and outcome. We found 72 children with diastatic skull fracture, 61 cases with depressed ('ping-pong') skull fracture, 22 cases with grow skull fracture, 11 children harboring intrusive skull fracture, 58 cephalhematomas, 26 extradural hematomas, and 7 children with severe brain injury and major posttraumatic diffuse ischemia ('black-brain'). Usually, infants and toddlers present with seizures, pallor, and rapid loss of consciousness. First choice examination, in all children was cerebral CT-scan, and for follow-up, we performed cerebral MRI. We emphasize on the importance of seizure prevention in this age group. Children presenting with extensive diffuse ischemia ('black-brain') had a poor outcome, death occurring in all 7 cases., CONCLUSION: Children 0-3 years old, present with a total distinctive pathology than adults. Children with head injury must be addressed to a pediatric department of neurosurgery and pediatric intensive care unit. Prophylaxis pays the most important role in improving the outcome.

1071. Civelek, E., et al. (2006). "[Penetrating transorbital intracranial foreign body]." Penetran transorbital uzanimli intrakraniyal yabanci cisim. 12(3): 245-248.

We report a seven year-old boy who suffered left orbital penetration of an industrial sewing machine needle. The needle passing through the left orbit and sphenoid bone at the posterior was extending into the layers of the dura of the left temporal lobe. In this patient, we preferred surgical approach and there was no complication after surgery. Penetrating intraorbital foreign materials with intracranial extension may lead to complications such as intracerebral hematoma, brain abscess, CSF fistula, proptosis of the eye, diplopia, orbital cellulitis and periorbital abscess. They have to be removed by surgical approach to prevent potential complications.

1072. Civil, I. D., et al. (1987). "Major trauma in an urban New Zealand setting: resource requirements." The Australian and New Zealand journal of surgery 57(8): 543-548.

Patients with severe injuries, place significant demands on an institution's facilities and staff if these patients are to be treated adequately. In the USA, requirements for institutions managing patients with major injuries have been outlined and 'trauma centres' designated. In New Zealand, the requirements for care of patients with severe injuries have not been documented. One hundred and fourteen patients who presented to the Accident and Emergency Department at Auckland Hospital over a 6 month period were prospectively evaluated. All patients had Injury Severity Scores greater than or equal to 16 and the majority were young males. The greatest number of patients presented at night and during the weekend. Radiographic studies and resuscitation room procedures were commonly required and 54% of patients required surgery within the first 24 h after presentation. Management of patients required involvement by a large variety of specialties with general surgery, intensive care, anaesthetics, neurosurgery and orthopaedics more commonly involved. Sixty per cent of patients required intensive care admission and the overall group had a 30% mortality rate. This study confirms that major trauma in New Zealand patients places similar demands on resources to that experienced in the USA. Although health resources are currently limited, appropriate allocation of these resources must be considered to best treat patients suffering severe injuries.

1073. Claiborne, S. T., et al. (2017). "Non-union rates in fibula free-flap reconstruction of head and neck oncologic defects." Journal of oral and maxillofacial surgery 75(10): e335.

Objective: The microvascular free tissue transfer of the fibula is a well-established and predictable method of providing reconstruction for mandibular and maxillary defects that arise from the resection of benign and malignant disease or traumatic injury. The purpose of this study is to evaluate our experience with the fibula free flap in 20 cases and describe the rate of non-union after reconstruction. Patients and Methods: From 2012 to 2017, the senior author and 3 reconstructive surgeons performed osseous fibula free flaps on a total of 30 patients. Five patients were excluded due to lack of adequate length followup. Minimum acceptable follow-up was imaging at least 8 weeks postoperatively with either CT scan or panoramic radiograph, at which time the most recent radiographic examination was evaluated for evidence of a continuous clear gap between bony segments, indicating non-union. Five more patients were excluded due to complete flap failure. Therefore, 20 fibula flap patients were considered for retrospective review. Within these 20 patients, there were a total of 11 males and 9 females, with an age range of 25-81 years. Sixteen involved mandibular reconstruction and 4 were maxillary cases. A wide variety of both benign and malignant disease provided the indication for surgical therapy. Ten patients had malignant disease (7 SCC, 1 clear cell odontogenic carcinoma, 1 ameloblastic carcinoma, 1 mucosal melanoma) and 4 had benign pathology (3 ameloblastomas, 1 keratocystic odontogenic tumor). Two patients had osteoradionecrosis and 2 had osteomyelitis. Post-traumatic deformities existed in 2 patients after gunshot wounds to the face. Complications of reconstruction included flap failure in 5/30 patients, who were therefore excluded from the study. Postoperative wound infection was the most frequent complication in 4/20 patients, and 3 of these patients were treated with hardware exchange as part of the goal of eliminating source of infection,

in addition to systemic antibiotics and surgical drainage. Reconstruction plates were used in all cases as the primary method of fixation. Cases involving exchanged hardware during a subsequent operation utilized single mini-plate fixation across all osteotomies. Results: A total of 54 osteotomies were bridged by plate fixation in the 20 fibula reconstructions. Of these 54 gaps, bony union was ultimately found in 39 or 72%. Maxillary rates (50%) were lower than mandibular cases (80%), but there were only 4 involving the maxilla compared to 16 mandibular. In the 20% non-unions found in the mandible, the majority were located in the posterior mandible. The overall non-union rate was 28% despite a fairly even split between heavy reconstruction plates (11 cases) and mini-plates (9 cases). Conclusions: The fibula free flap is a reliable and versatile reconstruction for head/neck oncologic defects, with a higher than expected rate of bony non-union. This may be more clinically significant in the case of implant reconstruction than in cases where the patient does not undergo dental rehabilitation.

1074. Clark, W. C., et al. (1986). "Analysis of 76 civilian craniocerebral gunshot wounds." Journal of neurosurgery 65(1): 9-14.

A retrospective analysis of 76 civilian craniocerebral gunshot wounds treated over a 20-month period is presented. The authors report a 62% mortality rate and conclude that the admission Glasgow Coma Scale (GCS) score is a valuable prognosticator of outcome. Other important findings were: patients with a GCS score of 3 invariably died, with or without surgical intervention; and the presence of intracranial hematomas, ventricular injury, or bihemispheric wounding was associated with a poor outcome. Standardized methods of data reporting should be adopted in order to allow multicenter trials or comparisons that might lead to management practices that could improve results.

1075. Clarke, W. E., et al. (2001). "Coordination of fibroblast growth factor receptor 1 (FGFR1) and fibroblast growth factor-2 (FGF-2) trafficking to nuclei of reactive astrocytes around cerebral lesions in adult rats." Molecular and cellular neurosciences 17(1): 17-30.

Traumatic injury to the adult central nervous system initiates a cascade of cellular and trophic events, culminating in the formation of a reactive gliotic scar through which transected axons fail to regenerate. Levels of fibroblast growth factor-2 (FGF-2), a potent gliogenic and neurotrophic factor, together with its full-length receptor, FGF receptor 1 (FGFR1) are coordinately and significantly increased postinjury in both nuclear and cytoplasmic fractions of extracted cerebral cortex biopsies after a penetrant injury. FGFR1 is colocalized with FGF-2 in the nuclei of reactive astrocytes, and here FGF-2 is associated with nuclear euchromatin. This study unequivocally demonstrates coordinate up-regulation and trafficking of FGF-2 and full-length FGFR1 to the nucleus of reactive astrocytes in an in vivo model of brain injury, thereby implicating a role in nuclear activity for these molecules. However, the precise contribution of nuclear FGF-2/FGFR1 to the pathophysiological response of astrocytes after injury is undetermined.

1076. Clarot, F., et al. (2008). "Air guns: weapons or toys?" The American journal of forensic medicine and pathology 29(4): 382-384.

1077. Clarot, F., et al. (2003). "Lethal head injury due to tear-gas cartridge gunshots." Forensic science international 137(1): 45-51.

We report a fatal head injury caused by a tear-gas cartridge and point out the underestimated potential injury of this type of weapon. Gas pressure wounds and the death mechanisms are also described. A review of the literature and forensic considerations of head injury without projectile are presented.

1078. Claussen, C. D., et al. (1977). "Computed tomography of trauma involving brain and facial skull (craniofacial injuries)." Journal of computer assisted tomography 1(4): 472-481.

Among head injuries, frontobasal fractures play an important role due to frequently concomitant intracranial complications. Intracranial hematomas, cerebral contusions, depressed fractures, and intracranial air are readily detected by computed tomography (CT). Traumatization of intraorbital structures often associated with blowout fractures and herniation of cerebral parenchyma into the ethmoidal, frontal, or sphenoidal sinuses are best demonstrated by CT. In assessing soft tissue structures, CT is superior to multidirectional tomography, which tends to be more suitable for fine detail study of bony structures. Furthermore, CT is helpful for diagnosing inflammatory processes due to bacterial invasion not infrequently following traumatic communication between the paranasal sinuses and the cranial cavity. Sequelae of head trauma such as posttraumatic porencephaly are clearly demonstrated by CT.

1079. Clayton, N. A., et al. (2019). "Ablative Fractional Resurfacing in Acute Care Management of Facial Burns: A New Approach to Minimize the Need for Acute Surgical Reconstruction." Journal of burn care & research : official publication of the American Burn Association 40(3): 368-372.

Current evidence suggests awaiting for scars to fully mature before engaging surgical reconstruction unless acute indications to prevent secondary damage, such as microstomia and eyelid ectropion are apparent. To evaluate the efficacy of ablative fractional CO2 laser intervention early in the acute treatment of panfacial burn injury. A 39-year-old Asian male with 60% TBSA flame burns including panfacial involvement was developing microstomia and upper and lower eyelid ectropion early proceeding epithelialization. At 6-weeks postinjury, ablative fractional CO2 laser treatment was commenced while still in the intensive care unit, and subsequently delivered at regular intervals. Nonsurgical scar contracture management was provided concurrently as per site specific standard protocols. Measurements and photographic data relative to deficits in eye and mouth competence were obtained at rest, as well as maximal opening at baseline and routinely until scar stabilization was reached. The outcomes were subsequently compared with facial burn patient historical data within our facility. No significant difference was identified in the functional ROM for mouth and eye regions; treatment duration was, however, shorter and aesthetic outcomes were considered superior to their surgical reconstruction counterparts in the historical cohort. This case report reveals that early ablative fractional CO2 resurfacing treatment, coalesced with nonsurgical scar management is an efficacious interventional approach to abate contractures to the face, accelerates and enhances scar maturation processes and may alleviate the need for surgical scar reconstructions. Moreover, optimal aesthetic outcomes may be achieved compared with traditional reconstructive methods.

1080. Clemedson, C. J., et al. (1973). "Head injuries caused by small-calibre, high velocity bullets. An experimental study." Zeitschrift fur Rechtsmedizin. Journal of legal medicine 73(2): 103-114.

1081. Clifton, G. L., et al. (2011). "Very early hypothermia induction in patients with severe brain injury (the National Acute Brain Injury Study: Hypothermia II): a randomised trial." The Lancet. Neurology 10(2): 131-139.

BACKGROUND: The inconsistent effect of hypothermia treatment on severe brain injury in previous trials might be because hypothermia was induced too late after injury. We aimed to assess whether very early induction of hypothermia improves outcome in patients with severe brain injury., METHODS: The National Acute Brain Injury Study: Hypothermia II (NABIS: H II) was a randomised, multicentre clinical trial of patients with severe brain injury who were enrolled within 2.5 h of injury at six sites in the USA and Canada. Patients with non-penetrating brain injury who were 16-45 years old

and were not responsive to instructions were randomly assigned (1:1) by a random number generator to hypothermia or normothermia. Patients randomly assigned to hypothermia were cooled to 35degreeC until their trauma assessment was completed. Patients who had none of a second set of exclusion criteria were either cooled to 33degreeC for 48 h and then gradually rewarmed or treated at normothermia, depending upon their initial treatment assignment. Investigators who assessed the outcome measures were masked to treatment allocation. The primary outcome was the Glasgow outcome scale score at 6 months. Analysis was by modified intention to treat. This trial is registered with ClinicalTrials.gov, NCT00178711., FINDINGS: Enrolment occurred from December, 2005, to June, 2009, when the trial was terminated for futility. Follow-up was from June, 2006, to December, 2009. 232 patients were initially randomised a mean of 1.6 h (SD 0.5) after injury: 119 to hypothermia and 113 to normothermia. 97 patients (52 in the hypothermia group and 45 in the normothermia group) did not meet any of the second set of exclusion criteria. The mean time to 35degreeC for the 52 patients in the hypothermia group was 2.6 h (SD 1.2) and to 33degreeC was 4.4 h (1.5). Outcome was poor (severe disability, vegetative state, or death) in 31 of 52 patients in the hypothermia group and 25 of 56 in the normothermia group (relative risk [RR] 1.08, 95% CI 0.76-1.53; p=0.67). 12 patients in the hypothermia group died compared with eight in the normothermia group (RR 1.30, 95% CI 0.58-2.52; p=0.52)., INTERPRETATION: This trial did not confirm the utility of hypothermia as a primary neuroprotective strategy in patients with severe traumatic brain injury.

1082. Close, J. K., et al. (2009). "Percutaneous ultrasound-guided intraorbital foreign body removal." Ophthalmic plastic and reconstructive surgery 25(4): 335-337.

Percutaneous ultrasound-guided intraorbital foreign body removal was successfully performed for removal of an intraorbital wooden foreign body. A 13-month-old boy presented with left periorbital cellulitis, which developed 3 days after a fall from an all-terrain vehicle. Orbital CT showed preseptal and postseptal orbital cellulitis, and an 11 x 2 mm linear foreign body in the medial compartment of the left eye. Surgical exploration of the left eye was performed, with no foreign body identified. Following surgery, diagnostic sonography demonstrated a linear foreign body adjacent to the medial rectus muscle, with sonographic characteristics compatible with wood. The percutaneous procedure was performed with intravenous deep sedation. With sonographic guidance, a Hartmann forceps was advanced in the medial soft tissues of the orbit, and the foreign body was removed intact. Ophthalmologic follow-up over 6 months revealed no evidence of visual loss, nerve injury, or impairment of extraocular muscle function.

1083. Cobb, S. R., et al. (1985). "Computed tomographic evaluation of ocular trauma." Computerized radiology : official journal of the Computerized Tomography Society 9(1): 1-10.

The CT scans of 10 traumatized patients with demonstrable ocular injuries were reviewed. The CT findings were correlated with the clinical findings in each case. CT manifestations of a variety of ocular and orbital injuries are reported and a systematic approach to the CT evaluation of ocular trauma is presented.

1084. Cocanour, C. S., et al. (1995). "Does the potential for organ donation justify scene flights for gunshot wounds to the head?" The Journal of trauma 39(5): 968-970.

OBJECTIVE: The goal of this study was to evaluate helicopter transport to an urban level I trauma center from the scene of injury for patients with self-inflicted gunshot wounds to the head., DESIGN: This study is a retrospective review of the prehospital, hospital, and billing records., MEASUREMENTS AND MAIN RESULTS: Despite the fact that 10 of 28 patients (36%) had an airway established by the medical flight crews, scene flights did not enhance survival. Twenty-seven of 28 patients (96%) died. The remaining patient's survival could not be attributed to the scene flight. We

estimated that 27 of 28 patients would have arrived at the trauma center sooner if they had been transported by the first-responder emergency medical services ground unit. Flight service charges were approximately one-third of the hospital charges. As a group, patients with a self-inflicted gunshot wound to the head had the highest rate of organ donation in this trauma center (26%). Twenty-nine organs were harvested from the seven donors., CONCLUSIONS: The use of helicopter scene flights from the scene of injury for patients with a self-inflicted gunshot wound to the head provides no medical advantage to the victims, but provides a high-yield source of desperately needed organs. The prompt establishment of an airway in the field may prolong patient survival long enough to allow evaluation for organ donation. Helicopter transport of these patients is justified only as a means of rapidly delivering the personnel capable of providing advanced airway skills to the scene. Patients requiring CPR in the field after isolated gunshot wounds to the head will not live long enough to become organ donor candidates; therefore, there is no benefit to helicopter transport for these patients.

1085. Coe, C. D., et al. (2010). "Effect of blast trauma and corneal foreign bodies on visual performance." Optometry and vision science : official publication of the American Academy of Optometry 87(8): 604-611.

PURPOSE: To evaluate the effect of non-penetrating corneal foreign bodies secondary to explosive blasts on the visual performance of soldiers., METHODS: In a prospective, non-interventional study subjective visual performance and objective optical quality of 11 injured eyes with retained corneal foreign bodies were compared with that of 11 normal controls. Visual performance measures consisted of best spectacle-corrected high-contrast visual acuity (HCVA), low-contrast (5%) visual acuity (LCVA), and contrast sensitivity (CS). LCVA was evaluated in two luminance levels (photopic and mesopic) and two glare conditions (with and without glare). Acuity measurements were scored using logMAR notation. Objective optical quality was assessed comparing total root mean square wavefront error (WFE) and percent higher order aberrations. Modulation transfer functions calculated from the wavefront maps were used to predict the results of the psychophysical contrast testing., RESULTS: HCVA of injured eyes (M = -0.03) did not differ significantly ($t(20) = 1.56$, $p = 0.13$) when compared with controls (M = -0.09). However, visual performance of injured eyes (M = 0.33) was significantly worse than control eyes (M = 0.11) on photopic LCVA ($t(20) = 4.16$, $p < 0.001$), mesopic LCVA(M = 0.44 vs. M = 0.21, $t(20) = 3.85$, $p = 0.001$), mesopic LCVA with glare (M = 0.49 vs. M = 0.21, $t(20) = 3.66$, $p = 0.002$), and small letter CS (M = 0.25 vs. M = 0.90, $t(20) = -6.6$, $p < 0.001$). For a 6-mm pupil, mean absolute WFE attributed to higher order aberrations for the injured eyes was 0.86 microm and 0.59 microm for the control eyes. This difference was significant ($t(20) = -2.15$, $p = 0.044$)., CONCLUSIONS: Although HCVA was no different than the normal controls, visual performance of the injured eyes was significantly worse in terms of LCVA and CS. On average, visual performance can be broadly predicted by the modulation transfer function derived from the subjects' wavefront aberration map.

1086. Cogbill, T. H. and H. G. Sullivan (1995). "Carotid artery pseudoaneurysm and pellet embolism to the middle cerebral artery following a shotgun wound of the neck." The Journal of trauma 39(4): 763-767.

Arterial missile embolism is a rare complication of penetrating vascular trauma. We report a case of middle cerebral artery pellet embolism and delayed appearance of a carotid artery pseudoaneurysm following a shotgun wound of the neck. The pseudoaneurysm was repaired. Because the patient had no associated neurologic deficits, the pellet embolus was left within the patient middle cerebral artery. He remains well 4 years after injury. A selective approach to the management of a pellet embolus to the middle cerebral artery based on clinical signs or symptoms and status of arterial patency is recommended. In addition, several principles are suggested to improve the reliability of arteriography for shotgun wounds of the neck.

1087. Cohen, J. E., et al. (2008). "Results of endovascular treatment of traumatic intracranial aneurysms." Neurosurgery 63(3): 476-476.

OBJECTIVE: To present results of early angiographic diagnosis and endovascular treatment of traumatic intracranial aneurysms (TICA)., METHODS: From June 2002 to December 2006, diagnostic angiography was performed on patients with moderate to severe traumatic brain injury that involved a cranial base fracture or a penetrating brain injury with a tract from the penetrating agent that entered at the pterional area, went through the middle cerebral artery candelabra, and crossed the midline. TICAs were treated by various endovascular techniques during the same angiographic procedure., RESULTS: Thirty-four patients with traumatic brain injury underwent angiography (25 penetrating brain injuries, nine blunt injuries); 13 TICAs were diagnosed (10 penetrating brain injuries, three blunt injuries). The Glasgow Coma Scale score at diagnosis ranged from 5 to 15. Angiography was performed for screening in eight patients and for clinical indications in five patients; 11 TICAs were diagnosed before rupture. Seven aneurysms were located on branches of the middle cerebral artery, two on pericallosal branches of the anterior cerebral artery, and four on the internal carotid artery. No recanalization was detected in 12 patients. One patient treated with a bare stent and coiling had a growing intracavernous pseudoaneurysm; therefore, internal carotid artery occlusion with extracranial-intracranial microvascular bypass was performed. Six patients refused angiographic follow-up, but computed tomographic angiography has failed to show recanalization. No patient presented with delayed bleeding (mean follow-up, 2.6 yr). There were no procedure-related complications or mortality., CONCLUSION: Early angiographic diagnosis with immediate endovascular treatment provided an effective approach for TICA detection and management. Endovascular therapy is versatile and offers a valuable alternative to surgery, allowing early aneurysm exclusion with excellent results.

1088. Cohen, J. E., et al. (2005). "Endovascular management of traumatic and iatrogenic aneurysms of the pericallosal artery. Report of two cases." Journal of neurosurgery 102(3): 555-557.

Traumatic intracranial aneurysms are rare complications of closed and penetrating head injuries and may also be related to a variety of neurosurgical procedures. The primary goals in the treatment of patients harboring these lesions are early identification and intervention to prevent bleeding. Traumatic aneurysms are fragile, prone to rupture, and represent a challenging subset of vascular lesions for either surgery or endovascular therapy. Surgical approaches to aneurysms located at the pericallosal arteries are associated with higher rates of morbidity and mortality than approaches to other supratentorial aneurysms. Current endovascular treatment most often involves occlusion of the parent artery with the potential of added morbidity. The authors present their experience in the endovascular management of traumatic and iatrogenic aneurysms of the pericallosal artery achieved by primary coil embolization with parent vessel preservation. For patients harboring traumatic pericallosal aneurysms with favorable anatomical characteristics, in which the morbidity caused by parent vessel occlusion is not acceptable, endosaccular coil placement may be a valuable option.

1089. Cohen, M. A., et al. (1986). "Low velocity hand-gun injuries of the maxillofacial region." Journal of maxillofacial surgery 14(1): 26-33.

In contrast to the number of reports in the literature describing high velocity injuries of the maxillo-facial region, there are relatively few which deal with civilian type gunshot injuries. The purpose of this study was to undertake a retrospective analysis of 40 cases of low-velocity hand-gun injuries of the maxillo-facial region. The majority of cases were due to assault followed by accidental shootings and failed suicide attempts. Injuries ranged from mild soft tissue damage without fractures to severe, comminuted fractures of the facial bones. In some cases, soft tissue damage was severe. Rarely were injuries life threatening. Entrance wounds were characteristically small and well circumscribed. In 60 per cent of cases the bullet did not exist and was retained within the tissues. The floor of the mouth and tongue were the soft tissues most commonly injured. Other structures injured were major blood

vessels, nerves and the eye. Mandibular fractures occurred in 58 per cent of cases, followed in frequency by maxillary complex fractures. Twenty per cent of fractures simultaneously involved bones of the upper, middle and lower-thirds of the facial skeleton. The above injuries are discussed and a classification of low-velocity hand-gun injuries of the maxillo-facial region is proposed.

1090. Cohen, M. J., et al. (2009). "Early release of high mobility group box nuclear protein 1 after severe trauma in humans: role of injury severity and tissue hypoperfusion." Critical care (London, England) 13(6): R174.

INTRODUCTION: High mobility group box nuclear protein 1 (HMGB1) is a DNA nuclear binding protein that has recently been shown to be an early trigger of sterile inflammation in animal models of trauma-hemorrhage via the activation of the Toll-like-receptor 4 (TLR4) and the receptor for the advanced glycation endproducts (RAGE). However, whether HMGB1 is released early after trauma hemorrhage in humans and is associated with the development of an inflammatory response and coagulopathy is not known and therefore constitutes the aim of the present study., METHODS: One hundred sixty eight patients were studied as part of a prospective cohort study of severe trauma patients admitted to a single Level 1 Trauma center. Blood was drawn within 10 minutes of arrival to the emergency room before the administration of any fluid resuscitation. HMGB1, tumor necrosis factor (TNF)-alpha, interleukin (IL)-6, von Willebrand Factor (vWF), angiopoietin-2 (Ang-2), Prothrombin time (PT), prothrombin fragments 1+2 (PF1+2), soluble thrombomodulin (sTM), protein C (PC), plasminogen activator inhibitor-1 (PAI-1), tissue plasminogen activator (tPA) and D-Dimers were measured using standard techniques. Base deficit was used as a measure of tissue hypoperfusion. Measurements were compared to outcome measures obtained from the electronic medical record and trauma registry., RESULTS: Plasma levels of HMGB1 were increased within 30 minutes after severe trauma in humans and correlated with the severity of injury, tissue hypoperfusion, early posttraumatic coagulopathy and hyperfibrinolysis as well with a systemic inflammatory response and activation of complement. Non-survivors had significantly higher plasma levels of HMGB1 than survivors. Finally, patients who later developed organ injury, (acute lung injury and acute renal failure) had also significantly higher plasma levels of HMGB1 early after trauma., CONCLUSIONS: The results of this study demonstrate for the first time that HMGB1 is released into the bloodstream early after severe trauma in humans. The release of HMGB1 requires severe injury and tissue hypoperfusion, and is associated with posttraumatic coagulation abnormalities, activation of complement and severe systemic inflammatory response.

1091. Cohen, O., et al. (2007). "Donor brain death mechanisms and outcomes after heart transplantation." Transplantation proceedings 39(10): 2964-2969.

We sought to explore whether the cause of donor brain death influenced recipient outcomes after cardiac transplantation. In retrospect, 358 consecutive donors provided cardiac allografts to adult patients undergoing orthotopic heart transplantation at a single urban US medical center from January 2000 through December 2005. Alternate recipients were excluded. Mechanism and cause of donor brain injury and death were divided into five categories: anoxia (nontraumatic) (n=36), blunt head trauma (n=220), penetrating head trauma (n=83), brain tumor/infection (n=7), and cerebrovascular event (n=12). The five subgroups were categorized as traumatic or nontraumatic. The end points of the study were causes of early and late mortality, survival, and rejection rate. There were 59 deaths in the 6-year period. Total and short-term recipient mortality were found to be statistically higher among heart transplant recipients when the donors suffered from traumatic brain death compared to those whose brain death etiology was nontraumatic (P=.045, P=.033, respectively). Rejection rate was similar in all groups (P=.497). In conclusion, donor traumatic brain death was found to be a valid risk factor for recipient mortality after heart transplantation. Caution should be used when evaluating such donors, particularly in the presence of other risk factors.

1092. Cohen-Zimerman, S., et al. (2020). "Neural underpinning of a personal relationship with God and sense of control: A lesion-mapping study." Cognitive, affective & behavioral neuroscience 20(3): 575-587.

A strong personal relationship with God is theoretically and empirically associated with an enhanced sense of control. While a growing body of research is focused on understanding the neural mechanisms underlying religious belief, little is known about the brain basis of the link between a personal relationship with God and sense of control. Here, we used a sample of patients with focal brain lesions (N = 84) and matched healthy controls (N = 22) to determine whether damage to the ventromedial prefrontal cortex (vmPFC)-a region associated with emotionally meaningful religious experiences and with sense of control-will modulate self-reports of a personal relationship with God and sense of control. We also examined potential mediators for these associations. Voxel-based lesion symptom mapping revealed that damage to the right vmPFC resulted in a stronger personal relationship with God, and patients with damage to this region demonstrated an increased sense of control relative to patients with damage to posterior cortex and healthy controls. Moreover, the association between vmPFC damage and greater perceived sense of control was mediated by a stronger personal relationship with God. Collectively, these results suggest that a strong personal relationship with God can serve an important psychological function by affecting sense of control, with both enhanced following damage to the right vmPFC.

1093. Cohen-Zimerman, S., et al. (2019). "Childhood Socioeconomic Status Predicts Cognitive Outcomes Across Adulthood Following Traumatic Brain Injury." Archives of physical medicine and rehabilitation 100(10): e16.

Objective: To examine the association between childhood socioeconomic status and the level and rate of change in intelligence scores throughout adulthood following traumatic brain injury. Design: This longitudinal study included data collected for the Vietnam Head Injury Study between 1960s and 2012 (follow-up, 5-22 years). Assessment of intelligence score was done by observers blind to patient' childhood SES. Setting: Outpatient multidisciplinary reevaluation of brain-injured veterans and controls. Participants: 186 combat male veterans with a penetrating brain injury and 54 male veterans without a brain injury volunteered to participate in this study. The groups were matched on age, childhood SES and pre-injury intelligence. Interventions: Not applicable. Main Outcome Measure(s): Childhood SES was determined for each participant based on parental educational attainment and occupational prestige. General intelligence was initially assessed pre-injury upon induction into the military, and again 15, 35 and 42 years post-injury. Total brain volume loss and lesion laterality were determined based on CT scans. Results: For both participants with and without TBI, childhood SES accounted for a significant portion of the variance in intelligence scores pre-injury and in all three post-injury evaluations, however, it was not associated with the rate of cognitive change. Moreover, childhood SES predicted cognitive outcome among patients with left hemisphere damage better than it did for right hemisphere damage patients. Conclusions: These findings provide the first evidence indicating the persistent effects of childhood SES on intelligence scores later in adulthood following a TBI. Childhood SES should be considered when predicting and assessing cognitive recovery following TBI, even when the injury occurred in adulthood. Author(s) Disclosures: All the authors report no conflict of interests. Key Words: Socioeconomic Status, Traumatic Brain Injury, Intelligence, Longitudinal Study

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1094. Cohen-Zimerman, S., et al. (2021). "The neural basis for mental state attribution: A voxel-based lesion mapping study." Human brain mapping 42(1): 65-79.

The ability to infer other persons' mental states, "Theory of Mind" (ToM), is a key function of social cognition and is needed when interpreting the intention of others. ToM is associated with a network of functionally related regions, with reportedly key prominent hubs located in the dorsolateral prefrontal cortex (dlPFC) and the temporoparietal junction (TPJ). The involvement of (mainly the right)

TPJ in ToM is based primarily on functional imaging studies that provide correlational evidence for brain-behavior associations. In this lesion study, we test whether certain brain areas are necessary for intact ToM performance. We investigated individuals with penetrating traumatic brain injury (n = 170) and healthy matched controls (n = 30) using voxel-based lesion-symptom mapping (VLSM) and by measuring the impact of a given lesion on white matter disconnections. ToM performance was compared between five patient groups based on lesion location: right TPJ, left TPJ, right dlPFC, left dlPFC, and other lesion, as well as healthy controls. The only group to present with lower ToM abilities was the one with lesions in the right dlPFC. Similarly, VLSM analysis revealed a main cluster in the right frontal middle gyrus and a secondary cluster in the left inferior parietal gyrus. Last, we found that disconnection of the left inferior longitudinal fasciculus and right superior longitudinal fasciculus were associated with poor ToM performance. This study highlights the importance of lesion studies in complementing functional neuroimaging findings and supports the assertion that the right dlPFC is a key region mediating mental state attribution.

1095. Cohen-Zimerman, S., et al. (2018). "Intelligence across the seventh decade in patients with brain injuries acquired in young adulthood." Trends in neuroscience and education 13: 1-7.

In this longitudinal study, we examined intelligence in a group of Vietnam veterans in their 60 s who suffered combat-related penetrating traumatic brain injuries (pTBI) in their 20 s (n = 120), as well as matched veterans with no brain damage (n = 33). Intelligence was evaluated using the Armed Forces Qualification Test (AFQT) administered before the injury occurred and then again at three points in time over the following 45 years. We tested for potential predictors and correlates of late midlife intelligence score, as well as the recent change in score over the seventh decade. The pTBI group had lower intelligence scores than the control group when currently evaluated. Pre-injury intelligence and the presence of a pTBI were the most consistent predictors of current intelligence scores. While exacerbated intellectual decline occurs following a young-adulthood pTBI and affects everyday life, no evidence for late midlife accelerated cognitive decline or dementia was found.

1096. Coker, N. J. (1991). "Management of traumatic injuries to the facial nerve." Otolaryngologic clinics of North America 24(1): 215-227.

Penetrating and nonpenetrating trauma to the head and neck produces myriad injuries to the facial nerve. This article presents a rationale of management of neural injury, emphasizing extracranial and intratemporal trauma and techniques of neurorrhaphy.

1097. Coker, N. J., et al. (1987). "Traumatic intratemporal facial nerve injury: management rationale for preservation of function." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery 97(3): 262-269.

A retrospective review of 29 cases of intratemporal facial nerve injuries included 18 temporal bone fractures, 7 gunshot wounds, and 4 iatrogenic complications. Surgical exploration confirmed involvement of the fallopian canal in the perigeniculate region in 14 longitudinal and 3 transverse or mixed fractures of the petrous pyramid. Gunshot and iatrogenic injuries usually occurred within the tympanic and vertical segments of the facial canal and at the stylomastoid foramen. When hearing is salvageable, the middle fossa approach provides the best access to the perigeniculate region of the facial nerve. In the presence of severe sensorineural hearing loss, the transmastoid-translabyrinthine approach is the most appropriate for total facial nerve exploration. Grade I to III results can be anticipated in timely decompression of lesions caused by edema or intraneural hemorrhage. Undetectable at the time of surgery, stretch and compression injuries with disruption of the endoneural tubules often lead to suboptimal results. Moderate-to-severe dysfunction (Grade IV), with slight weakness and synkinesis, is the outcome to be expected from the use of interpositional grafts.

1098. Colbachini, P. C. M., et al. (2022). "Air Rescue for Pediatric Trauma in a Metropolitan Region of Brazil: Profiles, Outcomes, and Overtriage Rates." Frontiers in Pediatrics 10.

Besides ensuring a quick response and transport of trauma victims, helicopter support also involves risks to patients and professionals and has higher operational costs. Studying prehospital triage criteria and their relationship with patient overtriage and outcomes is important, particularly in newly established services and in developing countries with limited health budgets. This could help improve the use of the helicopter rescue and provide better management of the costs and risks related to it. The objective of this study was to determine the epidemiologic and severity profiles of pediatric victims of trauma attended by helicopter in a Brazilian Metropolitan Area to evaluate the outcomes and overtriage rates related to pediatric air rescue in the region. We conducted an observational and retrospective study using 49 hospital and prehospital records from victims of trauma aged <18 years old (yo) assisted by helicopter and then transferred to a tertiary University Hospital. Of the 49 patients, 39 (79.6%) individuals were male, and the mean age was 11.3 yo. Vehicular collisions accounted for 15 (30.6%) of the traumas, and traumatic brain injuries occurred in 28 (57.1%) cases. A total of 29 (59.1%) individuals had severe trauma (Injury Severity Score; ISS >15), and 34 (69.4%) required admission to the intensive care unit. Overtriage varied from 18.4 to 40.8% depending on the criteria used for its definition, being more frequent in individuals aged between 1 and 5 yo. Death occurred in 10 (20.4%) patients. On prehospital evaluation, we classified 29/32 (90.6%) patients with severe trauma according to the Pediatric Trauma Score (PTS ≤8) and 18/25 (72%) according to the Revised Trauma Score (RTS ≤11). Of these, 7/29 (24.1%) and 6/18 (33.3%), respectively, presented ISS <15 at in-hospital evaluation. None of the patients with PTS >8 and 3/7 (42.8%) of those with RTS >11 presented ISS >15. In conclusion, air rescue of pediatric trauma victims was used mainly for critically ill individuals, resulting in rates of overtriage compatible with that found in the literature. PTS showed the lowest rates of overtriage within excellent rates of undertriage.

1099. Colbran, R., et al. (2020). "Rapid Rhino versus brain: a case report in traumatic epistaxis." ANZ journal of surgery 90(3): E48-E49.

1100. Coldwell, D. M. (2007). "The role of interventional radiology in trauma." Journal of Interventional Radiology 16(3): 213-215.

1101. Cole, R. D., et al. (1994). "Gunshot wounds to the mandible and midface: evaluation, treatment, and avoidance of complications." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery 111(6): 739-745.

As American society becomes progressively violent, an ever-increasing number of gunshot wounds are being seen across the United States. Particularly challenging are injuries that involve the mandible and midface, not only because of problems with reconstructing bone and soft-tissue defects but also because of emergent problems with airway obstruction and neurovascular compromise. We present 40 cases of gunshot wounds to the mouth, mandible, and maxilla treated at Wake Forest University Medical Center during the past 7 years. The focus of this retrospective analysis is on emergency evaluation and treatment, complications encountered, and operative techniques used for reconstruction. Special emphasis is placed on recognizing and avoiding the complications of these injuries.

1102. Coleman, D. M., et al. (2013). "Contemporary outcomes after distal vertebral reconstruction." Journal of vascular surgery 58(1): 152-157.

INTRODUCTION: Flow-limiting lesions or embolic phenomena can produce vertebrobasilar ischemia. This study aims to differentiate the pathophysiology of vertebral ischemia and examine contemporary outcomes after distal vertebral reconstruction., METHODS: Between February 2005 and November 2011, 41 consecutive distal vertebral artery (VA) reconstructions were performed in 34 patients, including bypass to the third portion of the VA (V3) at the C1-2 level (n = 24) or the C0-1 level (n = 7); transposition of the external carotid artery or its occipital branch onto V3 (n = 6); transposition of V3 onto the internal carotid artery (n = 3); and bypass from the ipsilateral subclavian artery to V3 (n = 1). Six patients required a concomitant carotid intervention, and nine patients required a partial resection of the C1 transverse process. Symptoms, present in 91% of patients, were attributed to a flow-limiting lesion in 16 (52%), to embolization in nine (29%), and to a mixed etiology in six (19%)., RESULTS: Intraoperatively, five patients required graft revision or conversion of a transposition to a bypass, and two patients required vertebral ligation. Median blood loss was 260 mL. Median hospital length of stay was 1 day. Postoperatively, one patient (2%) required re-exploration for bleeding, a stroke occurred in one patient (2%), and cranial nerve injury occurred in three patients (7%). There were no perioperative deaths. Survival analysis showed that primary patency at 1, 2, and 5 years, respectively, was 74%, 74%, and 54%. Secondary patency was 80% at 1 year and remained so through the end of follow-up at 80 months. A statistically significant difference in patency was noted favoring arterial transposition over vertebral bypass of 100%, 100%, and 83% at 1, 2, and 5 years, respectively, vs 65%, 65%, and 39% (P = .018). Considering successful redo bypass grafting for late failure, 97% of patients demonstrated preserved patency at their last follow-up. There were two late deaths of unknown etiology and no late strokes., CONCLUSIONS: Distal VA reconstruction for flow-limiting or embolic lesions provides excellent stroke protection and symptomatic relief with acceptable perioperative risk in selected patients.

1103. Coll Crespo, B., et al. (2001). "[War wound in an 84-year-old patient]." Herida de guerra en un enfermo de 84 anos. 16(1): 38.

1104. Collins, K. A. (2010). "Adolescent Russian roulette deaths." The American journal of forensic medicine and pathology 31(1): 4-6.

Adolescence, between the ages of 10 and 19 years, is a unique period both physically and emotionally. During this time of life, individuals are known to experiment and engage in risky behavior, sometimes with unforeseen morbidity and mortality. We also see suicide emerge as a manner of death in this age group. The most common method is gunshot wound and sometimes in the form of Russian roulette. Few studies have looked at deaths by Russian roulette, the victims, and scenarios. In particular, no study examines the adolescent victim of Russian roulette. To better understand and classify this entity, adolescent Russian roulette autopsy cases over a 20-year period were examined looking at the victims, scenarios, autopsy findings, cause and manner of death, and the weapons. All victims were males, ages 13 to 19 years, with a Black-to-White ratio of 1:1. No victim had a previous psychiatric history. Toxicology was positive for alcohol and/or marijuana in 50% of the victims. Friends were present when the victim shot himself which occurred in the home the majority of the time. In all but 1 case, premeditation of the game was involved as the victim provided the weapon for the roulette. The cause of death was gunshot wound to the head (6 to the right side, 1 to the mouth, 1 to the forehead), and the manner of death was suicide in 6 cases and accident in 2 cases. A review of the literature discusses the adolescent victim, suicide, and Russian roulette.

1105. Colombage, S. M. and S. R. Hulathduwa (2011). "Death of a driver due to an atypical missile." Journal of forensic and legal medicine 18(1): 23-25.

A road traffic accident of an unusual nature is presented. The driver of a pickup cab sustained fatal injuries by a large piece of concrete (missile) set in motion consequent to a car crashing onto the centre island of a highway.

1106. Colombo, F., et al. (1997). "[Clinical and therapeutic aspects of stab and gunshot wounds]." Aspetti clinici e terapeutici delle ferite d'arma bianca e da fuoco. 52(9): 1087-1093.

In the last three years (1992-1995) 130 stab (114) and gunshot (16) wounds were observed at and admitted to the Emergency Surgical Department of Fatebenefratelli Hospital of Milan. We observed a high incidence of non-EEC patients (62%). Imaging devices (US and CT scan) and surgical minimally invasive procedures have reduced open surgery rate with a remarkable reduction in drawbacks and mortality.

1107. Colombo, J., et al. (2008). "Noninvasive monitoring of the autonomic nervous system and hemodynamics of patients with blunt and penetrating trauma." The Journal of trauma 65(6): 1364-1373.

BACKGROUND: To describe early effects of sympathetic (SNS) and parasympathetic nervous system (PSNS) activities measured by heart rate (HR) and respiratory rate variabilities simultaneously with noninvasive hemodynamic patterns in patients with blunt and penetrating trauma., METHODS: Descriptive study of 168 monitored trauma patients in a level I university-run trauma service. We studied HR and respiratory rate variability by spectral analysis as a measure of autonomic nervous system (ANS) activity in severe blunt and penetrating injuries beginning shortly after their admission to the emergency department. The low frequency area is the area under the HR spectral analysis curve within the frequency range of 0.04 Hz to 0.10 Hz. This area primarily reflects the tone of the SNS as mediated by the vagus nerve. The respiratory frequency area, sometimes referred to as the high frequency area, is a 0.12 Hz-wide frequency range centered around the fundamental respiratory frequency defined by the peak mode of the respiratory activity power spectrum. It is indicative of vagal outflow reflecting PSNS activity. The low frequency area/respiratory frequency area, or L/R ratio, reflects the balance of the SNS and the PSNS. ANS was studied simultaneously with noninvasive hemodynamic patterns after blunt and penetrating thoracic or abdominal injury beginning shortly after admission. We measured cardiac index by bioimpedance, HR, and mean arterial pressure (MAP) to evaluate cardiac function, pulse oximetry (SapO2) to reflect changes in respiratory function, and transcutaneous oxygen indexed to fractional inspired oxygen (PtcO2/FIO2) to reflect tissue perfusion., RESULTS: ANS activity markedly increased especially in the nonsurvivors at 12 hours to 24 hours after admission. Compared with survivors, the nonsurvivors had lower MAP, CI, and PtcO2/FIO2 values associated with increased ANS activity., CONCLUSIONS: In the nonsurvivors, low flow, low MAP, and reduced tissue perfusion were associated with pronounced increases in PSNS and lesser increases in SNS activity. In the survivors, higher CI, MAP, and PtcO2/FIO2 values were associated with lesser increases in both PSNS and SNS activities.

1108. Como, J. J., et al. (2009). "Practice management guidelines for identification of cervical spine injuries following trauma: Update from the eastern association for the surgery of trauma practice management guidelines committee." Journal of Trauma - Injury, Infection and Critical Care 67(3): 651-659.

Background: Injury to the cervical spine (CS) is common after major trauma. The Eastern Association for the Surgery of Trauma first published its Practice Management Guidelines for the evaluation of CS injury in 1998. A subsequent revision was published in 2000. Since that time a large volume of literature has been published. As a result, the Practice Management Guidelines Committee set out to develop updated guidelines for the identification of CS injury. Methods: A search of the National Library of Medicine and the National Institutes of Health MEDLINE database was performed using

PubMed (www.pubmed.gov). The search retrieved English language articles regarding the identification of CS injury from 1998 to 2007. The questions posed were: who needs CS imaging; what imaging should be obtained; when should computed tomography, magnetic resonance imaging, or flexion/extension radiographs be used; and how is significant ligamentous injury excluded in the comatose patient? Results: Seventy-eight articles were identified. From this group, 52 articles were selected to construct the guidelines. Conclusion: There have been significant changes in practice since the previous CS injury guidelines. Most significantly, computed tomography has supplanted plain radiography as the primary screening modality in those who require imaging. Clinical clearance remains the standard in awake, alert patients with trauma without neurologic deficit or distracting injury who have no neck pain or tenderness with full range of motion. Cervical collars should be removed as soon as feasible. Controversy persists regarding CS clearance in the obtunded patient without gross neurologic deficit.

1109. Congiusta, D. V., et al. (2021). "Epidemiology of orthopaedic fractures due to firearms." Journal of Clinical Orthopaedics and Trauma 12(1): 45-49.

The majority of firearm injuries involve the extremities and have concomitant orthopaedic injuries. National data on the epidemiology of wounds caused by firearms may better inform physicians and identify areas of public health intervention. We conducted an analysis of a national database to describe the epidemiology of orthopaedic firearm injuries in the United States. The Nationwide Inpatient Sample 2001–2013 database was queried for adult patients with fractures excluding those of the skull using injury billing codes. Characterization of injury was determined using External Cause of Injury billing codes. Sociodemographic and geographic variables were reported. Chi square and multinomial logistic regression analyses were performed to identify predictors of type of firearm implicated in injury. 334,212 firearm injuries were reported in the database and about half had concomitant orthopaedic fractures. Most patients were between the ages 19 and 29, were African American, and were male. The most frequent circumstance of injury was assault/homicide, the most common firearm used was a handgun, and the most common fracture site was the femur. Patients without insurance and patients of lower income were most commonly afflicted. Knowing this distribution of the burden of this class of injury provides the opportunity to identify and intervene on behalf of at-risk populations, potentially reducing injuries by promoting firearm safety to these groups and advocating sensible practices to reduce inequitable outcomes caused by these injuries.

1110. Conner, W. C., 3rd, et al. (1998). "Traumatic aneurysms of the face and temple: a patient report and literature review, 1644 to 1998." Annals of plastic surgery 41(3): 321-326.

The branches of the external carotid artery are protected from injury in most locations by an adequate buffer of soft tissue. On occasion, the vessels approach the surface to cross bone structures, and in these key areas they become vulnerable to blunt trauma. The facial, superficial temporal, and terminal branches of the internal maxillary arteries are the branches most often affected via this mechanism of injury. In addition, damage to deeper branches of the internal maxillary artery and to the subparotid portion of the superficial temporal artery has been reported secondary to maxillary fractures and craniofacial surgery. A brief patient report illustrates the highlights of clinical examination, diagnostic study, and surgical management of an aneurysm of the facial artery. A review of the world literature since 1644 has revealed 386 patients with traumatic aneurysms of the face and temple.

1111. Conradi, S. E. (1982). "New aluminum-jacketed ammunition: the case of the "invisible" jacket." The American journal of forensic medicine and pathology 3(2): 153-155.

The recovery of the metallic jacket fired from higher-velocity weapons is crucial for ballistics testing. Therefore, even when exit wounds are present, radiographs should routinely be made. The use of the new Winchester Western Silvertip ammunition may present a problem to the forensic pathologist

because of the use of aluminum-jacketed bullets. Aluminum is only faintly radiopaque and may easily be overlooked on x-ray. An illustrative case is reported.

1112. Conroy, C. and J. F. Kraus (1988). "Survival after brain injury. Cause of death, length of survival, and prognostic variables in a cohort of brain-injured people." Neuroepidemiology 7(1): 13-22.

Injuries are the leading cause of death in the United States for those between 1 and 44 years of age and brain injuries are a major component of trauma. This report examines survival in a cohort of San Diego County, California, residents who incurred a brain injury in 1981. Cumulative risk of death over time, using the Cox Proportional Hazards Model, and predictors of death (determined by logistic regression) are used to evaluate survival. The results showed that about half of all brain-injured people who died, died in less than 2 h. Severe overall body damage and severe brain injury are the greatest causes of prehospital death. Even if they survived to the hospital, most people who die have brain injury as their underlying cause of death. Age as well as nature and severity of brain injury are the important predictors of in-hospital death. People who are discharged alive from the hospital have survival comparable to that of the population they came from. However, more die from trauma-related causes than would be expected.

1113. Consunji, R. J., et al. (2011). "A profile of deaths among trauma patients in a university hospital: the Philippine experience." Journal of injury & violence research 3(2): 85-89.

BACKGROUND: The Philippine General Hospital (PGH) is the pioneer in trauma care in the country, being the first to create a dedicated Trauma Service in 1989. The service has not conducted a review of its admissions and mortalities since 1992. The purpose of this study is to describe the mortality patterns of this service., METHODS: A descriptive and retrospective 3-year review, covering January 2004 June 2007, was conducted using an electronic patient database. Review of patient records included: population demographics, mechanism of injury, length of stay prior to death, and the cause of death., RESULTS: Of the 4947 patients admitted to the Division of Trauma during the study period, there were 231 (4.7%) deaths. The most common mechanisms of injuries were stab wounds (32.9 %), vehicular crashes (28.6 %), and gunshot wounds (25.5 %). Multiple organ failure/Sepsis (37.7 %) was the most frequent causes of death, followed by Exsanguinations (27.7 %), Central Nervous System failure (18.6 %) and other causes (10.8%). Forty four (66.7 %) of the 66 patients who died within the first 24 hours died from Exsanguinations, while 66 (61.1 %) of the 8 patients who died after 72 hours died from Multiple organ failure/Sepsis., CONCLUSIONS: Intentional causes of injury (i.e. penetrating interpersonal violence) caused the majority of trauma deaths in this series from the Philippine General Hospital. This highlights the need for prioritizing a public health approach to violence prevention in the Philippines. Further research must be conducted to identify risk factors for interpersonal violence. Early identification of lethal injuries that may cause exsanguinations and definitive control of hemorrhage should be the primary focus to prevent acute deaths, within 24 hours of admission. Further adjuncts to the definitive treatment of hemorrhage, the critical care of TBI and MOF/Sepsis are needed to reduce deaths occurring more than 72 hours after admission.

1114. Cook, S., et al. (2018). "Crosstalk between Estrogen Withdrawal and NFkappaB Signaling following Penetrating Brain Injury." Neuroimmunomodulation 25(4): 193-200.

OBJECTIVES: Characterized by neuroinflammation, traumatic brain injury (TBI) induces neuropathological changes and cognitive deficits. Estrogens are neuroprotective by increasing cell survival and this increase is mediated by a decrease in neuroinflammation. To further explore the relationship between estrogens, brain injury, and neuroinflammation, we examined the expression of the IKK/NFkappaB complex. The IKK/NFkappaB complex is a pleiotropic regulator of many cellular signaling pathways linked to inflammation, as well as three major cytokines (IL-1beta, IL-6, and TNF-alpha). We hypothesized that NFkappaB expression would be upregulated following injury and that this

increase would be exacerbated when circulating estrogens were decreased with fadrozole (aromatase inhibitor)., METHODS: Using adult zebra finches, we first determined the expression of major components of the NFkappaB complex (NFkappaB, IkappaB-alpha, and IkappaB-beta) following injury using qPCR. Next, male and female finches were collected at 2 time points (2 or 24 h after injury) and brain tissue was analyzed to determine whether NFkappaB expression was differentially expressed in males and females at either time point. Finally, we examined how the expression of NFkappaB changed when estrogen levels were decreased immediately after injury., RESULTS: Our study documented an increase in the expression of the major components of the NFkappaB complex (NFkappaB, IkappaB-alpha, and IkappaB-beta) following injury. Decreasing estrogen levels resulted in a surprising decrease in the NFkappaB complex studied here., DISCUSSION: These data further expand the model of how estrogens and other steroid hormones interact with the inflammatory pathways following injury and may prove beneficial when developing therapies for treatment of TBI. Copyright © 2018 S. Karger AG, Basel.

1115. Cooke, C. T. and D. J. Pounder (1988). "Spinocerebral faecal migration in a shotgun injury." The American journal of forensic medicine and pathology 9(2): 166-168.

Migration of foreign material within the subarachnoid space is a rare event, seldom reported in the medical literature. We report a unique case in which spinocerebral migration of faecal material occurred as a direct consequence of a shotgun injury to the pelvis.

1116. Cooper, J. A. and C. J. Hunter (2013). "Jael's syndrome: Facial impalement." Western Journal of Emergency Medicine 14(2): 158-160.

1117. Cooper, P. R., et al. (1979). "Computerized tomographic scan and gunshot wounds of the head: indications and radiographic findings." Neurosurgery 4(5): 373-380.

The authors document their experience with the computerized tomographic (CT) scanner for evaluating gunshot wounds of the head. Only those patients who were considered to be operative candidates and who were neurologically stable were scanned. In the postoperative period, patients who were not scanned preoperatively and those whose condition did not improve were also scanned. In the preoperative period the CT scanner is useful for identifying and localizing missile tracks, bony and metallic fragments, intra- and extraparenchymal hematomas, intracranial air, and brain swelling. In the postoperative period the CT scanner may demonstrate retained bone fragments, edema, brain abscess, and intracranial air. The limitations of the CT scan in evaluating gunshot wounds include an inability to define vascular lesions suchas traumatic aneurysms and post-traumatic spasm. Metallic scatter from missile fragments may render certain CT cuts uninterpretable. In addition, the CT scan may appear minimally abnormal in spite of immediate and irreversible injury caused by a shock wave transmitted to brain stem structures. The CT scanner has superceded angiography as a diagnostic tool for evaluating gunshot wounds of the head because it is noninvasive and rapid, allows visualization of the entire head, can resolve very small lesions that produce little or no mass effect, can help to determine the nature of intracranial lesions and may quantitate the amount of hemorrhage and edema. Because it enables physicians to visualize intracranial structures in three dimensions, the CT scan may precisely define missile tracks and contiguous lesions in a manner not heretofore possible with other diagnostic modalities. Thus, it is invaluable for the rational planning of surgical therapy.

1118. Copcu, E., et al. (2003). "Reconstruction of facial gunshot wound by the cervicopectoral flap." European Journal of Trauma 29(1): 54-57.

Background: Reconstruction of large facial defects secondary to shotgun blast to the face is a very difficult task in surgery. Case Study: We report on a 34-year-old female patient with suicidal

shotgun injury to her face delivered by a hunting rifle at close range into her mouth. She showed a large right cheek defect and a mandibular fracture. The defect was closed by a cervicopectoral fasciocutaneous flap; the mandibular fracture was managed with a titanium reconstruction plate. Good aesthetic and functional results were achieved 1 year after reconstruction. Conclusion: Early definitive reconstruction of shotgun injuries is still controversial. The cervicopectoral flap has many advantages. It is easy and secure to harvest and possesses skin properties similar to the face. The flap is quite thin allowing soft tissue coverage without a bulky view. This is the first study in the literature using a cervicopectoral flap for closure of a facial gunshot wound. We conclude that in patients with facial gunshot wounds, early reconstruction with a cervicopectoral flap offers a very important alternative.

1119. Copcu, E., et al. (2004). "Trauma and Fracture of the Mandible: Effects of Etiologic Factors on Fracture Patterns." European Journal of Trauma 30(2): 110-115.

Background: The mandible is one of the most frequently fractured bones. The objective of this prospective study was to determine and illustrate fracture patterns of the mandible in relation to various etiologic factors. Patients and Methods: A total of 218 patients with mandibular fractures were included in this study. Data regarding age, gender, causes and anatomic sites of fractures and treatment modalities were collected. Conventional plain radiographs of the mandible were obtained in all patients. The plain radiographs included such projections as Towne and Waters in patients suspected of having subcondylar fractures or associated facial fractures. Radiographs were scanned using a high-resolution scanner, and fracture lines were marked. The lines were copied and pasted to a graphic image of the mandible. All fracture lines were confirmed on surgical explorations of the fractures when the patients were under general anesthesia. Results: Traffic accidents (67%) were the most frequent cause of mandibular fractures. 51% of the patients had multiple fractures including fractures of the parasymphysis and angle, which were the most commonly affected sites (33.3%). 49% of the patients had a single fracture. The body of the mandible was the most frequently affected site in these patients (26.2%). Conclusion: Weak points of the mandible and etiologic factors were the determinants of mandibular fracture sites. We speculate that the main determinants of fracture sites were characteristics of the mandible in those fractures caused by motor vehicle accidents, while the other etiologic factors themselves determined the fracture sites for the other types of trauma.

1120. Copeland, A. R. (1989). "Suicide among nonwhites. The Metro Dade County experience, 1982-1986." The American journal of forensic medicine and pathology 10(1): 10-13.

Suicide among nonwhites was studied using the case files of the office of the Medical Examiner of Metropolitan Dade County in Miami, Florida. A total of 116 cases, during the years 1982-1986, were analyzed as to the age, sex, cultural background, cause of death, blood alcohol content at autopsy, and reason for the suicide of the victim. By analyzing the ethnic/cultural backgrounds of the victims, it was noted that the overall rate of suicide among nonwhites in Dade County was 5 per 100,000 population per year. However, the rate varies within the overall group such that black-Hispanics, American Indians, and Haitians have suicide rates of 13.9, 11, and 3.1 per 100,000 population per year, respectively. Some of these rates are higher than the U.S. national nonwhite suicide rate of 7 per 100,000 population. Interestingly, while suicide rates are variable, the reasons listed for the suicide and the high frequency of young adult victims are similar to those for whites. A discussion ensues concerning this similarity and what future work in the field remains to be done.

1121. Copley, I. B. (1990). "Remarkable recovery after a cranio-cerebral injury produced by an impacted hot missile fragment: apparent 'regeneration' of the temporal lobe." British journal of neurosurgery 4(6): 523-527.

A facio-cranio-cerebral injury due to a large piece of shrapnel causing direct and heat damage to the temporal lobe is described. It was managed by initial dural repair which was followed by sloughing

and repeated wound debridement, leaving an open cerebral wound communicating with a facial wound. Auto-rotation of the temporal lobe occurred, allowing split-skin grafting onto arachnoid mater to obtain dural closure. Further treatment of the facial wound by skin-grafting the cavity and prosthetic reconstruction allowed early return to society and a full rehabilitation programme.

1122. Copley, I. B. (1991). "Cranial tangential gunshot wounds." British journal of neurosurgery 5(1): 43-53.

The effects of high velocity missiles are described. A series of cases of craniocerebral tangential gunshot wounds over a 6 year period is presented with unsuspected cerebral contusion shown by CT. Tangential wounds are defined and classified into four groups. The associated brain damage, often unsuspected prior to CT, and in some cases without radiographic changes, of the four groups is compared. The short- and long-term sequelae and the extent of cerebral damage belie the innocent appearance of the scalp wound. This influences the management of this unusual type of head injury.

1123. Copley, I. B. (1998). "The MEDUNSA sign." British journal of neurosurgery 12(1): 71.

1124. Coppel, D. L., et al. (1973). "Civil disturbance and anesthetic workload in the Royal Victoria Hospital, Belfast. II. The respiratory and intensive care unit." Anesthesia and analgesia 52(2): 147-155.

1125. Cordelier, P. and D. S. Strayer (2006). "Using gene delivery to protect HIV-susceptible CNS cells: inhibiting HIV replication in microglia." Virus research 118(1-2): 87-97.

Antiretroviral chemotherapy penetrates the CNS poorly. CNS HIV, thus sheltered, may injure the brain and complicate control of systemic HIV infection. Microglial cells play a major role in HIV persistence in the CNS but are rarely targeted for gene delivery. Because recombinant SV40 vectors (rSV40s) transduce other phagocytic cells efficiently, we tested rSV40 delivery of anti-HIV genetic therapy to microglial cells. Microglia prepared as enriched cultures from human fetal brain, were transduced with marker vectors, SV(RFP) and SV(Nef/FLAG), respectively, carrying DsRed and HIV-1 Nef bearing a FLAG epitope. By immunostaining and FACS, 95% of unselected cells expressed the transgenes, without detectable toxicity. Microglia were transduced with SV(AT), carrying human alpha1-antitrypsin (alpha1AT), which blocks Env and Gag processing. SV(AT)-treated microglia strongly resisted challenge with HIV-1BaL, even when microglia were transduced with SV(AT) following HIV challenge. Thus, rSV40s effectively transduce microglia and protect them from HIV.

1126. Corkin, S. (1979). "Hidden-figures-test performance: lasting effects of unilateral penetrating head injury and transient effects of bilateral cingulotomy." Neuropsychologia 17(6): 585-605.

1127. Corkin, S., et al. (1984). "Prognostic factors for life expectancy after penetrating head injury." Archives of neurology 41(9): 975-977.

Survival curves were made for 190 World War II veterans with penetrating head injuries, and for 106 WW II veterans with peripheral nerve injuries who matched the subjects with head injuries with respect to age at injury, years of formal education, and preinjury intelligence-test score. The results indicated that penetrating head injury coupled with posttraumatic epilepsy shortened life expectancy in subjects who survived the early postinjury period, but that head injury alone did not. Educational level was also a significant variable independent of seizures: subjects with more education survived longer than those with less education. Age at injury and the difference between preinjury and postinjury intelligence-test scores did not predict survival status.

1128. Cornett, M. A., et al. (1993). "Case report: intracranial penetration of a nasogastric tube." The American journal of emergency medicine 11(1): 94-96.

1129. Cornetta, S., et al. (2009). "Unusual death of a transvestite: identification of crime weapon and survival time*." Journal of forensic sciences 54(5): 1149-1151.

The authors report a case of a transvestite found murdered near his automobile with several lacerated contused wounds to the face and cranial fractures. Autopsy revealed that the cause of death was a serious head trauma with subdural and subarachnoidal hemorrhages. In order to identify the crime weapon, a scanning electron microscopy (SEM) was used which revealed metallic residue on the skin fragments with the same molecular composition of the car paint. As for survival time, antibody anti-beta-amyloid precursor protein (APP) was applied to brain fragments and brainstem tissue, allowing for axonal varicosities (which form 2 to 3 h following death) to be observed under the optic microscope. So, by using SEM we understood that the fatal cranial-encephalic lesions were the result of the victim's head being repeatedly struck against the car door while anti-betaAPP led to the understanding that the time elapsed between injury and death was less than 2 to 3 h.

1130. Cornford, E. M., et al. (1996). "Glut1 glucose transporter activity in human brain injury." Journal of neurotrauma 13(9): 523-536.

The principal glucose transporter at the blood-brain barrier (BBB) is the Glut1 isoform, and transporter density is believed to be an index of cerebral metabolic rate. In the present study, glucose transporter expression was studied in tissue resected 7-8 h after acute traumatic brain injuries in 2 patients. Light microscopic immunochemistry indicated a zone of complete loss of the Glut1 glucose transporter isoform in microvessel endothelial cells adjacent to sites of small vessel injury, concentrically surrounded by a narrow zone of variable Glut1, and distally surrounded by capillaries with typically immunoreactive endothelia in nondisrupted parenchyma. Variably reactive capillaries displayed alternating sectors of greatly reduced and highly reactive Glut1 density, suggesting a high density and low density of transporter activity in contiguous endothelial cells. Quantitative electron microscopic immunogold analyses demonstrated that the transporter was predominantly localized to the luminal and abluminal endothelial membranes, with lesser reactivity in cytoplasm; pericyte Glut1 was minimally above background levels. In endothelial sectors with reduced Glut1 transporter immunoreactivity, the luminal:abluminal ratio of Glut1 epitopes was less than unity; while it is greater than unity in highly reactive endothelial cells. The number of Glut1-immunoreactive sites per micrometer of capillary membrane was not significantly different from previous reported Glut1 density in seizure resections, and about 2- to 3-fold higher than in human red cells. In the same tissue samples, qualitative immunogold electron microscopy of human serum albumin indicated leakage of this protein (MW 65,000) from the vascular space into pericapillary regions. Thus the high Glut1 density observed in capillaries from acutely injured brain occurs concomitantly with compromised barrier function.

1131. Coronado, V. G., et al. (2011). "Surveillance for traumatic brain injury-related deaths--United States, 1997-2007." Morbidity and mortality weekly report. Surveillance summaries (Washington, D.C. : 2002) 60(5): 1-32.

PROBLEM/CONDITION: Traumatic brain injury (TBI) is a leading cause of death and disability in the United States. Approximately 53,000 persons die from TBI-related injuries annually. During 1989-1998, TBI-related death rates decreased 11.4%, from 21.9 to 19.4 per 100,000 population. This report describes the epidemiology and annual rates of TBI-related deaths during 1997-2007., REPORTING PERIOD: January 1, 1997-December 31, 2007., DESCRIPTION OF SYSTEM: Data were analyzed from the CDC multiple-cause-of-death public-use data files, which contain death

certificate data from all 50 states and the District of Columbia., RESULTS: During 1997-2007, an annual average of 53,014 deaths (18.4 per 100,000 population; range: 17.8-19.3) among U.S. residents were associated with TBIs. During this period, death rates decreased 8.2%, from 19.3 to 17.8 per 100,000 population (p = 0.001). TBI-related death rates decreased significantly among persons aged 0-44 years and increased significantly among those aged >=75 years. The rate of TBI deaths was three times higher among males (28.8 per 100,000 population) than among females (9.1). Among males, rates were highest among non-Hispanic American Indian/Alaska Natives (41.3 per 100,000 population) and lowest among Hispanics (22.7). Firearm- (34.8%), motor-vehicle- (31.4%), and fall-related TBIs (16.7%) were the leading causes of TBI-related death. Firearm-related death rates were highest among persons aged 15-34 years (8.5 per 100,000 population) and >=75 years (10.5). Motor vehicle-related death rates were highest among those aged 15-24 years (11.9 per 100,000 population). Fall-related death rates were highest among adults aged >=75 years (29.8 per 100,000 population). Overall, the rates for all causes except falls decreased., INTERPRETATION: Although the overall rate of TBI-related deaths decreased during 1997-2007, TBI remains a public health problem; approximately 580,000 persons died with TBI-related diagnoses during this reporting period in the United States. Rates of TBI-related deaths were higher among young and older adults and certain minority populations. The leading external causes of this condition were incidents related to firearms, motor vehicle traffic, and falls., PUBLIC HEALTH ACTIONS: Accurate, timely, and comprehensive surveillance data are necessary to better understand and prevent TBI-related deaths in the United States. CDC multiple-cause-of-death public-use data files can be used to monitor the incidence of TBI-related deaths and assist public health practitioners and partners in the development, implementation, and evaluation of programs and policies to reduce and prevent TBI-related deaths in the United States. Rates of TBI-related deaths are higher in certain population groups and are primarily related to specific external causes. Better enforcement of existing seat belt laws, implementation and increased coverage of more stringent helmet laws, and the implementation of existing evidence-based fall-related prevention interventions are examples of interventions that can reduce the incidence of TBI in the United States.

1132. Corradino, G., et al. (1988). "Traumatic carotid-cavernous fistula." Southern medical journal 81(5): 660-663.

Carotid-cavernous fistulas are uncommon, although not rare, complications of trauma to the base of the skull; they may result in cranial nerve palsies, blindness, and occasionally in devastating subarachnoid hemorrhage. We have presented a case of carotid-cavernous fistula in a 17-year-old boy, treated successfully with balloon embolization. Although surgical treatment was advocated in the past, the low morbidity and high success rate of percutaneous balloon embolization currently make this the procedure of choice.

1133. Coruh, A. (2019). "High Voltage Electric Burn Repair of the Forehead by Reverse Flow Temporalis Muscle Flap." Journal of burn care & research : official publication of the American Burn Association 40(3): 373-376.

Repairing soft tissue defects of the forehead which exposes the bare bone is a dilemma with few reconstructive techniques for plastic surgeons. Forehead is an important aesthetic unit of the face which is covered with the glabrous skin. Due to the relative lack of similar mobile tissue locally, reconstruction of large soft tissue defects of the forehead region by local flaps is demanding. Temporalis muscle flap does not reach to the midline of the forehead region because of the insufficient length of the deep temporal vascular system. During the transfer of the muscle, only a small volume and size of the muscle can reach to the defect, remaining most of the muscle bulk in the pedicle and a relatively limited arc of rotation, thus a small volume of usable tissue at the distal portion of the flap. We successfully used reverse flow temporalis muscle flap for the purpose of eliminating the above-mentioned disadvantage of temporalis muscle flap in a 23-year-old male patient who sustained a high-voltage electrical burn

resulting 12 x 8 cm left forehead defect exposing the bare bone.

1134. Cosan, T. E., et al. (2006). "Peripheral seventh nerve palsy due to transorbital intracranial penetrating pontine injury." European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery 263(4): 327-330.

The case of a child injured by a knitting needle penetrating transorbitally and intracranially, resulting in carotid cavernous fistula and pontine injury, is reported. After receiving medical and endovascular treatment, the only remaining abnormal neurological manifestation was right peripheral facial nerve palsy. The clinical sequences of events and the demonstration of a pontine lesion leading to peripheral facial palsy are presented. Facial nuclear injury with a penetrating trauma is an extremely rare condition. It is important to identify the anatomical regions injured in penetrating traumas. The lesions must be identified by computerized tomography, magnetic resonance imaging, clinical and laboratory investigation.

1135. Cosan, T. E., et al. (2001). "Injury caused by deeply penetrating knife blade lodged in infratemporal fossa." European journal of emergency medicine : official journal of the European Society for Emergency Medicine 8(1): 51-54.

Knife-inflicted, deeply penetrating head and neck trauma is an uncommon life-threatening injury and a challenging problem. An examination of the neurovascular and systemic physical status is a first requirement and the decision as to which approach to adopt for the removal of the blade is of critical importance. Here we report a rare case of a pre-auricular stab wound with the knife blade deeply lodged in the extracranial infratemporal fossa. Radiological investigations showed that the knife blade had entered from the temporomandibular joint and become lodged through the anterior margin of foremen magnum below the petrosal bone. Minimal left vocal cord paresis, left palatal weakness and a slight deviation of the tongue towards the left side were observed. The other neurological and systemic physical evaluations were normal. Simple withdrawal of the blade in the operating room did not cause serious neurovascular injury. Here we discuss and compare the expanded exposure of anatomical structures for blade removal and simple withdrawal in similar injuries.

1136. Cosar, A., et al. (2005). "Craniocerebral gunshot wounds: results of less aggressive surgery and complications." Minimally invasive neurosurgery : MIN 48(2): 113-118.

Four hundreds patients who suffered from cranial gunshot wounds injuries were analyzed. Surgical therapy, primary and secondary debridement, including repair of dural defects and removal of retained intracranial bone and metal fragments were applied. Central nervous system infections were mostly observed in cases with cerebrospinal fluid (CSF) fistulas. In 130 of 400 patients, bone and metal fragments were determined on control CT scans. Most of the deaths in this group of patients were attributed to the influence of brain injury and occurred within the first month after injury. Fragments retained after first debridement were followed periodically by CT scans. Surgery was not performed until the infection developed. Retained fragments did not increase the infection risk but high rates of infection did occur in cases with CSF fistulas. The presence of diffuse brain damage, brainstem injury, CNS infection, or ventricular injury was associated with a poor outcome. The prognostic importance of complications such as intracranial haemorrhage, epileptic seizures, hydrocephalus, was also investigated.

1137. Coscia, A., et al. (2019). "Use of the sports concussion assessment tool 3 in emergency department patients with psychiatric disease." Academic emergency medicine 26: S91.

Background: There are no assessments of concussion specialized for the ED setting. One commonly used tool is the Sports Concussion Assessment Tool 3 (SCAT3) Concussion Symptom Severity Score (CSSS). The SCAT3 has not been validated for use in non-athlete populations. We aimed to determine the relationship between psychiatric history, and SCAT3 CSSS score. We hypothesized that subjects with a history of psychiatric disorders would have a higher CSSS score compared to those without. Methods: This was an analysis from a prospective, non-randomized, non-blinded, multicenter study of adults with suspected concussion (BrainPulseTM Jan Medical) from three US EDs. Subjects with a penetrating injury to the brain, Glasgow Coma Score (GCS) < 13, or medical device in the head were excluded. Demographic data, a BrainPulse device recording, the SCAT3, a neurologic exam, and a cognitive test were obtained. Subjects with depression, anxiety, bipolar disease, post-traumatic stress disorder, schizophrenia, and/or taking medications for psychiatric disease were classified as having pre-injury psychiatric history. The association between SCAT3 CSSS score and psychiatric disorder was analyzed using multivariable median regression. Bivariate associations between CSSS and potential predictors were first explored via a Mann-Whitney U test. Stepwise backward elimination was used to develop a final model. Results: Of 305 adult subjects, 262 had no missing data. Mean age was 44 (SD 19), the median CSSS score was 32.5 (IQR 15-62), 133 (51%) were female, 206 (79%) were Caucasian. A total of 174/262 (66%) were diagnosed with concussion and 151/262 (58%) had psychiatric history. Psychiatric history (ppp<0.05) were all independently associated with higher CSSS. Subjects with psychiatric history scored 16.8 points (95 CI 6.73, 26.79) higher on the CSSS after controlling for age, sex, race, and concussion diagnosis. A subject with a concussion diagnosis in the ED scored 19.5 points (95 CI 8.54, 30.46) higher on the CSSS after controlling for psychiatric history, age, sex, and race. Conclusion: Subjects with a history of psychiatric disorders had a higher CSSS compared to those without. These data suggest the CSSS component of the SCAT3 may need to be tailored for use in an ED population with psychiatric comorbidities.

1138. Costa, S. T., et al. (2017). "Systematic review of finite element analysis utilisation in craniofacial gunshot wounds." Australian Journal of Forensic Sciences 49(4): 369-378.

The study of wound ballistics should include biomechanical science for better results in diagnosis, treatments and prognosis. Finite Element Analysis can provide interesting tools when human head injuries need to be evaluated. This work is the first step in a systematic study of the use of finite element analysis in craniofacial gunshot wounds. The study aimed to systematically: (1) review the use of Finite Element Analysis on heads injuries, especially gunshot wounds; (2) review the safety of using standard patterns of Finite Element Analysis; and (3) analyse and discuss the advantages and deficiencies of finite element models. Electronic research databases, Pubmed, Scopus and Web of Knowledge, were searched using the restricted key words: finite element gunshot. Studies were included if they reported finite element analysis in heads, simulating gunshot injuries. Excluded studies were those that did not clearly describe their methods and results, had significant discrepancies, were not published in the English language or were not published yet. There were 30 references identified by the bibliographic search strategy. Fourteen manuscripts were eligible for inclusion and were fully critically appraised. The collected data were able to furnish details about the simulations as well as some variables that may affect the predictive accuracy of the simulation.

1139. Costanzo, C., et al. (2011). "Brain abscess in seven cats due to a bite wound: MRI findings, surgical management and outcome." Journal of feline medicine and surgery 13(9): 672-680.

UNLABELLED: PRESENTATION AND LESION LOCALISATION: Seven adult domestic shorthair cats were presented with a 1- to 6-day history of progressive neurological signs. A focal skin puncture and subcutaneous swelling over the dorsal part of the head were detected on physical examination. Neurological examination indicated lesion(s) in the right forebrain in four cats, multifocal forebrain in one cat, left forebrain in one cat, and multifocal forebrain and brainstem in the remaining cat. In all cats, magnetic resonance imaging revealed a space-occupying forebrain lesion causing a

severe mass effect on adjacent brain parenchyma. CLINICAL APPROACH AND OUTCOME: All cats were managed with a combination of medical and surgical treatment. At surgery a small penetrating calvarial fracture was detected in all cats, and a tooth fragment was found within the content of the abscess in two cats. The combination of surgical intervention, intensive care and intravenous antimicrobials led to a return to normal neurological function in five cats., PRACTICAL RELEVANCE: As this series of cases indicates, successful resolution of a brain abscess due to a bite injury depends on early recognition and combined used of antimicrobials and surgical intervention. A particular aim of surgery is to remove any skull and foreign body (tooth) fragments that may represent a continuing focus of infection.

1140. Costello, B. J., et al. (2000). "Distraction osteogenesis for the reconstruction of traumatic defects." Journal of Cranio-Maxillofacial Trauma 6(2): 47-52.

Background and Objectives. Distraction osteogenesis has become popular in recent years as a means to reconstruct congenital defects and deformities. These techniques may also be used to reconstruct traumatic deformities. The distraction techniques offer volumetric expansion of a deficient site that may be difficult to reconstruct using any other method. Method and Materials. The basic concepts, indications, and application of distraction osteogenesis are reviewed. Two clinical cases are presented in which distraction osteogenesis was utilized to reconstruct traumatic defects and deformities. The advantages of distraction osteogenesis for defect reconstruction are discussed. Results and/or Conclusions. Distraction osteogenesis techniques afford the clinician the ability to overcome obstacles that render traditional reconstructive methods difficult and/or unpredictable. They obviate the need for a donor site and provide improved soft tissue coverage by volumetric tissue expansion. The application of these new devices and techniques provides the reconstructive surgeon numerous options for traumatic defect repair. In some cases, these options may offer significant advantages over the traditional techniques.

1141. Cote, M. N., et al. (2011). "Nutritional support in severe traumatic brain injury." Critical Care 15: S133.

Introduction: Clinical guidelines recommend full caloric replacement within 7 days after severe traumatic brain injury (TBI) since it may improve clinical outcomes. However, enteral feeding is often poorly tolerated in this population. We hypothesized that most patients with severe TBI do not receive adequate caloric and protein intake. Methods: We performed a retrospective cohort study of randomly selected patients with severe TBI (GCS ≤8) identified with ICD-10 codes and admitted to a 24-bed ICU of a Canadian level 1 trauma center between January 2005 and December 2006. We excluded patients <16 years old, with penetrating TBI or mechanically ventilated for <48 hours. Using a standardized pretested case report form, we collected daily kilocalories and proteins (ordered and received), sedation, use of prokinetic drugs and post-pyloric access. The primary endpoint was achievement of ≥90% of caloric and protein requirement within 7 days. Secondary endpoints were factors associated with achievement of nutritional goals and with gastric intolerance (one episode of residuals ≥250 ml/4 hours). A sample size of 100 patients was required to obtain a margin of error of 9%. Student t and chi-square tests were used to compare continuous data and proportions. We obtained ethics approval. Results: Among the 109 patients included, 82.6% were men (mean age 40.5 ± 20.5 years, GCS 3.7 ± 1.3 and BMI 25.3 ± 5.1 kg/m2). Patients had 1,204 potential feeding days. Ninety-six patients (88.1%) were fed by day 3. Mean caloric and protein orders were 32.6 ± 4.8 kcal/kg and 1.4 ± 0.2 g/kg, respectively. Two patients never received enteral nutrition. Nutrition was started at a mean rate of 32.6 ± 9.3% of the nutritional goal using the stomach as the initial access in 97.2%. The achievement of caloric, protein and both requirements was successful in 48 (44.0%, 95% CI = 34.7 to 53.4%), 64 (58.7%, 95% CI = 49.5 to 68.0%) and 42 (38.5, 95% CI = 29.4 to 47.7%) patients during the first week. The most associated factor with unsuccessful nutrition was gastric intolerance (RR = 1.40. 95% CI = 1.11 to 1.88, P <0.01), which occurred in 49.5% patients. Factors associated with gastric intolerance were young age (P <0.001),

increased intracranial pressure (P <0.001), high opioid doses (P = 0.004) and nonuse of prokinetic drugs (P = 0.05). Conclusions: Most patients with severe TBI did not achieve nutritional goals within 7 days, partially due to high gastric residuals. Although we identified factors associated high gastric residuals, improving feeding tolerance is unlikely to be the only intervention to significantly improve nutritional intakes.

1142. Cotner, B., et al. (2017). "Quality of sleep in caregivers of service members and veterans with traumatic brain injury." Archives of physical medicine and rehabilitation 98(10): e97-e98.

Research Objectives: To examine sleep quality in persons who provide care to Service Members and Veterans (SMV) with traumatic brain injury (TBI).DesignA mixed method study. Setting: Focus group participants were recruited through community outreach initiatives and multiple Department of Defense medical treatment facilities nationwide. Focus groups were held at Walter Reed National Military Medical Center. Participants: 31 caregivers of SMVs who had sustained a TBI participated in one of six focus groups (approx. 90 mins). Participant were female (90.3%), spouses (71%) with spouse; Age: M=39.8 years, SD=10.6). Interventions: Not applicable.Main Outcome Measure(s)Quality of sleep of caregivers of persons with TBI. Results: Almost half (45.2%) of the caregivers reported having sleep problems. Caregivers described four types of sleep issues: 1) Cannot sleep, and in some cases, using medication to assist; 2) Cannot fall asleep due to being “wound up” 3) Waking up often during the night due to SMV being awake and/or worrying; and 4) Waking up tired from poor quality of sleep in general.Conclusion/DiscussionThese results suggest that there is a high incidence of caregivers of SMVs with TBI experiencing sleep problems. While caregivers of SMVs with moderate-severe and penetrating TBIs were the most prevalent group to report sleep issues, caregivers of SMVs with equivocal mild and mild TBIs also reported sleep issues indicating that inadequate sleep is common for this population of caregivers. The main limitation to this study is that the case examples rely on a small number of focus group interviews. Given this limitation, results should be considered preliminary.

1143. Coughlan, A. K. and E. K. Warrington (1978). "Word-comprehension and word-retrieval in patients with localized cerebral lesions." Brain : a journal of neurology 101(1): 163-185.

1144. Coughlan, M. D., et al. (2003). "Craniocerebral gunshot injuries in children." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery 19(5-6): 348-352.

INTRODUCTION: Despite the worldwide increase in the incidence of gunshot injuries, there are few large published series on craniocerebral gunshot injuries in children., MATERIALS AND METHODS: The records of 30 consecutive children who were treated for craniocerebral gunshot injuries at the Red Cross War Memorial Children's Hospital from 1989 to 2002 were reviewed retrospectively. The circumstances of the injury, clinical status, CT findings, complications, and outcome were assessed., RESULTS: The median age was 7 years. Seventy-seven percent of the victims were boys. The majority of the children were injured in the crossfire of civilian violence. The initial management consisted of debridement under local anesthesia in 16 children and neurosurgical procedures under general anesthesia were performed in 14. Sixteen children sustained transhemispheric injuries, 5 bihemispheric injuries, 5 tangential injuries, and 4 transventricular injuries. All 3 children with a GCS <4 died within 72 h of admission. Three of the 7 children with GCS 4-7 died but there were no deaths in those children whose GCS was >7 post-resuscitation. Motor deficits, cranial nerve palsies, and visual field defects were very common. Early post-traumatic seizures were the commonest complication (18%)., CONCLUSION: Children with higher post-resuscitation GCSs fared better than adults in terms of mortality but not necessarily morbidity. As in the case with adults, the GCS after resuscitation is a very good prognostic indicator of mortality.

1145. Couper, G. W., et al. (2000). "Unguarded electric plugs cause penetrating head injuries in children." Journal of accident & emergency medicine 17(1): 55.

1146. Coupland, R. M. and P. E. Pesonen (1992). "Craniocerebral war wounds: non-specialist management." Injury 23(1): 21-24.

The non-specialist management of 28 craniocerebral war wounds is described. Of these, 26 were operated upon of which three died. Two of the survivors developed wound abscesses in the early postoperative period. None developed epilepsy while in hospital. Aspects of the operative management are discussed.

1147. Courtney, A. and M. Courtney (2015). "The Complexity of Biomechanics Causing Primary Blast-Induced Traumatic Brain Injury: A Review of Potential Mechanisms." Frontiers in neurology 6: 221.

Primary blast-induced traumatic brain injury (bTBI) is a prevalent battlefield injury in recent conflicts, yet biomechanical mechanisms of bTBI remain unclear. Elucidating specific biomechanical mechanisms is essential to developing animal models for testing candidate therapies and for improving protective equipment. Three hypothetical mechanisms of primary bTBI have received the most attention. Because translational and rotational head accelerations are primary contributors to TBI from non-penetrating blunt force head trauma, the acceleration hypothesis suggests that blast-induced head accelerations may cause bTBI. The hypothesis of direct cranial transmission suggests that a pressure transient traverses the skull into the brain and directly injures brain tissue. The thoracic hypothesis of bTBI suggests that some combination of a pressure transient reaching the brain via the thorax and a vagally mediated reflex result in bTBI. These three mechanisms may not be mutually exclusive, and quantifying exposure thresholds (for blasts of a given duration) is essential for determining which mechanisms may be contributing for a level of blast exposure. Progress has been hindered by experimental designs, which do not effectively expose animal models to a single mechanism and by over-reliance on poorly validated computational models. The path forward should be predictive validation of computational models by quantitative confirmation with blast experiments in animal models, human cadavers, and biofidelic human surrogates over a range of relevant blast magnitudes and durations coupled with experimental designs, which isolate a single injury mechanism.

1148. Covelli, E., et al. (2006). "Unknown posttraumatic foreign body in facial region." The Journal of craniofacial surgery 17(1): 191-194.

This study emphasizes the importance of scrupulous diagnostic first aid procedures to avoid the consequences of trauma due to a foreign body. Two patients were examined, both with facial trauma showing nonspecific symptoms. Through objective internal and external oral examination complete with clinical and radiographic examinations Three dimensional computed tomography (TC3D), foreign bodies unknown at the time of the trauma were identified. When the foreign bodies had been removed, the ache symptoms disappeared, restoring functionality and the patient's facial appearance. This study shows the need for detailed early diagnosis to achieve correct monitoring and therefore proper treatment for these patients.

1149. Cowley, R. A., et al. (1979). "The subcellular pathology of shock in trauma patients: studies using the immediate autopsy." The American surgeon 45(4): 255-269.

In summary, our immediate autopsy program provides a new tool for investigating the pathophysiologic effects of shock and trauma at the cellular and subcellular levels. By minimizing the time delay between death and tissue sampling with this technique, we have demonstrated the feasibility of validly applying the refinements of electron microscopy, histochemistry and analytical biochemistry

to human tissue. Qualitative, semi-quantitative and quantitative data with these techniques have been integrated with clinical, physiologic and chemical studies on these patients during life. Cell injury produces an altered steady state of metabolism within the cell, evidence of which is seen in altered ultrastructure. If the injury is too severe, the cell will pass the "point-of-no-return," at which time the changes in the cell are no longer compatible with life and the cell dies and undergoes necrosis. Although the initiating injury and the patterns of the altered steady state may vary, once the cell has passed the "point-of-no-return," the patterns of cell injury regardless of the initial insult, are similar. We believe that the cellular patterns seen in patients dying from shock and trauma are remarkably similar to those produced by hypoxic tissue injury in experimental systems. Tissue from control patients in whom ischemic injury due to episodes of hypotension did not occur show good morphologic preservation with normal mitochondria and other cell organelles. Tissue from patients who have experienced acute shock consisting of a period of hypotensive ischemia show changes in the mitochondria and ER compatible with the experimental picture of hypoxia: i.e., dilated ER, with loss of ribosomes, swelling of mitochondria and the appearance of flocculent densities in the mitochondria. Tissues taken from the patients who had experienced repeated episodes of shock, whom we designated as those in "chronic shock," showed changes paralleling the acute changes, but also showed much evidence of autophagocytosis as a) the cells attempted to achieve a lower metabolic requirement in order to survive, and b) they attempted to "clean-up" and remove altered and damaged organelles and debris from previous bouts with sublethal ischemic injury. We hope that the increased knowledge of tissue and cellular injury obtained by the immediate autopsy will provide a means of integration, hypothesis formation and testing of the vast knowledge of cell biology and pathology, and the opportunity for developing in the human the potential for testing new hypotheses in model systems resulting in immediate and innovative feedback for the patient in terms of diagnosis, functional monitoring and treatment.

1150. Cox, M. W., et al. (2007). "Traumatic pseudoaneurysms of the head and neck: early endovascular intervention." Journal of vascular surgery 46(6): 1227-1233.

BACKGROUND: Trauma to the head and neck with military munitions often presents with complex multisystem injury patterns. Vascular evaluation typically focuses on the carotid and vertebral arteries; however, trauma to branches of the external carotid artery may also result in devastating complications. Pseudoaneurysms are the most frequent finding on delayed evaluation and can result in life-threatening episodes of rebleeding., METHODS: Patients evacuated from the Afghanistan and Iraq conflicts with penetrating injury to the face and neck were evaluated by the vascular surgery service to determine the potential for unsuspected vascular injury. Patients with significant penetrating injury underwent computed tomography angiography (CTA) as the initial evaluation and subsequent arteriography in cases where injuries were suspected or metallic fragments produced artifacts obscuring the vasculature. Data on all vascular evaluations were entered prospectively into a database and retrospectively reviewed., RESULTS: Between February 2003 and March 2007, 124 patients were evaluated for significant penetrating trauma to the head and neck. Thirteen pseudoaneurysms of the head and neck were found in 11 patients: two in the internal carotid artery, one of the vertebral artery, and 10 involving branches of the external carotid. Seven pseudoaneurysms were symptomatic, of which two presented with episodes of massive bleeding and airway compromise. Seven pseudoaneurysms were treated with coil embolization, 1 with Gelfoam (Upjohn, Kalamazoo, Mich) embolization, 2 with stent grafts, 2 with open repair, and 1 with observation alone. None of the patients undergoing embolization had complications; however, a stent graft of the internal carotid artery occluded early, without stroke. All of the pseudoaneurysms had resolved on follow-up CTA or angiogram., CONCLUSIONS: Pseudoaneurysms are a common finding in patients with high-velocity gunshot wounds or blast injuries to the head and neck. Most involve branches of the external carotid artery and can be treated by embolization. CTA should be performed on all patients with high-velocity gunshot wounds or in cases of blast trauma with fragmentation injuries of the head and neck.

1151. Crandon, I. W., et al. (2004). "Civilian cranial gunshot wounds: a Jamaican experience." The West Indian medical journal 53(4): 248-251.

Gunshot injuries are an escalating social and medical dilemma in many Western and some developing countries. Of 40 patients arriving at the University Hospital of the West Indies (UHWI), Jamaica, from 1993 to 1998, with gunshot wounds of the head, 30 were admitted. Six of those admitted died within 24 hours, five with poor Glasgow Coma scores. Ten patients had surgery, two of whom died. Six complications occurred: two patients each developed an infection, cerebrospinal fluid fistula or seizures. All patients were victims of an assault and all had intracranial penetration, the most common sites of which were facial and frontal. Median hospital stay was eleven days. The Glasgow Coma Score on admission was a good prognostic indicator. Fourteen patients had associated injuries, four of which were in the neck. Surgery was considered inappropriate for moribund patients and those with inaccessible bone and bullet fragments. Young males were the most common victims of this devastating form of assault.

1152. Crane, J. K. (2018). "Intrathecal spinal abscesses due to Candida albicans in an immunocompetent man." BMJ case reports 2018.

Infections of the central nervous system due to Candida albicans are uncommon and are usually only observed in special circumstances, such as following neurosurgery or penetrating head trauma, in immunosuppressed patients, premature infants or in patients with ventriculoperitoneal shunts. The author reports a case of an immunocompetent man who presented with a thoracic intraspinal abscess due to C. albicans Despite surgical drainage and 6 weeks of high-dose fluconazole therapy, the abscess extended and recurred in the cervical spine, requiring a second operation to arrest the infection.

1153. Crawford, T. C., et al. (2018). "Traumatically Brain-Injured Donors and the Impact on Lung Transplantation Survival." The Annals of thoracic surgery 106(3): 842-847.

BACKGROUND: Concern has been raised over inferior lung transplantation survival associated with traumatic brain injury (TBI) organ donors. Our purpose was to explore the relationship between TBI donors and lung transplantation survival in the lung allocation score (LAS) era., METHODS: We queried the United Network for Organ Sharing Scientific Registry of Transplant Recipients and identified all adult (>=18 years) lung transplantations performed from May 4, 2005, to December 31, 2015. Recipients were dichotomized based on donor cause of death, TBI versus non-TBI, propensity score across eight variables (final LAS, intensive care unit admission before transplantation, extracorporeal membrane oxygenation before transplantation, donor age 50 years or older, cytomegalovirus antibody recipient-/donor+, ischemia time, annual center transplantation volume, single versus double lung transplantation), and matched 1:1 without replacement. Our primary outcomes were survival at 1, 3, and 5 years by Kaplan-Meier method., RESULTS: A total of 17,610 patients underwent isolated lung transplantation over the study period at 75 different transplantation centers. TBI was the leading cause of death in the donor population: 47% of all donors. Propensity score matching generated 6,782 well-matched donor TBI versus non-TBI pairs (all covariate $p > 0.2$). Risk-adjusted survival was similar between recipients of TBI donors versus non-TBI donors at 1 year (86% versus 86%, log-rank $p = 0.27$), 3 years (68% versus 68%, log-rank $p = 0.47$), and 5 years (55% versus 54%, log-rank $p = 0.40$)., CONCLUSIONS: In the largest analysis of TBI donors and the impact on lung transplantation survival to date, we found similar survival out to 5 years in lung transplant recipients of TBI versus non-TBI donors, alleviating concerns over continued transplantation with this unique donor population.

1154. Crevenna, R., et al. (1999). "Unusual treatment of slaughterer's gun injury." Injury 30(8): 537-538.

1155. Crevenna, R., et al. (1999). "Is there an obligation for neurosurgical intervention in Slaughterer's gun injuries?" Acta Chirurgica Austriaca 31(SUPPL. 156): 165-167.

Backeground: Slaughterer's guns ('humane killers') are powder-activated cattle skull impacting tools. Today mechanical stunning is typical for countrylike regions, because in the municipal slaughter-houses electrical stunning of pigs and ruminants is preferred. In very rare cases these weapons are used for suicide. They then cause penetrating brain lesions and if the victim survives the brain-damage, an encephalitis caused by the impacted material results in the case of no neurosurgical intervention. Methods: The aim of this short report is to describe this rare and special type of injury especially the wounding mechanism in a forensic point of view. Additional we discuss the clinical course of a patient who attempted suicide by a slaughterer's gun, and survived the injury without neurosurgical intervention. Results: Although these injuries are very rare events today, it is important for involved physicians to know the wounding mechanism, the consequences and potential complications of injuries caused by slaughterer's guns. It is possible to survive such an injury without neurosurgical intervention. Conclusions: In our opinion such penetrating head-injuries should be treated by revision of the gunshot canal and by removal of foreign bodies (brain debris, impacted bone fragments and contaminated skin) under antibiotic treatment.

1156. Crevenna, R., et al. (2003). "[Therapy of head injuries caused by animal slaughter guns]." Therapie bei Kopfverletzungen durch Schlachtschussapparate. 153(1-2): 37-39.

Slaughterer's guns ("humane killers") are powder-activated cattle skull impacting tools. Today mechanical stunning is typical for country like regions, because in the municipal slaughter-houses electrical stunning of pigs and ruminants is preferred. In rare cases these weapons are used for suicide. They then cause penetrating brain lesions and if the victim survives the brain-damage, an encephalitis caused by the impacted material results. The neurosurgical treatment is to revise the gunshot canal and to remove impacted fragments of bone and contaminated skin (imprimat) under antibiotic cover. A psychiatric treatment of the mostly underlying depression and a rehabilitative treatment should complete therapy. So treatment of slaughterer's gun injury should have a multidisciplinary approach.

1157. Cripps, M. W., et al. (2009). "The number of gunshot wounds does not predict injury severity and mortality." The American surgeon 75(1): 44-48.

It is presumed that as the number of gunshot wounds (GSWs) increases, so do the Injury Severity Score (ISS) and mortality risk. We hypothesized that the number of bullet wounds relates to ISS and death; however, a single GSW to the head is ominous. We reviewed the charts of all GSW patients admitted to a trauma center from 2004 to 2006 (n = 531). We analyzed patient demographics, ISS, and mortality. There was no correlation with the number of GSWs with either ISS or mortality. There was only a 0.3 per cent increased risk of death for each additional GSW (r2 = 0.12). Patients with a single GSW versus multiple GSWs had no difference in mortality (9.1 vs 8.4%, P = 0.8). A single GSW to the head carried a 50 per cent mortality risk. For those who sustained both head and body GSWs, each additional GSW did not increase mortality (r2 = 0.007). Our study shows that the number of GSWs has no affect on mortality or ISS. Internal triage and management of gunshot victims should not be affected by the categorization of patients as having a single versus multiple GSWs.

1158. Cristofori, I., et al. (2016). "Neural correlates of mystical experience." Neuropsychologia 80: 212-220.

Mystical experiences, or subjectively believed encounters with a supernatural world, are widely reported across cultures and throughout human history. Previous theories speculate that executive brain

functions underpin mystical experiences. To evaluate causal hypotheses, structural studies of brain lesion are required. Previous studies suffer from small samples or do not have valid measures of cognitive functioning prior to injury. We investigated mystical experience among participants from the Vietnam Head Injury Study and compared those who suffered penetrating traumatic brain injury (pTBI; n=116) with matched healthy controls (HC; n=32). Voxel-based lesion-symptom mapping analysis showed that lesions to frontal and temporal brain regions were linked with greater mystical experiences. Such regions included the dorsolateral prefrontal cortex (dlPFC) and middle/superior temporal cortex (TC). In a confirmatory analysis, we grouped pTBI patients by lesion location and compared mysticism experiences with the HC group. The dlPFC group presented markedly increased mysticism. Notably, longitudinal analysis of pre-injury data (correlating with general intelligence and executive performance) excludes explanations from individual differences. Our findings support previous speculation linking executive brain functions to mystical experiences, and reveal that executive functioning (dlPFC) causally contributes to the down-regulation of mystical experiences.

1159. Cristofori, I., et al. (2019). "The lonely brain: evidence from studying patients with penetrating brain injury." Social neuroscience 14(6): 663-675.

Loneliness is perceived as social isolation and exclusion. The neural substrate of loneliness has been investigated with functional neuroimaging; however, lesion-based studies and their associated outcomes are needed to infer causal involvement between brain regions and function. Here, we applied voxel-based lesion-symptom mapping (VLSM) analyses to investigate the causal role of brain lesions on self-report of loneliness (UCLA Loneliness Scale) in a unique sample from the Vietnam Head Injury Study, including veterans with penetrating traumatic brain injuries (pTBI) (n = 132) and healthy controls (HCs) (n = 35). Our results revealed that the right anterior insula (AI) and right prefrontal cortex (PFC) are key brain regions underpinning loneliness perception. Individuals with selective lesions to the right AI and right PFC were less likely to report loneliness compared to patients with selective lesions to the posterior cortex and HCs. Therefore, it appears that lesions to key regions involved in processing social pain act to lower the perception of loneliness. Reporting loneliness was associated with executive dysfunction, apathy, disinhibition, and lower life satisfaction. In conclusion, the reported findings broaden our understanding of how loneliness is processed in the social brain, and how behavioral and cognitive factors can influence this perception.

1160. Cristofori, I., et al. (2015). "The neural bases for devaluing radical political statements revealed by penetrating traumatic brain injury." Social cognitive and affective neuroscience 10(8): 1038-1044.

Given the determinant role of ventromedial prefrontal cortex (vmPFC) in valuation, we examined whether vmPFC lesions also modulate how people scale political beliefs. Patients with penetrating traumatic brain injury (pTBI; N = 102) and healthy controls (HCs; N = 31) were tested on the political belief task, where they rated 75 statements expressing political opinions concerned with welfare, economy, political involvement, civil rights, war and security. Each statement was rated for level of agreement and scaled along three dimensions: radicalism, individualism and conservatism. Voxel-based lesion-symptom mapping (VLSM) analysis showed that diminished scores for the radicalism dimension (i.e. statements were rated as less radical than the norms) were associated with lesions in bilateral vmPFC. After dividing the pTBI patients into three groups, according to lesion location (i.e. vmPFC, dorsolateral prefrontal cortex [dlPFC] and parietal cortex), we found that the vmPFC, but not the dlPFC, group had reduced radicalism scores compared with parietal and HC groups. These findings highlight the crucial role of the vmPFC in appropriately valuing political behaviors and may explain certain inappropriate social judgments observed in patients with vmPFC lesions.

1161. Cristofori, I., et al. (2015). "White and gray matter contributions to executive function recovery after traumatic brain injury." Neurology 84(14): 1394-1401.

OBJECTIVE: We investigated the association between regional white and gray matter volume loss and performance on executive functions (EFs) in patients with penetrating traumatic brain injury (pTBI)., METHODS: We studied 164 pTBI patients and 43 healthy controls from the Vietnam Head Injury Study. We acquired CT scans for pTBI patients and divided them according to lesion localization (left and right prefrontal cortex [PFC]). We administered EF tests (Verbal Fluency, Trail Making, Twenty Questions) and used voxel-based lesion symptom mapping (VLSM) and group-based correlational and multiple regression analyses to examine the relative influence of gray and white matter lesions on EF recovery., RESULTS: The VLSM analysis revealed that white and gray white matter lesions were associated with impaired EFs. In the left PFC lesion group, damage to the PFC gray matter, anterior corona radiata, and superior longitudinal fasciculus (SLF) were most correlated with functional recovery. Verbal Fluency, which involves a broad fronto-temporo-parietal network, was best predicted by SLF lesion volume. Trail Making and Twenty Questions, which is associated with more focal left frontal damage, was better predicted by PFC lesions., CONCLUSIONS: Our results indicated that white matter volume loss can be a superior predictor of recovery and a crucial factor driving clinical outcome in functions involving a broad network such as Verbal Fluency. White matter damage may place additional burden on recovery by deteriorating signal transmission between cortical areas within a functional network. Copyright © 2015 American Academy of Neurology.

1162. Cristofori, I., et al. (2016). "Brain Regions Influencing Implicit Violent Attitudes: A Lesion-Mapping Study." The Journal of neuroscience : the official journal of the Society for Neuroscience 36(9): 2757-2768.

Increased aggression is common after traumatic brain injuries and may persist after cognitive recovery. Maladaptive aggression and violence are associated with dysfunction in the prefrontal and temporal cortex, but such dysfunctional behaviors are typically measured by explicit scales and history. However, it is well known that answers on explicit scales on sensitive topics--such as aggressive thoughts and behaviors--may not reveal true tendencies. Here, we investigated the neural basis of implicit attitudes toward aggression in humans using a modified version of the Implicit Association Task (IAT) with a unique sample of 112 Vietnam War veterans who suffered penetrating brain injury and 33 healthy controls who also served in combat in Vietnam but had no history of brain injury. We hypothesized that dorsolateral prefrontal cortex (dlPFC) lesions, due to the crucial role of the dlPFC in response inhibition, could influence performance on the IAT. In addition, we investigated the causal contribution of specific brain areas to implicit attitudes toward violence. We found a more positive implicit attitude toward aggression among individuals with lesions to the dlPFC and inferior posterior temporal cortex (ipTC). Furthermore, executive functions were critically involved in regulating implicit attitudes toward violence and aggression. Our findings complement existing evidence on the neural basis of explicit aggression centered on the ventromedial prefrontal cortex. These findings highlight that dlPFC and ipTC play a causal role in modulating implicit attitudes about violence and are crucially involved in the pathogenesis of aggressive behavior., SIGNIFICANCE STATEMENT: Maladaptive aggression and violence can lead to interpersonal conflict and criminal behavior. Surprisingly little is known about implicit attitudes toward violence and aggression. Here, we used a range of techniques, including voxel-based lesion-symptom mapping, to examine the causal role of brain structures underpinning implicit attitudes toward aggression in a unique sample of combat veterans with traumatic brain injury. We found that damage to the dorsolateral prefrontal cortex (dlPFC) led to a more positive implicit attitude toward violence that under most normal situations would be considered inappropriate. These results suggest that treatments aimed at increasing cognitive control using cognitive behavioral therapies dependent on the intact dlPFC could treat aggressive and violent behavior. Copyright © 2016 the authors 0270-6474/16/362757-12$15.00/0.

1163. Croca, M., et al. (2013). "Complex neuropsychiatric symptoms after suicidal attempt by double gunshot to the head." European Psychiatry 28.

Cranioencephalic trauma and resulting traumatic brain injury are sometimes associated with hard to manage psychiatric symptoms, requiring interpretation from an integrated neuropsychiatric perspective. We present the case of a 49-year-old man with no known psychiatric history who attempted suicide by gunshot to the head resulting in severe cranioencephalic trauma (GCS=7) and subsequent admission to our hospital's Neurosurgery ward. Brain-CT showed two intracranial projectiles, in left temporal and right occipital topography, as well as multiple haemorragic foci. He was transferred to our Psychiatry ward, as there was no neurosurgical indication and he repeatedly attempted suicide. At admission, he presented with level of consciousness fluctuations, temporospatial disorientation, anosognosia and difficult to assess depressive symptoms. Brief neuropsychological evaluation showed deficits on visual-perceptive abilities, executive functions, logical reasoning, and immediate verbal memory, with a MoCA (Montreal Cognitive Assessment) total score under the normative values. Some language capacities (i.e. naming and repetition) were found to be preserved. Neuroophthalmological evaluation evidenced damage to the anterior left optic tract and a right campimetric defect. The EEG revealed no epileptic activity. At the 34th day of hospitalization, after accidental choking, he began to exhibit delirium with accompanying psychotic symptoms. Presently, two-and-a-half months after admission, we observe remission of delirium, coherent and organized speech, an alexithymic pattern of response, ideative perseverance and no suicidal ideation. The noteworthiness of this case resides on the scarcity of published reports and on the difficulty it presents in terms of therapeutic and post-discharge management, originating from the hard-to-interpret symptoms and uncertain prognosis.

1164. Crockard, H. A. (1974). "Bullet injuries of the brain." Annals of the Royal College of Surgeons of England 55(3): 111-123.

Experience gained with a wide variety of missile injuries of the brain is presented. Clinical signs and intracranial pressure (ICP) studied in the early post-injury period have been correlated with survival and treatment. Stress is laid on fluid requirements and the importance of controlled ventilation in the management of the labile clinical condition of such patients. Coughing and struggling caused extrusion of blood and brain from the wound, and this was reduced considerably with endotracheal intubation and mechanical ventilation. Post-operatively high ICP could be controlled in potential survivors with continued ventilation.

1165. Crockard, H. A. (1979). "Penetrating craniocerebral missile injuries." International anesthesiology clinics 17(2-3): 307-326.

1166. Crockard, H. A., et al. (1977). "Somatosensory evoked potentials, cerebral blood flow and metabolism following cerebral missile trauma in monkeys." Surgical neurology 7(5): 281-287.

Somato sensory evoked potentials (SEP), cerebral blood flow and cerebral metabolism were studied in seven rhesus monkeys before and after a right occipito-frontal missile injury with an air rifle. The sensory evoked potential was present shortly after injury though markedly altered in shape. There was a very close correlation (r2 equal to 0.83) between SEP and cerebral blood flow on the uninjured side five minutes after injury. On the injured side, this was also noted but the amplitude of the SEP was much smaller, perhaps due to direct injury. If the flow in either hemisphere fell below 15-20 mls/100 gm/min, the evoked response disappeared, but in several animals a subsequent increase in flow was associated with a return of electrical activity. There was no correlation with cerebral perfusion pressure or cerebral metabolic rates for oxygen or lactate production, though it is likely that this is not due to physiological reasons but rather methodological. It might be inferred from these results that adequate flow is vital for the preservation and return of electrical activity following brain injury.

1167. Crockard, H. A. and D. S. Gordon (1973). "Early intracranial pressure and blood-flow measurements in cerebral gunshot wounds." The British journal of surgery 60(4): 316.

1168. Crocker, K. L., et al. (2021). "Neurogenesis in the adult Drosophila brain." Genetics 219(2).

Neurodegenerative diseases such as Alzheimer's and Parkinson's currently affect ~25 million people worldwide. The global incidence of traumatic brain injury (TBI) is estimated at ~70 million/year. Both neurodegenerative diseases and TBI remain without effective treatments. We are utilizing adult Drosophila melanogaster to investigate the mechanisms of brain regeneration with the long-term goal of identifying targets for neural regenerative therapies. We specifically focused on neurogenesis, i.e., the generation of new cells, as opposed to the regrowth of specific subcellular structures such as axons. Like mammals, Drosophila have few proliferating cells in the adult brain. Nonetheless, within 24 hours of a penetrating traumatic brain injury (PTBI) to the central brain, there is a significant increase in the number of proliferating cells. We subsequently detect both new glia and new neurons and the formation of new axon tracts that target appropriate brain regions. Glial cells divide rapidly upon injury to give rise to new glial cells. Other cells near the injury site upregulate neural progenitor genes including asense and deadpan and later give rise to the new neurons. Locomotor abnormalities observed after PTBI are reversed within 2 weeks of injury, supporting the idea that there is functional recovery. Together, these data indicate that adult Drosophila brains are capable of neuronal repair. We anticipate that this paradigm will facilitate the dissection of the mechanisms of neural regeneration and that these processes will be relevant to human brain repair.

1169. Crockett, A., et al. (2013). "A rare case of a penetrating,life-threatening injury to the oropharynx." Journal of Laryngology and Otology 127(4): 8.

Case report A six-year-old child presented to the accident and emergency department after he had been found in the street apnoeic and cyanosed with a broken pencil embedded in his mouth and a Glasgow Coma Score of 3. In the accident and emergency department, the child's Glasgow Coma Score fluctuated between 8 and 13. A penetrating injury of the soft palate was noted, and a provisional diagnosis of penetrating intracranial injury was made. Antibiotics were given and the child was intubated and ventilated. Computed tomography (CT) showed no evidence of brain or spinal cord injury. Examination under anaesthesia revealed a small penetrating wound in the nasopharynx with cerebrospinal fluid (CSF) leakage. The child was transferred, intubated, to Great Ormond Street Hospital. Attempted extubation after 72 hours failed because of a poor gag reflex and aspiration. Magnetic resonance imaging (MRI) and magnetic resonance angiography showed an ill-defined lesion in the right side of the medulla and upper spinal cord. Antibiotics were continued. After 9 days, a tracheostomy was fashioned. The child's level of consciousness subsequently improved, but there was evidence of a partial bulbar palsy together with left facial and upper and lower limb weakness. The CSF leak ceased spontaneously within 72 hours. Further management consisted of nasogastric tube feeding and rehabilitation, including swallowing therapy and physiotherapy. After six months, there was still a mild left-sided limb weakness. Conclusion This unusual penetrating injury of the brain stem was diagnosed on clinical grounds and correct management instituted despite a normal CT scan. Suspicions were subsequently confirmed by MRI scanning, together with the development of focal neurological signs which became apparent following extubation.

1170. Croezen, D. H. and T. L. Van Natta (2001). "Presentation and outcomes for organ donation in patients with cerebral gunshot wounds." Clinical transplantation 15 Suppl 6: 11-15.

This study was undertaken to examine the presentation and outcomes relative to solid organ donation in patients with fatal cerebral gunshot wounds at a level I trauma center over a 7-year period. A retrospective chart review of patients with such wounds over the years 1993-99 was completed. Eighty (80) patients were considered potential solid organ donors. Of these, 28 (35%) became organ donors, yielding 97 transplantable organs. Ninety-six percent presented with a GCS of less than 6. Mean SBP on presentation was 130, ranging from 48 to 225. Median time from presentation to death was 18 hours. Intravenous fluids given over the first 6 hours averaged 4.3 liters. Pressors were required in 68% of cases, blood products in 34%. Consent rate for donation was 32% when requested by a physician and 59% when requested by an organ procurement organization (OPO) co-ordinator. No request was made in 15 cases. Patients with fatal cerebral gunshot wounds, but with solid organ donor potential, have a characteristic presentation. Those with hemodynamic stability and those whose hypotension responds promptly to treatment can be expected to have a donor potential despite their devastating brain injury. Minimal time and resources are required to support such patients. Additional organs may have been obtained if the request for donation was consistently separated from the families' notification of brain death, and if the request was initiated by an OPO coordinator rather than a physician. Further, all patients admitted with cerebral gunshot wounds and poor neurologic function should have local OPO referral, potential survival notwithstanding.

1171. Crokard, H. A., et al. (1977). "Physiological consequences of experimental cerebral missile injury and use of data analysis to predict survival." Journal of neurosurgery 46(6): 784-794.

The authors describe cerebrovascular and cerebral metabolic changes in monkeys, subjected to cerebral missile injury. After injury with BB pellet at 90 m/sec, there is a rapid rise in intracranial pressure (ICP), which reaches a peak 2 to 5 minutes posttrauma, and then falls to about 20 to 30 mm Hg. This, with a fall in mean blood pressure (MBP), results in a 50% reduction in cerebral perfusion pressure (CPP), Cerebral blood flow (CBF) is also reduced, although acutely there is no close relationship with (CPP). Cerebrovascular resistance falls initially and then at 30 minutes rises to very high values. Cerebral metabolic rates (CMR's) for oxygen fall after injury and remain low for the rest of the animal's life; CMR's for lactate rise immediately after injury and persists for 5 hours, then fall. After injury with a faster missile (180 m/sec), the ICP rises higher and faster, and the peak is shorter. The CCP is reduced in this injury to approximately 30 mm Hg, and only one animal survived more than 1 hour. With the conventional forms of data analysis, the length of survival after injury correlates well with MBP, ICP, and CBF, but separately they were completely unsatisfactory for prediction of an individuals prognosis. With the technique of multiple linear regression analysis, the survival of individual animals could be predicted with great accuracy. This is possible also when two postinjury parameters,CBF and MBP, are used.

1172. Crone, K. R., et al. (1986). "Superior sagittal sinus air after penetrating craniocerebral trauma." Surgical neurology 25(3): 276-278.

Intracranial air secondary to craniocerebral trauma is not uncommon. Computed tomography scanning may show the air within specific intracranial compartments. We report a case of air within the superior sagittal sinus visualized with computed tomography and documented at operation.

1173. Cross, J. N. and O. S. Morgan (1984). "Delayed presentation of brain abscess following penetrating cranial wound." The West Indian medical journal 33(3): 201-203.

1174. Crutcher, C. L., 2nd, et al. (2016). "Racial Disparities in Cranial Gunshot Wounds: Intent and Survival." Journal of racial and ethnic health disparities 3(4): 687-691.

BACKGROUND: Gunshot wounds (GSW) to the head are associated with the highest mortality of all gun-related injuries, with assault reported as the leading cause of penetrating GSW. Several studies have explored factors and trends related to assault and self-inflicted GSW separately. The aim of this study was to investigate epidemiological characteristics and racial differences collectively in patients with GSW to the head by examining associations to injury intent and survival., METHOD: A retrospective study was performed by accessing the hospital trauma registry at our regional Level 1 Trauma Center. A query of neurosurgery consults with penetrating trauma was completed from January 2008 to October 2013. Patients with penetrating intracranial GSW were included in the study. A chi-square test was used to evaluate association between patients' characteristics and intent of injury. Logistic regression analyses predicting intent of injury and survival were also conducted., RESULTS: Of 111 patients, the majority were male (87.4 %). Most were African American (57.7 %) and Caucasian (35.1 %). Compared to African Americans, Caucasian patients were more likely to inflict self-harm (odds ratio (OR) 16.369 (95 % confidence interval (CI) 5.633-47.571), $p < 0.0001$), while African Americans (OR 26.413 (95 % CI 8.957-77.890), $p < 0.0001$) were more likely to be victims of assault. Race and other demographic variables did not predict survival nor did intent of injury ($p = 0.368$)., CONCLUSION: This study reports that there are racial disparities between assault GSW and self-inflicted GSW. However, neither race nor intent is a predictor of survival outcome. Targeted efforts are needed to reduce occurrence of cranial GSW events in order to decrease associated morbidity and mortality.

1175. Cruvinel Isaac, D. L., et al. (2003). "Prognostic factors in open globe injuries." Ophthalmologica. Journal international d'ophtalmologie. International journal of ophthalmology. Zeitschrift fur Augenheilkunde 217(6): 431-435.

PURPOSES: To evaluate the main factors related to visual outcome after open globe injuries (excluding intraocular foreign bodies)., METHODS: Retrospective study analyzing consecutive ocular lacerations, primarily repaired in this institution, between January 1993 and January 2000. Of the 364 cases, 283 (77.75%) lacerations were statistically analyzed, correlating the preoperative variables with the postoperative visual acuity (VA). Excluded from this study were all patients with less than 6 months of follow-up, previous ocular surgery, unreliable information on VA, intraocular foreign bodies and endophthalmitis. When a bilateral injury was detected, only 1 eye was randomly chosen., RESULTS: It was observed, after statistical analysis (multivariate analysis), that the most important factors related to postoperative poor VA (less than 20/100) were: the length of the laceration, the elapsed time between the injury and the surgery and the presence or absence of vitreous loss, cataract (lens damage), hyphema, laceration posterior to rectus muscle insertion and retinal detachment., CONCLUSION: With this study, it was possible to point out the most important factors related to visual prognosis in open globe injuries. The results found are similar to results previously reported. Copyright 2003 S. Karger AG, Basel

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1176. Cruz Filho, N. A., et al. (2013). "Facial nerve grafting and end-to-end anastomosis in the middle ear: tympanic cavity and mastoid." Brazilian journal of otorhinolaryngology 79(4): 441-445.

UNLABELLED: Sectioned facial nerves can be repaired with grafting or end-to-end anastomosis., OBJECTIVE: To discuss these repair procedures and what can be expected of them., METHOD: Seven patients with sectioned facial nerves were included in the study. Four underwent grafting and three were offered end-to-end anastomosis. Facial nerve palsy was iatrogenic in five patients and was caused by bullet wounds in two. Assessment of motor function recovery was based on Janssen's scale., RESULTS: Mean motor recovery was rated at 72.5% for subjects offered grafting and 73.3% for patients submitted to anastomosis., CONCLUSION: 1. Grafting and anastomosis are proper solutions to repair sectioned facial nerves; complete recovery is never attained; synkinesis may occur. 2. In principle anastomosis is the procedure of choice, but when there is minimal traction in the facial nerve stump grafting is preferred. 3. Both procedures yielded mean motor recovery rates above 70% (72.5% for grafting and 73.3% for anastomosis).

1177. Cruz, J., et al. (1996). "Cerebral extraction of oxygen, lactate production, and perfusion pressure in gunshot wound to the head: case report." The Journal of trauma 40(3): 445-448.

A case of gunshot wound to the head is presented, in which the patient made a satisfactory recovery after a prolonged period of elevated intracranial pressure and increased cerebral extraction of oxygen. Even though cerebral extraction of oxygen was increased in the most acute phase, the arteriojugular lactate difference was never abnormally decreased (ischemic). This finding indicated that, in this patient, increased cerebral extraction of oxygen was not sufficient to result in global cerebral ischemia (increased cerebral lactate production). To our knowledge, this is the first report on frequent serial assessment of cerebral extraction of oxygen and lactate production in severe penetrating head injury.

1178. Cucci, M., et al. (2022). "Evaluation of blood pressure variability in moderate to severe traumatic brain injuries." Critical care medicine 50(1 SUPPL): 772.

INTRODUCTION/HYPOTHESIS: Traumatic brain injuries (TBI) result in significant morbidity and mortality annually. Clinical practice guidelines recommend prevention of secondary injury by avoidance of hypotension; however, it is unknown if blood pressure variability (BPV) would have effects on clinical outcomes. The aim of this study is to evaluate whether increased BPV is associated with unfavorable Glasgow Outcome Scale (GOS) scores in patients with moderate to severe TBIs. METHODS: This study is a retrospective, cohort study of adult trauma ICU patients admitted to a level 1 trauma center with moderate to severe TBIs (head Abbreviated Injury Scale (AIS) >1, Glasgow Coma Scale (GCS) 3-12) from 1/1/2018 to 5/31/2020. Patients were excluded for anoxic and penetrating brain injuries and severe alcohol withdrawal. Group assignment was favorable (GOS 4-5) vs. unfavorable (GOS 1-3) GOS scores at discharge. The GOS was adjudicated by least two independent, blinded reviewers. The SBP was obtained from all BP readings in the initial 72 hours obtained on at least hourly. The primary outcome measure was the standard deviation (SD) of systolic blood pressure (SBP) and the coefficient of variance (CV) of SBP was also measured. The SD-SBP was computed by variance from the mean and CV-SBP by the SD divided by the mean. A generalized linear model was performed to test the association with the SD-SBP and the GOS. RESULTS: Of the 608 patients eligible for inclusion, 89 patients were included with 50 (56%) and 39 (44%) in the unfavorable and favorable groups, respectively. The study population had a mean age of 59 (SD 21), 65% male, median head AIS of 4 [IQR 3-5] and GCS of 6 [IQR 3-10], primarily subdural (n=54, 61%) and subarachnoid (n=48, 54%) hemorrhages, and 42 (47%) required surgical intervention. There was no significant difference between the mean SBP readings (125 vs. 123 mmHg, p=0.377), SD-SBP (16.8 vs. 18.2, p=0.236), or CV-SBP (0.13 vs. 0.15, p=0.104) between the favorable and unfavorable groups. Based on a generalized linear model, there was no association of SDSBP (estimate -0.03, p=0.213) or CV-SBP (estimate -0.04, p=0.173) with the GOS. CONCLUSIONS: Blood pressure variability measured by SD-SBP or CV-SBP may not be associated with an unfavorable outcome in patients with moderate to severe TBI.

1179. Cudnik, M. T., et al. (2012). "Prehospital factors associated with mortality in injured air medical patients." Prehospital emergency care : official journal of the National Association of EMS Physicians and the National Association of State EMS Directors 16(1): 121-127.

BACKGROUND: Air medical transport provides rapid transport to definitive care. Overtriage and the expense and risk of transport may offset survival benefits., OBJECTIVE: We assessed the ability of prehospital factors to predict resource need for helicopter-transported patients., METHODS: We performed a prospective, observational cohort analysis of injured scene patients taken to one of two level I trauma centers from October 2009 to September 2010. Variables analyzed included patient demographics, diagnoses, and clinical outcomes (in-hospital mortality, emergent surgery within 24 hours, blood transfusion within 24 hours, and intensive care unit [ICU] admission >=24 hours, as well as

a combined outcome of all clinical outcomes). Prehospital variables were prospectively obtained from air medical providers at the time of transport and included past medical history, mechanism of injury, and clinical factors. We compared those variables with and without the outcomes of interest via chi(2) analysis and the Kruskal-Wallis test, where appropriate. Multivariate logistic regression identified factors associated with outcomes of interest with the intent of developing a clinical prediction tool., RESULTS: Five hundred fifty-seven patients were transported during the study period. The majority of the patients were male (67%) and white (95%) and had an injury that occurred in a rural location (58%). Most injuries were blunt (97%), and patients had a median Injury Severity Score (ISS) of 9. The overall mortality was 4%; 48% of the patients had one of the four outcomes. The most common reasons for requesting air transport were motor vehicle collision (MVC) with high-risk mechanism (18%), MVC at a speed greater than 20 mph (18%), Glasgow Coma Scale score (GCS) less than 14 (15%), and loss of consciousness (LOC) greater than 5 minutes (15%). Factors associated with mortality were age greater than 44 years, GCS less than 14, systolic blood pressure (SBP) less than 90 mmHg, and flail chest. This model had 100% sensitivity and 50% specificity and missed no deaths. The combined endpoint of all four outcomes (death, receipt of blood, surgery, ICU admission) included intubation by emergency medical services, two or more fractures of the humerus/femur, presence of a neurovascular injury, a crush injury to the head, failure to localize to pain on examination, GCS less than 14, or the presence of a penetrating head injury. This model had a sensitivity of 57% (53%-61%) and a specificity of 78% (75%-87%)., CONCLUSIONS: Very few prehospital criteria were associated with clinically important outcomes in helicopter-transported patients. Evidence-based guidelines for the most appropriate utilization of air medical transport need to be further evaluated and developed for injured patients.

1180. Cui, Y., et al. (2018). "Removal of an intraorbital metallic foreign body following double-penetrating ocular injury: A case report." Medicine 97(51): e13790.

RATIONALE: Open eye injury is one of the commonest ophthalmic emergencies, and when accompanied by intraorbital foreign bodies, the condition carries a poor prognosis., PATIENT CONCERNS: A 28-year-old man presented to the emergency department of our hospital complaining of sudden painful loss of vision in the left eye after he hammered an iron plate., DIAGNOSIS: The ocular examination revealed a 4-mm full thickness scleral laceration with prolapsed uveal tissue, a traumatic cataract. Computed tomography (CT) demonstrated an orbital foreign body in the retrobulbar area., INTERVENTIONS: The patient underwent emergency scleral suturing, severance of medial rectus muscle, and removal of the orbital foreign body. Twelve days after the emergency operation, pars plana lensectomy and pars plana vitrectomy were performed., OUTCOMES: After 3 months of follow-up, there was no immune response. Visual acuity in the left eye was the perception of hand motion. The retina remained mostly attached with normal intraocular pressure, and good cosmetic appearance. The globe anatomy was maintained, but the vision could not be restored due to the grave nature of the trauma., LESSONS: Transconjunctival approach extraocular muscle severance may thus be a suitable approach to the removal of intraorbital metallic foreign body.

1181. Cullen, E. F. and T. M. Luckasevic (2010). "Suicide with a homemade shotgun: case report and review of literature." The American journal of forensic medicine and pathology 31(3): 255-257.

This is a 57-year-old white man with a medical history of depression and recent suicidal ideation that necessitated police response with confiscation of his shotgun. Approximately 3 weeks later he was found by his landlord lifeless on the floor surrounded by a pool of blood.Scene investigation revealed a homemade shotgun and a hammer lying near the decedent. Autopsy revealed a contact shotgun wound to the right side of the decedent's head. The shotgun blast caused injury to the skull with evisceration of the brain. Soot and shotgun filler were present surrounding and within the entrance wound. In this case report, we show that the preventive measures of taking away one's firearms and admission into a psychiatric hospital is in some cases not enough to prevent suicide. The desire to end one's existence may lead to a well thought out and ingenuous means to commit the act of suicide.

1182. Culton, G. L. (1969). "Spontaneous recovery from aphasia." Journal of speech and hearing research 12(4): 825-832.

1183. Cummings, H. G. (1967). "Boy's radiograph tells a tale." Dental survey 43(6): 71-73.

1184. Cunliffe, C. H. and J. S. Denton (2008). "An atypical gunshot wound from a home-made zip gun--the value of a thorough scene investigation." Journal of forensic sciences 53(1): 216-218.

Zip guns and the atypical gunshot wounds they produce are rare in forensic pathology. Because of this, investigators and forensic pathologists may be unfamiliar with their construction, appearance, and the wounds associated with them. A 43-year-old mechanic, with a history of depression was found dead in a washroom stall at work with an atypical gunshot wound of the head. Upon initial investigation, no weapon was found at the scene. Due to the nature of the scene, and the unusual characteristics of the wound, the manner of death was at first thought to be a homicide. Subsequently, a simple zip gun, which had been overlooked during the scene investigation, was discovered by a co-worker while he was cleaning the stall. Examination of the wound revealed evidence of contact range firing. A markedly deformed bullet was recovered from the head, consistent with the use of the home-made gun. These findings, along with further police investigation and review of the past medical history, indicated that the manner of death was a suicide.

1185. Cunningham, T. J., et al. (2004). "Systemic treatment of cerebral cortex lesions in rats with a new secreted phospholipase A2 inhibitor." Journal of neurotrauma 21(11): 1683-1691.

An internal fragment of the human neuroprotective polypeptide DSEP (Diffusible Survival Evasion Peptide) was delivered at 0.4 mg/kg (subcutaneously) 20-30 min after stab wound lesions in the parietal cortex of anesthetized rats. The peptide, CHEASAAQC or CHEC-9, inhibited the inflammatory response to the lesion and the degeneration of neurons adjacent to the wound. Four days after surgery, peptide-treated animals ($n = 6$) had 75% fewer reactive ameboid microglia/brain macrophages in the cortical parenchyma surrounding the lesion compared to vehicle-injected control rats ($n = 6$, $p = 0.004$). The cortical laminae in area 2 adjacent to the lesion were completely obscured in controls because of the increase in inflammatory cells and frank degeneration of neurons, while there was preservation of the neurons and cytoarchitecture after peptide treatment. In parallel experiments, CHEC-9 was found to inhibit the enzymatic activity of secreted phospholipase A2 (sPLA2), including activity present in the serum of peptide-injected rats. Kinetic analysis revealed the peptide increased the average Km for serum by 318% when tested 45 min after treatment (peptide-treated, $n = 6$; control-treated, $n = 6$; $p = 0.0087$), suggesting the principal effect of the peptide was to lower the affinity of serum sPLA2 for substrate. The sPLA2 inhibition by this particular peptide sequence appeared to be highly specific since inversion of a single pair of amino acids eliminated the inhibitory effect. Phorbol-12-myristate-13-acetate stimulated platelet aggregation, a PLA2-regulated activity, was also inhibited by the peptide. The discovery of CHEC-9 makes it possible to study in vivo the long appreciated contribution made by PLA2-directed inflammation to both acute and chronic neurodegeneration and may be helpful in designing therapies to limit neuron death in these conditions.

1186. Cunningham, T. L., et al. (2014). "Correlations between blood-brain barrier disruption and neuroinflammation in an experimental model of penetrating ballistic-like brain injury." Journal of neurotrauma 31(5): 505-514.

Abstract Blood-brain barrier (BBB) disruption is a pathological hallmark of severe traumatic brain injury (TBI) and is associated with neuroinflammatory events contributing to brain edema and cell

death. The goal of this study was to elucidate the profile of BBB disruption after penetrating ballistic-like brain injury (PBBI) in conjunction with changes in neuroinflammatory markers. Brain uptake of biotin-dextran amine (BDA; 3 kDa) and horseradish peroxidase (HRP; 44 kDa) was evaluated in rats at 4 h, 24 h, 48 h, 72 h, and 7 days post-PBBI and compared with the histopathologic and molecular profiles for inflammatory markers. BDA and HRP both displayed a uniphasic profile of extravasation, greatest at 24 h post-injury and which remained evident out to 48 h for HRP and 7 days for BDA. This profile was most closely associated with markers for adhesion (mRNA for intercellular adhesion molecule-1) and infiltration of peripheral granulocytes (mRNA for matrix metalloproteinase-9 [MMP-9] and myeloperoxidase staining). Improvement of BBB dysfunction coincided with increased expression of markers implicated in tissue remodeling and repair. The results of this study reveal a uniphasic and gradient opening of the BBB after PBBI and suggest MMP-9 and resident inflammatory cell activation as candidates for future neurotherapeutic intervention after PBBI.

1187. Curado, R. L., et al. (2020). "Demographic Profile of the Patient Operated with Hepatic-Splenic Trauma in a Tertiary University Hospital (1990-2009)." Journal of the American College of Surgeons 231(4): e232.

Introduction: Analyze the profile, risk factors and prognosis of patients operated with hepatosplenic trauma in a Tertiary University Hospital. Methods: Retrospective study, patients operated with hepatic-splenic trauma. Variables analysed: gender, age, systolic blood pressure, diastolic blood pressure, glasgow coma scale, heart rate, respiratory rate, place of first visit, hemodynamic stability, trauma mechanism, complementary procedures in the primary assessment. RTS, ISS, TRISS, treatment instituted, consumption of blood products, associated injuries and length of hospital stay. Results: 70 patients with hepatic-splenic injury, mechanism was penetrating in 48.58% (34 cases), blunt trauma in 51.42% (36 cases). Most were male (penetrating: 91.17% and blunt 86.11%). The variables that showed a statistical difference between the penetrating and blunt trauma were: mean age: 25.05 ± 6.85 years / 30.42 ± 10.47 years (p = 0.0015); Glasgow Coma Scale: 14.82 ± 0.63 / 9.48 ± 4.97 (p = 0.001); RTS: 7.42 ± 0.82 / 5.46 ± 2.55 (p = 0.001); TRISS 0.92 ± 0.16 / 0.69 ± 0.38 (p = 0.003); time elapsed between the initial care and the start of surgery: 45.12 ± 34.42 minutes / 135.35 ± 141.12 minutes (p = 0.001); exploratory laparotomy: 82.35% / 82.92% (p = 0.023). Conclusion: The profile of patients operated for hepatic-splenic trauma is: young man, with initial external care. Predominance of gunshot injury in penetrating trauma and car accident in blunt trauma; TBI was more present in blunt trauma, which defined lower RTS and TRISS in this group; most hepatosplenic lesions were of lesser severity.

1188. Curry, J. T., 3rd and R. D. Zallen (1974). "The use of malleable metal mesh in open mandibular reductions. Report of nine cases." Oral surgery, oral medicine, and oral pathology 38(3): 335-343.

1189. Curtin, F., et al. (2016). "High dose clinical pharmacology study of GNbAC1, a humanized monoclonal antibody for multiple sclerosis." Neurology 86(16).

Objective: to assess safety and pharmacology of GNbAC1 a humanized monoclonal antibody Background: MSRV-Env is a protein of endogenous retroviral origin. This protein is expressed in active brain lesions of multiple sclerosis (MS) patients. Due to its pro-inflammatory and myelinotoxic effects, MSRV-Env appears as a pertinent target in MS. GNbAC1 is an IgG4 humanized monoclonal antibody (mAB) which neutralizes MSRV-Env and prevents cytokine release and the nitrosative stress process at the OPC level. Design: This randomized placebo-controlled dose-escalation study evaluated the safety and pharmacokinetics in the plasma and cerebro-spinal fluid (CSF) of GNbAC1 in 21 healthy volunteers at doses of 6, 18, 36 mg/kg. Lumbar punctures were performed at Days 2, 15 and 29 post-infusion. Results: All subjects completed the study. GNbAC1 was well tolerated. All adverse events were mild or moderate in severity. No subject was withdrawn as a result of adverse events. There were no notable dose or treatment related trends in the number or type of adverse events. Pharmacokinetic data show a

dose-linear pharmacokinetics in the plasma with half-life ranging from 21.5 to 25.3 days. The concentration of GNbAC1 in CSF was assessed after intravenous infusion at Day 2, 15, and 29. A CSF/plasma ratio of 0.13[percnt] was observed at Day 2 increasing to 0.36[percnt] at Day 15 and 0.28[percnt] at Day 29. The pharmacokinetic profile of GNbAC1 in the CSF shows a progressive increase in this compartment up to an equilibrium. Conclusion: These CSF pharmacokinetic data show that the brain penetration of GNbAC1 is in line with data from other mABs and sufficient to neutralize the MSRV-Env target expressed in brain lesions. These favourable results pave the way to launch a Phase IIb trial testing GNbAC1 in MS patients.

1190. Cury, R. G., et al. (2017). "Holmes Tremor Secondary to a Stabbing Lesion in the Midbrain." Tremor and other hyperkinetic movements (New York, N.Y.) 7: 523.

Background: The development of Holmes tremor (HT) after a direct lesion of the midbrain has rarely been reported in the literature, although several etiologies have been linked with HT, such as stroke, brainstem tumors, multiple sclerosis, head trauma, or infections., Phenomenology Shown: A 31-year-old male, having been stabbed in the right eye, presented with a rest and action tremor in the left upper limb associated with left hemiparesis with corresponding post-contrast volumetric magnetic resonance imaging T1 with sagittal oblique reformation showing the knife trajectory reaching the right midbrain., Educational Value: Despite the rarity of the etiology of HT in the present case, clinicians working with persons with brain injuries should be aware of this type of situation.

1191. Cusick, J. M. and G. Soriya (2010). "Basics & backups critical patient requires airway control & vascular access." JEMS : a journal of emergency medical services 35(3): 34-36.

1192. Cuttino, C. L. and R. K. Green (1972). "Immediate management of facial gunshot wounds: report of case." Journal of oral surgery (American Dental Association : 1965) 30(9): 674-677.

1193. Cvetinovic, M., et al. (1997). "Implants in management of gunshot injuries of teeth, facial bones and jaws." Vojnosanitetski pregled 54(4 Suppl): 37-39.

The use of implants in management of gunshot injuries of teeth, face and jaws presents novelty that is manifested in primary surgical treatment, reduction and fixation of bone fragments and teeth, replacement of lost parts of bone tissues as well as preparation for definitive prosthetic management. At the Clinic for Maxillofacial Surgery of the MMA 173 implants of different types and purposes have been placed in the period 1991-1997, in rehabilitation of the patients injured during the civil war. Although this number of placed implants is significant, the conclusive estimate about benefit of using implants may be obtained only after a longer period of time. Early results are satisfactory.

1194. Cvetkovic, D., et al. (2018). ""The pen is mightier than the sword" - suicidal trans-orbital intracranial penetrating injury from a pencil." Forensic science, medicine, and pathology 14(2): 221-224.

A 40-year-old drug addict, who was being treated with methadone and occupational therapy, committed suicide by striking a wooden pencil into his right eye socket. While still conscious, he hit his head hard against a table, jamming the pencil even deeper into his head. The autopsy showed that the pencil missed the globe and lodged in the inner part of the right eye socket. It pierced the orbital part of the right ethmoid bone, the right ethmoid cells, and the right superior nasal concha, then passed through the body of the sphenoid bone and the clivus of the occipital bone before stopping in the brain tissue. The basilar artery was transected at the pontomedullary junction, where the tip of the pencil had lodged. Also, at the pontomedullary junction, an approximately 3 mm deep laceration of the brainstem was evident together with flecks of green paint. Histological examination revealed that laceration at the

pontomedullary junction was even deeper than the macroscopic appearance had suggested, with several small lateral cracks, focal deep hemorrhage, and disruption of both gray and white matter of the brainstem. Fragments of cellulose originating from the wooden pencil could also be clearly distinguished. Toxicological analysis was performed using liquid chromatography with mass spectrometry, and it showed traces of methadone in the blood and humor vitreous samples. The cause of death was damage to the vital structures in the brainstem, resulting from a penetrating injury to the head by a pencil. Herein, we present a self-inflicted trans-orbital penetrating injury by a non-missile, low-velocity object - a pencil, with a rather unusual, immediately incapacitating outcome.

1195. Cychowska, M. and E. Bloch-Boguslawska (2013). "Cases of non-fatal chop wounds to the head." Przypadki obrazen rabanych glowy bez skutku smiertelnego. 63(4): 283-287.

Chop wounds, due to the fact that they are usually located on the head and are inflicted by a weapon or an object with a large mass, usually lead to death from an extensive damage to the skull and brain structures. Non-lethal chop wounds to the head are found very rarely in forensic practice. The following paper presents three cases, in which the occurrence of wounds has been attributed to the use of an axe. In the first case, the sustained injuries actually resulted in a life-threatening condition. The injuries in the second case bore attributes of exposure to direct danger to life and health within the meaning of the relevant article of the Criminal Code. The third case can be considered interesting, not only because of the nature of the suffered post-traumatic lesions, but also in view of the circumstances of the death of the victim occurring later on in life.

1196. Czyz, C. N., et al. (2017). "Post-traumatic ophthalmic artery pseudoaneurysm from orbital projectile." Canadian journal of ophthalmology. Journal canadien d'ophtalmologie 52(4): e130-e132.

1197. Czyz, C. N. and A. T. Strand (2016). "Minimally invasive in vivo orbital pressure measurement." Clinical & experimental ophthalmology 44(8): 724-725.

1198. D'Addario, J., et al. (2022). The Role of Neurointervention in Traumatic Vascular Injury and Vascular Surgery: 251-260.

There is an increasing recognition of the devastating consequences of delayed recognition of traumatic injuries to vasculature of the head and neck. This has prompted the development of more aggressive screening criteria. When intervention is needed but open surgical treatment is not viable, the neurointerventional specialist may be able to address many of these difficult lesions. Similarly, there is great opportunity for collaboration between vascular surgeons and neurointerventionalist in less acute patient care such as in the case of incidentally discovered intracranial aneurysms and intracranial stenosis. The neurointerventionalist also can take advantage of the emerging field of transcarotid artery revascularization for patients needing carotid revascularization who are at high risk for transradial or transfemoral stenting.

1199. da Costa, L. and M. Chapman (2022). Measurement of Cerebrovascular Reactivity Using Transcranial Doppler. 175: 59-73.

The Doppler effect (or Doppler shift), which is the basis for the transcranial Doppler (TCD) technique, was described by Christian Andreas Doppler, an Austrian physicist, at a meeting of the Natural Sciences Section of the Royal Bohemian Society in Prague on 25 May 1842. The principle was presented in the paper Über das farbige Licht der Doppelsterne (Eden, Ultrasound Med Biol 16:831–832, 1990) (Concerning the colored light of the double stars) and initially applied to astronomy. In 1965, M. Miyazaki and K. Kato (Jpn Circ J 29:375–382, 1965) described the use of ultrasonic Doppler

technique in the evaluation of blood flow and hemodynamics. However, ultrasound technology at the time was not able to penetrate the skull, and therefore cerebral blood flow (CBF) could not be assessed directly. With the development of the low frequency pulsed Doppler technique (2 MHz), able to penetrate the calvarium in most skulls, Aaslid et al. (J Neurosurg 57:769–774, 1982) were able to use TCD to measure blood flow velocity in the intracranial arteries for the first time. Since then, TCD has been used in medical practice as a technique to measure CBF and later cerebrovascular reactivity (CVR) in many conditions, including ischemic stroke, TBI, subarachnoid hemorrhage and vasospasm, and brain death, both in clinical practice and as a research tool in the search of better understanding physiologic responses of the intracranial circulation to healthy and pathologic stimuli. The objective of this chapter is to provide a brief summary of the use of TCD in the evaluation of cerebrovascular reactivity, with a brief overview of its use in TBI and aneurysmal subarachnoid hemorrhage.

1200. da Costa, L. B., et al. (2006). "Shotgun pellet embolization to the posterior cerebral circulation." AJNR. American journal of neuroradiology 27(2): 261-263.

The embolization of missiles to the intracranial circulation is a rare event. We describe here a case of a man shot by a shotgun, presenting with a posterior fossa stroke and occlusion of the superior cerebellar artery by a metallic pellet. To our knowledge, this is the third case of posterior fossa circulation pellet emboli.

1201. da Silva, A. M., et al. (1992). "Posttraumatic epilepsy in civilians: clinical and electroencephalographic studies." Acta neurochirurgica. Supplementum 55: 56-63.

Posttraumatic epilepsy (PTE) is a known consequence of head trauma. The factors involved in posttraumatic seizures generation and the relationship between acute seizures and posttraumatic epilepsy are not without controversy. This also applies to the evolution of the electroencephalographic characteristics. The study here reported was performed analysing data from patients with posttraumatic epilepsy (N = 205) and data from patients followed-up since trauma and considered as a high risk population for the development of PTE (patients with acute seizures and/or patients with focal lesions--contusion, haematomas or penetrating head injury) (N = 152). Seizure type was associated with age and trauma severity (children, elderly and worst trauma cases present with a higher proportion of partial seizures). Neurological deficit and lesion location were associated with the seizure occurrence. The increased incidence of seizures was found when the most diffused brain dysfunction was combined with neurological deficits. The analysis of sequential EEGs performed at first, at 6th and 12 months post trauma revealed a non-stationary pattern throughout these time periods with EEG focal abnormalities remaining frequent for more than two years after the trauma. Children and old people have a higher proportion of EEG abnormalities with more frequent abnormal generalized activity in children and more frequent abnormal focal EEG activity in the elderly.

1202. Dabezies, O. H., Jr., et al. (1982). "Penetrating orbital injury caused by an "Afro comb'." Annals of ophthalmology 14(8): 780-782.

1203. Dada, M. A., et al. (1993). "Shotgun pellet embolism to the brain." The American journal of forensic medicine and pathology 14(1): 58-60.

This report describes the autopsy findings in a young man who died after having been shot with a shotgun from about 30 m. Although not suspected clinically, a right middle cerebral artery territory infarct was found; its cause was shown to be a shotgun pellet embolus that had lodged just proximal to the trifurcation of the right middle cerebral artery. The case underscores the importance of performing a thorough postmortem examination, including a careful study of cerebral vasculature, in instances of brain infarction.

1204. Daghfous, A., et al. (2015). "Contribution of imaging in the initial management of ballistic trauma." Diagnostic and interventional imaging 96(1): 45-55.

INTRODUCTION: The purpose of this study is to specify the role of imaging in the initial management of ballistic traumas., METHODS: This is a retrospective study that colligated 83 victims of a gunshot wound during demonstrations, treated in our trauma centre between 12 January and 3 February 2011. All of the patients were haemodynamically stable and examined by conventional radiography and/or ultrasound and/or 16-slice CT-scan (CT)., RESULTS: The mean age of the victims was 26years with a sex ratio of 0.02. All wounds were unique. Injury to the limbs was most common in 75.5% of the cases (n=64) followed by that of the torso in 19.5% of the cases (n=16). Wounds in the spine (n=2), brain (n=2) and facial skeleton (n=1) were observed. Conventional x-rays objectified 32 cases of open fractures 95% of which were in the legs. Twenty-one of the victims of gunshot wounds had a CT-scan that objectified the path of the bullet and an assessment of the wound was made in all cases. The confrontation of the data from the CT-scan and that noted during surgery and during the monitoring demonstrated that the CT-scan is very efficient in the diagnosis of pleural effusion, vascular wounds, thoracic parenchymatous wounds and wounds of the solid organs and brain lesions and the facial skeleton. However, the sensitivity is low for the diagnosis of hollow organs., CONCLUSION: The CT-scan is very useful in the initial care of stable patients with gunshot wounds as regards the haemodynamics and helps objectify the path of the bullet and obtain a precise assessment of the damage. Conventional x-rays are unavoidable for wounds to the legs and spine.

1205. Dagi, T. F. (1987). "Emergency management of missile injuries to the brain: resuscitation, triage, and preoperative stabilization." The American journal of emergency medicine 5(2): 140-148.

1206. Dagi, T. F. and J. Fandino (2018). "Victor Horsley and surgical management of firearm injuries of the head." Journal of neurosurgery 128(4): 60-61.

Introduction: At the time of the Boer War, the major Biritsh conflict preceeding World War I, mortality from gunshot wounds of the head approximated 100% and these wounds were often purposely neglected. Sir Victor Horsley began studying these wounds at the end of the 19th century and concluded, by 1915, in advance of Cushing, that a methodical approach to penetrating injuries could save lives. This presentation reviews his work, its roots and its outcomes Methods: The military and civilian surgical literature from the end of the 19th century when new weapons and cartridges were introduced through the end of WWI was reviewed with special attention to Horsley's clinical and research investigation in the context of the culture of military surgery of the period. Results: Horsley's work was as important at Harvey Cushing's, though the early emphasis on animal models of head injury did not have the same influence as Cushing's clinical reports. Horsley succeed, however, in changing the attitude of British military surgical command, and thus contributed both neurosurgically and politically to the benefit of wounded soldiers. Conclusion: Horsley deserves to be recognized better for his contributions to the study, pathophysiology and surgery of intracranial penetrating injury, particularly prior to Cushing's celebrated involvement.

1207. D'Agostino, R., et al. (2021). "Management of Penetrating Traumatic Brain Injury: Operative versus Non-Operative Intervention." The Journal of surgical research 257: 101-106.

BACKGROUND: Penetrating traumatic brain injury (pTBI) is the most lethal form of TBI, with mortality rates as high as 90%. This high mortality rate leads many providers to feel that the treatment of pTBI is futile. Contrary to this point of view, several studies have shown that victims of pTBI who present with a Glasgow Coma Scale (GCS) >=6 have a reasonable chance of a meaningful outcome.

This study sought to investigate outcomes of pTBI patients based on GCS score who underwent neurosurgical intervention (craniotomy or craniectomy) and compare them with patients who did not undergo surgical intervention., MATERIALS AND METHODS: The study represents a secondary analysis of the data that were collected from 2006 to 2016 from 17 institutions as part of a multi-center study, investigating clinical outcomes for adult patients sustaining pTBI and surviving >72 h. Patients were divided into those with GCS 3-5 and those with GCS >=6. Within these groups, patients were stratified by whether they received surgical intervention, compared with standard non-surgical care. Patient level data (age and gender), clinical data (Injury Severity Score and Abbreviated Injury Score), GCS on admission, post-op infection rates, and outcomes data (mortality, length of stay [LOS], intensive care unit LOS) were collected. Both groups were compared using independent sample t-test or chi-squared test., RESULTS: Seven hundred twenty patients with pTBI were identified over 11 y, out of which 336 (46.7%) underwent surgery. The mean Injury Severity Score and Abbreviated Injury Score on admission were higher in the surgical intervention group than their non-surgical counterpart in patients with a GCS >=6 ($P < 0.0001$). Patients with GCS of 3-5 with surgical intervention demonstrated a higher survival rate than non-surgical patients ($P < 0.0001$). In the GCS >=6 group, surgical intervention did not impact near-term mortality. Intensive care unit LOS was significantly longer in the surgical intervention group in patients with GCS >= 6 ($P < 0.0001$) and GCS of 3-5 ($P < 0.0001$), as was total hospital LOS ($P < 0.0001$). Patients with a GCS 3-5 and >=6 who underwent surgical intervention were more likely to develop a central nervous system infection ($P = 0.016$; $P = 0.017$)., CONCLUSIONS: Surgical intervention in pTBI patients with GCS 3-5 results in improved mortality but comes at a cost of increased resource utilization in the form of longer LOS and higher infection rate. On the other hand, in patients with GCS >=6, surgery does not provide significant benefits in patient survival. Future prospective studies providing insight as to the impact of surgery on the resource utilization and quality of survival would be beneficial in determining the need for surgical intervention in this population.

1208. Dahl, H. M., et al. (2021). "Epidemiology of traumatic brain injury in children 15 years and younger in South-Eastern Norway in 2015-16. Implications for prevention and follow-up needs." European journal of paediatric neurology : EJPN : official journal of the European Paediatric Neurology Society 31: 70-77.

OBJECTIVE: This retrospective study aimed to describe the volume, severity, and injury mechanism of all hospital-admitted pediatric traumatic brain injury (pTBI) at Oslo University Hospital (OUH), emphasizing consequences for prevention and factors indicating a need for follow-up programs., METHOD: Data were extracted from the OUH Trauma registry on 176 children, 0-15 years old, admitted to OUH in 2015 and 2016 with a pTBI diagnosis. The dataset contains demographic data, injury mechanism, type, and severity (Glasgow coma scale, GCS; abbreviated injury scale, AIS; injury severity score, ISS), ICD-10 diagnosis codes, level of treatment, and destination of discharge., RESULTS: 79.5% had mild, 9% moderate, and 11.4% severe TBI. The incidence of hospital-treated pTBI in Oslo was 29 per 100,000 per year. The boy: girl ratio was 1.9:1, but in the young teenage group (14-15 years), the ratio was 1:1. Intracranial injury (ICI) identified on CT/MRI was associated with extended hospital stays, with a median of 6 days compared to 1 day for patients without ICI. 27% of the patients assessed as mild TBI at admission had ICI. Children below eight years of age had a higher incidence of moderate and severe ICI from trauma (53% v.s. 28% in children >= eight years)., CONCLUSION: The injury characteristics of hospital-treated pTBI are in line with other European countries, but we find the boy-girl ratio different as young teenage girls seem to be catching up with the boys. ICI and length of stay should be considered when deciding which patients need follow-up and rehabilitation.

1209. Dahlin, B. C. and B. Waldau (2016). "Surgical and Nonsurgical Treatment of Vascular Skull Base Trauma." Journal of Neurological Surgery, Part B: Skull Base 77(5): 396-403.

Vascular trauma is associated with blunt skull base fractures and penetrating injuries. We review the contemporary management of cranial vascular trauma, including blunt and penetrating cerebrovascular injury as well as refractory epistaxis from facial trauma.

1210. Dai, D., et al. (2018). "On a knife-edge: clinical uncertainty with an extensive knife blade in situ in the craniofacial region." BMJ case reports 2018.

A 25-year-old man presented to the trauma department following a penetrating stab wound to his left infraorbital margin with retained knife blade causing superoposterior displacement of the globe. Plain skull X-ray revealed an extensive retained blade with subsequent CT imaging revealing the tip of the blade had reached the right styloid process with no neurovascular compromise. Initial concern was primarily for the left eye leading to ophthalmology being the first specialty requested to review the patient. However, once the extent of the injury was established, ophthalmology requested further review from maxillofacial, ENT and neurosurgery. This resulted in an 84 hours wait between the initial injury and the removal of the knife blade. Incredibly, the patient had no initial sequelae from such an extensive injury and had an unremarkable recovery with no further complications aside from a laceration to the left inferior rectus muscle that was conservatively managed.

1211. Dailey, M., et al. (2017). "Enabling Donation after Cardiac Death in the Emergency Department: Overcoming Clinical, Legal, and Ethical Concerns." The Journal of emergency medicine 52(4): 588-592.

BACKGROUND: In light of the growing gap between candidates for organ donation and the actual number of organs available, we present a unique case of organ donation after cardiac death. We hope to open a discussion regarding organ procurement from eligible donors in the prehospital and emergency department setting., CASE: This case study, involving an otherwise healthy man who, after suffering an untimely death, was able to successfully donate his organs, highlights the need to develop an infrastructure to make this type of donation a viable and streamlined option for the future., DISCUSSION: Given the departure from traditional practice in United States transplantation medicine, we bring forth legal and ethical considerations regarding organ donation in the emergency department. We hope that this case discussion inspires action and development in the realm of transplant medicine, with the aim of honoring the wishes of donors and the families of those who wish to donate in a respectful way, while using our medical skills and technologies to afford candidates who are waiting for organs a second chance., CONCLUSIONS: We believe that this case shows that donation after cardiac death from the emergency department, while resource-intensive is feasible. We recognize that in order for this to become a more attainable goal, additional resources and systems development is required.

1212. Dal Monte, O., et al. (2013). "A voxel-based lesion study on facial emotion recognition after penetrating brain injury." Social cognitive and affective neuroscience 8(6): 632-639.

The ability to read emotions in the face of another person is an important social skill that can be impaired in subjects with traumatic brain injury (TBI). To determine the brain regions that modulate facial emotion recognition, we conducted a whole-brain analysis using a well-validated facial emotion recognition task and voxel-based lesion symptom mapping (VLSM) in a large sample of patients with focal penetrating TBIs (pTBIs). Our results revealed that individuals with pTBI performed significantly worse than normal controls in recognizing unpleasant emotions. VLSM mapping results showed that impairment in facial emotion recognition was due to damage in a bilateral fronto-temporo-limbic network, including medial prefrontal cortex (PFC), anterior cingulate cortex, left insula and temporal

areas. Beside those common areas, damage to the bilateral and anterior regions of PFC led to impairment in recognizing unpleasant emotions, whereas bilateral posterior PFC and left temporal areas led to impairment in recognizing pleasant emotions. Our findings add empirical evidence that the ability to read pleasant and unpleasant emotions in other people's faces is a complex process involving not only a common network that includes bilateral fronto-temporo-limbic lobes, but also other regions depending on emotional valence.

1213. Dal Monte, O., et al. (2014). "The left inferior frontal gyrus is crucial for reading the mind in the eyes: brain lesion evidence." Cortex; a journal devoted to the study of the nervous system and behavior 58: 9-17.

Deficit in the ability to understand and predict the mental states of others is one of the central features of traumatic brain injury (TBI), leading to problems in social-daily life such as social withdrawal and the inability to maintain work or family relationships. Although several functional neuroimaging studies have identified a widely distributed brain network involved in the Reading the Mind in the Eyes Test (RMET), the necessary brain regions engaged in this capacity are still heavily debated. In this study, we combined the RMET with a whole-brain voxel-based lesion symptom mapping (VLSM) approach to identify brain regions necessary for adequate RMET performance in a large sample of patients with penetrating TBI (pTBI). Our results revealed that pTBI patients performed worse on the RMET compared to non-head injured controls, and impaired RMET performance was associated with lesions in the left inferior frontal gyrus (IFG). Our findings suggest that the left IFG is a key region in reading the mind in the eyes, probably involved in a more general impairment of a semantic working memory system that facilitates reasoning about what others are feeling and thinking as expressed by the eyes.

1214. Dalgic, A., et al. (2010). "Brain injury due to air gun shot: report of three adult cases." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 16(5): 473-476.

Air guns (AGs) are arms that use air or another compressed gas to propel a projectile. Generally, brain injury may occur in children due to their incomplete skull development; however, the less-resistant and thin region of the skull in adults may also be penetrated by an AG shot. In this paper, we present three adult cases treated in our clinic for brain injury caused by an AG. The first case had brain and skull damage related to the high pressure of the compressed gas, and the others additionally had foreign bodies in their brain. All of the patients were operated. Two were discharged without neurological deficit; the third case had a permanent slight hemiparesis. Average follow-up was 11 months and no abscess formation was observed in this period. AGs are known as low-velocity arms; however, they have the potential to cause brain injury, and brain penetration may occur especially in the relatively less resistant and thin sites of the skull such as the orbit and temporal and occipital bones. As cerebrospinal fluid leakage is one of the expected conditions, urgent surgery is usually required.

1215. D'Alise, M. D., et al. (1996). "External carotid-to-middle cerebral bypass in the treatment of complex internal carotid injury." The Journal of trauma 40(3): 452-455.

Patients with penetrating carotid injuries above C2 present special challenges to the cerebrovascular surgeon. A subgroup of patients may lack the vascular collaterals necessary to tolerate carotid sacrifice or prolonged ischemia during direct carotid repair. We present a technique of extracranial-intracranial (EC-IC) saphenous vein bypass in two patients with high cervical and skull base carotid injuries and poor vascular collaterals. This technique allows preservation of internal carotid flow during the proximal anastomosis. Interruption of cerebral blood flow is limited to the duration required for a distal intracranial anastomosis and is confined to the territory supplied by a single middle cerebral branch. The procedure eliminates systemic anticoagulation, includes trapping of the injured

segment of the internal carotid artery, and restores a volume of flow similar to that of the internal carotid artery. It is a valuable adjunct in this specific population of patients with high carotid injuries who cannot tolerate even brief periods of temporary occlusion or in whom clinical urgency precludes an endovascular trial occlusion.

1216. Dallas, J., et al. (2019). "Should ondansetron use be a reason to admit children with isolated, nondisplaced, linear skull fractures?" Journal of neurosurgery. Pediatrics: 1-7.

OBJECTIVE: Isolated, nondisplaced skull fractures (ISFs) are a common result of pediatric head trauma. They rarely require surgical intervention; however, many patients with these injuries are still admitted to the hospital for observation. This retrospective study investigates predictors of vomiting and ondansetron use following pediatric ISFs and the role that these factors play in the need for admission and emergency department (ED) revisits., METHODS: The authors identified pediatric patients (< 18 years old) with a linear ISF who had presented to the ED of a single tertiary care center between 2008 and 2018. Patients with intracranial hemorrhage, significant fracture displacement, or other traumatic injuries were excluded. Outcomes included vomiting, ondansetron use, admission, and revisit following ED discharge. Both univariable and multivariable analyses were used to determine significant predictors of each outcome ($p < 0.05$)., RESULTS: Overall, 518 patients were included in this study. The median patient age was 9.98 months, and a majority of the patients (59%) were male. The most common fracture locations were parietal (n = 293 [57%]) and occipital (n = 144 [28%]). Among the entire patient cohort, 124 patients (24%) had documented vomiting, and 64 of these patients (52%) received ondansetron. In a multivariable analysis, one of the most significant predictors of vomiting was occipital fracture location (OR 4.05, $p < 0.001$). In turn, and as expected, both vomiting (OR 14.42, $p < 0.001$) and occipital fracture location (OR 2.66, $p = 0.017$) were associated with increased rates of ondansetron use. A total of 229 patients (44%) were admitted to the hospital, with vomiting as the most common indication for admission (n = 59 [26%]). Moreover, 4.1% of the patients had ED revisits following initial discharge, and the most common reason was vomiting (11/21 [52%]). However, in the multivariable analysis, ondansetron use at initial presentation (and not vomiting) was the sole predictor of revisit following initial ED discharge (OR 5.05, $p = 0.009$)., CONCLUSIONS: In this study, older patients and those with occipital fractures were more likely to present with vomiting and to be treated with ondansetron. Additionally, ondansetron use at initial presentation was found to be a significant predictor of revisits following ED discharge. Ondansetron could be masking recurrent vomiting in ED patients, and this should be considered when deciding which patients to observe further or discharge.

1217. Dalve, K., et al. (2021). "Neighborhood disadvantage and firearm injury: does shooting location matter?" Injury Epidemiology 8(1).

Background: Firearm violence is a public health problem that disparately impacts areas of economic and social deprivation. Despite a growing literature on neighborhood characteristics and injury, few studies have examined the association between neighborhood disadvantage and fatal and nonfatal firearm assault using data on injury location. We conducted an ecological Bayesian spatial analysis examining neighborhood disadvantage as a social determinant of firearm injury in Seattle, Washington. Methods: Neighborhood disadvantage was measured using the National Neighborhood Data Archive disadvantage index. The index includes proportion of female-headed households with children, proportion of households with public assistance income, proportion of people with income below poverty in the past 12 months, and proportion of the civilian labor force aged 16 and older that are unemployed at the census tract level. Firearm injury counts included individuals with a documented assault-related gunshot wound identified from medical records and supplemented with the Gun Violence Archive between March 20, 2016 and December 31, 2018. Available addresses were geocoded to identify their point locations and then aggregated to the census tract level. Besag-York-Mollie (BYM2) Bayesian Poisson models were fit to the data to estimate the association between the index of neighborhood disadvantage and firearm injury count with a population offset within each census tract.

Results: Neighborhood disadvantage was significantly associated with the count of firearm injury in both non-spatial and spatial models. For two census tracts that differed by 1 decile of neighborhood disadvantage, the number of firearm injuries was higher by 21.0% (95% credible interval: 10.5, 32.8%) in the group with higher neighborhood disadvantage. After accounting for spatial structure, there was still considerable residual spatial dependence with 53.3% (95% credible interval: 17.0, 87.3%) of the model variance being spatial. Additionally, we observed census tracts with higher disadvantage and lower count of firearm injury in communities with proximity to employment opportunities and targeted redevelopment, suggesting other contextual protective factors. Conclusions: Even after adjusting for socioeconomic factors, firearm injury research should investigate spatial clustering as independence cannot be able to be assumed. Future research should continue to examine potential contextual and environmental neighborhood determinants that could impact firearm injuries in urban communities.

1218. Damestani, Y., et al. (2012). "Windows to the brain: Novel concept for providing non-invasive, chronic access to neural tissues for laser-based traumatic brain injury diagnostics and therapeutics." Lasers in surgery and medicine 44: 39-40.

Background: Based on the World Health Organization projection, road traffic accidents will be the third cause of the global burden of disease and disablement by 2020 and the major cause of traumatic brain injury (TBI). Our goal is to develop a novel transparent polycrystalline Yttria-Stablized-Zirconia (YSZ) cranial implant ("window") that enables life-long, non-invasive delivery and/or collection of laser light into and from shallow and deep brain tissue on demand. Our innovative cranial implant thus allows for real-time and highly precise visualization and treatment of MTBI without the need of future highly-invasive craniotomies or trepanation procedures. Study: The fractured skull will be replaced with YSZ implant to allow the delivery and/or collection of laser light precisely to multiple affected areas within the brain which must be detected and treated chronically. The window will be permanently covered with native scalp that can be rendered temporarily transparent on demand in a minimally-invasive manner using percutaneous drug delivery of optical clearing agents (OCAs) with microneedles. Results: An YSZ implant has been successfully fabricated with current-activated powder-assisted densification processing method. Waveguides have been written across millimeter-thick YSZ using femtosecond laser irradiation with ultralow energies. The optimal YSZ surface roughness for integration of the scalp and skull to the implant was determined by culturing mouse fibroblast and osteoblast cells on the implant. Optical coherence tomography images of YSZ implanted on mouse's skull suggest that the transparent YSZ implant improves axial and lateral resolution and penetration depth into the brain. Porcine skin samples treated with OCA using microneedles demonstrate significant optical clearing. Conclusion: The results from the present study suggest that novel YSZ implants in conjunction with OCA can be used in delivering and/or collecting laser light to the brain for treatment and monitoring of TBI.

1219. Damm, A., et al. (2015). "Transorbital impalement by a wooden stick in a 3-year-old child." BMJ case reports 2015.

We present a case of a 3-year-old girl with a transorbital impalement injury due to a wooden stick penetrating the lower inferior palpebra and progressing through the orbita, after the child jumped from a table and hit a wooden basket containing pieces of exposed stick. CT revealed the stick progressing transorbitally through the medial wall and terminating just below the sella turcica. The stick was successfully removed by neurosurgical and ophthalmological specialists. The eye was subsequently inspected, and showed no pathological findings. The girl was treated with topical chloramphenicol and discharged 2 days later. Follow-up examination 2 months after the trauma demonstrated normal visual acuity and ocular motility, with no diplopia, tearing or pain. Copyright 2015 BMJ Publishing Group Ltd.

1220. Dammeier, S., et al. (2016). "Mass-Spectrometry-Based Proteomics Reveals Organ-Specific Expression Patterns To Be Used as Forensic Evidence." Journal of proteome research 15(1): 182-192.

Standard forensic procedures to examine bullets after an exchange of fire include a mechanical or ballistic reconstruction of the event. While this is routine to identify which projectile hit a subject by DNA analysis of biological material on the surface of the projectile, it is rather difficult to determine which projectile caused the lethal injury--often the crucial point with regard to legal proceedings. With respect to fundamental law it is the duty of the public authority to make every endeavor to solve every homicide case. To improve forensic examinations, we present a forensic proteomic method to investigate biological material from a projectile's surface and determine the tissues traversed by it. To obtain a range of relevant samples, different major bovine organs were penetrated with projectiles experimentally. After tryptic "on-surface" digestion, mass-spectrometry-based proteome analysis, and statistical data analysis, we were able to achieve a cross-validated organ classification accuracy of >99%. Different types of anticipated external variables exhibited no prominent influence on the findings. In addition, shooting experiments were performed to validate the results. Finally, we show that these concepts could be applied to a real case of murder to substantially improve the forensic reconstruction.

1221. Dams-O'Connor, K. (2013). "Prior TBI history affects 6-month outcomes in individuals presenting to level i trauma centers with mild TBI: A track-tbi study." Journal of neurotrauma 30(15): A27.

Introduction The notion that multiple TBIs can have a cumulative detrimental impact is widely accepted, but most research support comes from athlete studies and relevance to community samples is not known. Given the prevalence of mild TBI (mTBI), it is important to understand the factors that contribute to poorer outcomes. Methods We investigated the prevalence of prior TBI (pTBI) in a community sample of individuals who received emergency department (ED) care for mTBI, and compared patients with and without pTBI on indices of pre-index injury psychosocial functioning, health, substance use, and 6-month outcomes. Subjects were recruited from three Level I trauma centers as part of the multicenter prospective Transforming Research and Clinical Knowledge in TBI (TRACK-TBI) study. Patients were eligible if they: 1) presented to the ED within 24 hours after sustaining mTBI of sufficient severity to require CT scan per evidence-based guidelines; 2) were ≥ 18 years old. Extensive data were collected at baseline to characterize the index injury (including medical record abstraction and CT scan) and pre-index injury functioning. Participants were screened for lifetime history of TBI. Index injury outcomes were assessed 6 months post-injury and included measures of postconcussion symptoms, psychosocial functioning, and cognitive functioning. Results Of 586 TRACK-TBI participants, 136 (23%) reported at least one pTBI with loss of consciousness (LOC). There were no demographic differences between individuals with and without pTBI. Individuals with pTBI had lower rates of employment and were less likely to be married than those with no pTBI ($p < .01$). Those with pTBI had worse medical and psychiatric health, as indicated by number of chronic medical conditions ($p = .001$) and higher rates of anxiety disorder, depression, sleep disorder, and bipolar disorder ($p < .05$). Individuals with pTBI were twice as likely to use tobacco, alcohol, and illicit drugs ($p = .000$). Surprisingly, individuals with a pTBI had less severe index injuries, as indicated by duration of LOC ($p = .001$), duration of post-traumatic amnesia (PTA; $p = .000$), length of hospital stay ($p = .000$), and rates of positive CT scans ($p = .000$). The groups did not differ in blood alcohol content at ED admission. Six months after index injury, individuals with a pTBI were less likely to have returned to work ($p = .023$) and reported greater family strain ($p = .000$). Individuals with pTBI reported more post-concussion symptoms and psychiatric problems, and had slower processing speed than those with no pTBI controlling for age, education and injury severity ($p < .01$). Effect sizes for most comparisons were moderate. Conclusions The current study found associations between pTBI and pre-index injury health and psychosocial problems, and overall worse outcomes among those with pTBI at 6 months post-index injury. While these findings are consistent with the athlete literature, it is notable that pTBI sustained years before the index injury had a marked impact on recovery from mTBI. Contrary to expectations, those with pTBI had less severe index injuries. Higher levels of pre-index emotional and health problems lead to these patients being viewed as complicated and contributed to the perceived

need for CT scans despite the index TBI itself being less severe. Most individuals recover completely within days or weeks after mTBI, and the enduring symptoms experienced by 15-20% of individuals are not well explained or understood. The findings of this study suggest that prior history of TBI may be an often overlooked predictor of poor outcomes after mTBI or concussion.

1222. Dandu, K. V., et al. (2017). "A 10-Year Analysis of Head and Neck Injuries Involving Nonpowder Firearms." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery 156(5): 853-856.

Objectives Firearms have an enduring and visible presence within American culture. However, the public health impact of nonpowder firearms and other "toy" guns has not been fully studied. These guns-including BB guns (ie, ball bearing), paintball guns, and pellet guns-are typically marketed to a younger audience. The objective of this study is to analyze head and neck injuries related to nonpowder firearms. Study Design Cross-sectional analysis of a national database. Setting Academic medical center. Subjects and Methods The National Electronic Injury Surveillance System was queried for head and neck injuries involving nonpowder guns, including air, BB, and pellet guns, and associated ammunition. Analysis of age, sex, incidence, injury location, and diagnosis was performed. Results From 2005 to 2014, there were 1695 cases recorded, or 55,060 estimated emergency room visits, due to injuries related to nonpowder guns and fired ammunition. The majority of patients were male (80.9%). These injuries were most common in children 6 to 12 years of age (37.9%), followed by those 13 to 18 years old (27.1%) and adults (>=19 years old; 17.8%), while preschool children (0-5 years) represented 17.2%. The most common injury diagnosis was penetrating foreign body (34.9%), followed by lacerations (24.3%) and contusions/abrasions (13.7%). Conclusion Nonpowder and other nonlethal firearm-related injuries to the head and neck region are a frequent source of emergency room visits nationally. Safety measures and public education on a mainstream level are required.

1223. Danesh-Meyer, H. V., et al. (2001). "Gaze-evoked amaurosis produced by intraorbital buckshot pellet." Ophthalmology 108(1): 201-206.

OBJECTIVE: To report the first case of gaze-evoked amaurosis secondary to an intraocular foreign body and to highlight the characteristic clinical findings of patients with this symptom., DESIGN: Case report and review of the literature., METHODS: Case review, clinical history, electrophysiologic testing, and follow-up., MAIN OUTCOME MEASURES: Visual acuity, automated perimetry, and visual fields., RESULTS: A case of gaze-evoked amaurosis as a result of an intraorbital foreign body is described, and 19 additional cases of gaze-evoked amaurosis are reviewed from the English language literature. These cases share certain characteristics including good vision in primary position with deterioration of vision in eccentric gaze; concurrent objective pupillary abnormalities in eccentric gaze; stereotypic onset and recovery of vision; and funduscopic abnormalities consisting of disc edema and chorioretinal folds., CONCLUSIONS: Gaze-evoked amaurosis is a reliable sign of intraconal mass lesion. We report the first case of gaze-evoked amaurosis secondary to an intraorbital foreign body.

1224. D'Angelica, M., et al. (1995). "Hypopituitarism secondary to transfacial gunshot wound." The Journal of trauma 39(4): 768-771.

Hypopituitarism secondary to penetrating head trauma is extremely rare, and its diagnosis may be delayed for several years. We present a patient who developed hypopituitarism secondary to a transfacial gunshot wound and who experienced damage to the hypophysis secondary to transmission of energy and bullet fragments. The importance of a computerized tomographic scan of the head in facial gunshot wound is discussed.

1225. Daniels, J. S., et al. (2021). "Management of Maxillofacial Gunshot Injuries With Emphasis on Damage Control Surgery During the Yemen Civil War. Review of 173 Victims From a Level 1 Trauma Hospital in Najran, Kingdom of Saudi Arabia." Craniomaxillofacial Trauma and Reconstruction.

Study Design: Studies on the concept of Damage Control Surgery (DCS) in the management of firearm injuries to the oral and maxillofacial region are still scarce, hence the basis for the current study. Objectives: The objectives of the current study is to share our experience in the management of maxillofacial gunshot injuries with emphasis on DCS and early definitive surgery. Methods: This was a retrospective study of combatant Yemeni patients with maxillofacial injuries who were transferred across the border from Yemen to Najran, Kingdom of Saudi Arabia. Demographics and etiology of injuries were stored. Paths of entry and exit of the projectiles were also noted. Also recorded were types of gunshot injury and treatment protocols adopted. Data was stored and analyzed using IBM SPSS Statistics for Windows Version 25 (Armonk, NY: IBM Corp). Results: A total of 408 victims, all males, were seen during the study period with 173 (42.4%) males sustaining gunshot injuries to the maxillofacial region. Their ages ranged from 21 to 56 years with mean ± SD (27.5 ± 7.6) years. One hundred and twenty-one (70.0%) victims had extraoral bullet entry, while 53 (30.0%) victims had intraoral entry route. Ocular injuries, consisting of 25 (14.5%) cases of ruptured globe and 6 (3.5%) cases of corneal injuries, were the most commonly associated injuries. A total of 78 (45.1%) hemodynamically unstable victims had DCS as the adopted treatment protocol while early definitive surgery was carried out in 47(27.2%) hemodynamically stable victims. ORIF was the treatment modality used for the fractures in 132 (76.3%) of the victims. Conclusions: We observed that 42.4% of the war victims sustained gunshot injuries. DCS with ORIF was the main treatment protocol adopted in the management of the hemodynamically unstable patients.

1226. Danilovskii, M. A., et al. (1987). "[Role of endogenous neurohumoral factors in mechanisms of the pathogenesis and compensation of unilateral movement disorders after serial removal of the motor neocortex]." Rol' endogennykh neirogumoral'nykh faktorov v mekhanizmakh patogeneza i kompensatsii odnostoronnikh dvigatel'nykh rasstroistv posle seriinykh udalenii motornogo neokorteksa. 73(5): 602-606.

The role of neurohumoral factors in the mechanisms of restoring the lost motor functions after two successive unilateral removals of the neocortex motor region, was studied. The dynamics of the restoring correlated with the posture asymmetry factor (PAF) activity in the CSF. PAF activity was reduced during the restoring by an inactivation factor (FI). Periods of restoration after the 2nd extirpation and inactivation of PAF were shorter than after the 1st one. The existence of the FI before the 2nd extirpation may account for this phenomenon.

1227. Daradkeh, G., et al. (2014). "Nutritional status, assessment, requirements and adequacy of traumatic brain injury patients." Pakistan journal of biological sciences : PJBS 17(10): 1089-1097.

Traumatic Brain Injury (TBI) has been considered as a serious public health problem. Each year, traumatic brain injuries are contributing to a substantial number of cases of permanent disability and deaths and it can be classified according to the severity into penetrating and closed head injury. Symptoms, beside to be unconscious can be defined as vomiting, nausea, headache, dizziness, lack of motor coordination, difficulty in balancing, blurred vision and lightheadedness, bad taste in the mouth, ringing in the ears, fatigue and lethargy as well as changes in sleep patterns. The brain is known to be the functional regulator for all the metabolic activities inside the body and TBI patients mostly have a complex metabolic alterations including aberrant cellular metabolism, abnormal metabolic processes, changes in hormones functions and inflammatory cascade. The TBI patient's status needed to be assessed medically and nutritionally since the medical status of the patients can affect the nutrition part. Data from the four assessment tools are needed to be correctly used and interpreted in order to make a proper nutritional diagnosis, clinical assessment, biochemistry as well as anthropometric measurements. Regardless the methods used for assessing TBI patients, having adequate intake and medical care can

lead to a reduction in hospital costs, numbers of day hospitalized, numbers of hours of mechanical ventilation and in the overall infection rates.

1228. Darok, M. and R. Gatternig (2005). "Suspected suicide and suicide attempt with mysterious concomitant circumstances." Forensic science international 147 Suppl: S17-19.

Two cases of suicide and attempted suicide, respectively, are presented. A 15-year old boy suffering from diabetes died of hyperglycemia after continuous drinking of large amounts of sugared tea. He concealed his disease from the teachers as well as from the doctor. A 52-year old woman was found with multiple blunt force injuries and stab wounds. The suspicion of homicide attempt could be clarified, as all of the injuries were self-inflicted.

1229. Darsaut, T. E., et al. (2007). "Endovascular management of an embedded intracranial knife." The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques 34(4): 460-463.

BACKGROUND: Endovascular therapy (ET) is infrequently used in the setting of acute penetrating intracranial trauma., METHODS: We report a case where ET was used immediately prior to and following removal of an embedded intracranial knife, which was found to be disrupting the anterior cerebral artery., RESULTS: The proximal vessel was coiled and angiographically occluded and then the knife was removed with the microcatheter in place. Immediate angiography allowed us to see and quickly treat the contrast extravasation with further coiling. Despite full medical management, the patient died of elevated intracranial pressure., CONCLUSION: In this severely injured patient, endovascular therapy represented the most suitable means to attempt safe removal of the knife.

1230. Darwazeh, R., et al. (2018). "Traumatic Brain Injury Caused by Missile Wounds in the North of Palestine: A Single Institution's Experience with 520 Consecutive Civilian Patients." World neurosurgery 116: e329-e339.

BACKGROUND: Literature about traumatic brain injury caused by missile wounds is scanty. We shed some light on this field., METHODS: This retrospective study was carried out, between September 2000 and September 2010, on 520 civilian patients who sustained traumatic brain injury from missiles in the north of Palestine. Thorough detailed analyses were made of patients' admission Glasgow Coma Scale (GCS) scores, pupillary reactivity to light, site and mode of injuries, type of injurious agents, missile trajectory, method of treatment, radiologic manifestations, complications, and outcome. The GCS score was used to assess the level of consciousness, whereas the Glasgow Outcome Scale score was used to evaluate the outcome., RESULTS: Patients' age ranged from 6 months to 75 years. Only 50 (9.6%) patients were female. Patients injured by metallic bullets, rubber bullets, and shrapnel from bomb explosions numbered 351, 139, and 30, respectively. Of 384 patients who were treated conservatively, no mortality was detected, whereas of 136 surgically treated patients, 66 (48.5%) died of their injuries. Although our management of patients was not optimal because of many factors, the overall mortality was 12.7% (n = 66)., CONCLUSIONS: The promptness of transport to hospital was a decisive factor with a major bearing on decreasing mortality. Brain computed tomography was invaluable in the diagnosis and follow-up of our patients. In addition, age, pupillary reactivity, admission GCS score, missile trajectory, ventricular involvement, and site and mode of injury were important prognostic factors.

1231. Darwazeh, R., et al. (2022). "Spontaneous migration of retained intracranial missiles: experience with 16 cases." Neurosurgical review 45(3): 2417-2430.

Spontaneous migration of retained intracranial missiles is uncommon but a potentially serious phenomenon. Our objective is to increase awareness of the risk of spontaneous migration of retained

intracranial missiles by reporting our case series of 16 patients. We performed a retrospective single-center study on patients treated for intracranial missile injuries between 2000 and 2010 in Palestine with a particular focus on the migration of retained intracranial missiles. Detailed analyses were made of patients' age, sex, type of injurious agents (metallic bullets/rubber bullets/metallic shrapnel from bomb explosion), initial missile position, site to where the missile migrated, radiological and neurological manifestations, complications, treatment modalities (surgery vs. conservative) and functional outcome by Glasgow outcome scale-extended (GOSE) classification at last follow-up. In a cohort of 190 patients with retained intracranial missiles, we identified 16 (8.4%) patients with spontaneous migration. Patients' age ranged from 10 to 30 years (mean: 18.9 +/- 6.4 years). There were only 2 female patients. The missiles that migrated intracranially were metallic bullets (n = 10), rubber bullets (n = 3), and metallic shrapnel from a bomb explosion (n = 3). Among the 16 patients, 10 patients experienced symptoms due to missile migration and were treated surgically, while six patients did not develop new symptoms after missile migration and were managed conservatively. In our case series, 16/190 (8.4%) patients with retained intracranial missiles developed spontaneous migration. Neurosurgeons performing delayed surgery on patients with retained intracranial missiles should be aware of the risk of spontaneous migration and verify the location of the missile after positioning the patient for surgery.

1232. Das, D., et al. (2020). "Large organic orbitocranial foreign body." BMJ case reports 13(8).

1233. Das, J. M., et al. (2015). "Penetrating brain injury with a bike key: a case report." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES 21(6): 524-526.

Penetrating brain injury (PBI) may be caused by low-velocity or high-velocity objects. Several objects are known to cause such injury ranging from knives to rooster pecks. However, an assault with the key of a bike causing PBI has not been reported in the literature. The objective of this study was to report the case of a 21-year-old male patient, who presented after an assault with a bike key. The key was impacted in the left parietal region. Left parietal craniotomy was done and the key was removed. There was an underlying parenchymal contusion, which was excised. On post-operative day two, the patient developed motor aphasia, which subsided in subsequent days with antiedema measures. At the first month follow-up, the patient was having normal speech and consciousness. Prompt treatment of penetrating brain injury is important and angiography is not always necessary for PBI.

1234. Das, L., et al. (2000). "Spontaneous migration of an intracranial bullet across the midline." Asian Oceanian Journal of Radiology 5(1): 38-41.

Penetrating injuries of the brain may occur due to metallic foreign bodies such as bullets. Spontaneous migration of these bullets within the intracranial compartment or even to the spine is a well known phenomenon. Most of the movements described in various reports are within one hemisphere of the brain. To the best of the knowledge of the authors, no case of migration of a bullet across the midline to the opposite cerebral hemisphere of the brain has been reported in the English literature earlier. We present an extremely rare case of a spontaneous migration of a copper jacketed, intracranial bullet across the midline to the opposite cerebral hemisphere. The potential of intracranial bullets to migrate within the cranio spinal axis from a surgically accessible location to an inaccessible location and vice versa, makes serial imaging studies mandatory in all such patients.

1235. Dasgupta, S., et al. (2015). "Orbital foreign body- Study of a case series." Nepalese journal of ophthalmology : a biannual peer-reviewed academic journal of the Nepal Ophthalmic Society : NEPJOPH 7(1): 60-64.

BACKGROUND: Orbital foreign bodies (OFBs) may remain in the orbital cavity for considerable time and manifest with secondary complications., OBJECTIVE: To report five consecutive cases of orbital trauma with OFBs, who presented at our institute from Jan 2010 to Dec 2013., CASES: The first case of our series with a non-specific history of injury had a chronic granulomatous discharging sinus in the left upper eyelid and an intact globe. The second case, with an injury to the left lower eyelid following an assault, presented late and the manifestations were similar to that of the first case. The third case, of a road traffic accident, had sustained multiple facial and periocular injuries. The nature of all of three OFBs was uncertain by CT- scan, till surgical exploration. The fourth case had sustained injury to his left eye by a flying metal object. X-ray was sufficient to detect the OFB, but as scleral penetration was associated, management was complex. The fifth case had a nonspecific history of injury and the manifestation was similar to that of the first case. The surgical exploration revealed multiple OFB (wood)., CONCLUSION: The OFBs pose difficult diagnostic and therapeutic challenges. Management of such cases, at times, calls for innovation in decision making and formulation of strategies.

1236. Daszkiewicz, P., et al. (2016). "Airgun shot wound to the orbit with retention of pellet. Case report and review of the literature." Neurologia i neurochirurgia polska 50(5): 379-382.

Shot wounds become a growing clinical concern in the civilian setting, due to increasing popularity of air guns among minors. We present a pediatric case of a shot wound to the orbit with sparing of the eyeball and retention of airgun pellet in the retrobulbar space. The pellet was removed 3 months after injury via lateral orbitotomy. Pathophysiology and ballistics of shot wounds are briefly reviewed and current views on the management strategy of shot wounds with retained projectile are discussed.

1237. Datta, A., et al. (2020). "Traumatic brain injury induced amyloid plaque scintigraphy." European Journal of Nuclear Medicine and Molecular Imaging 47(SUPPL 1): S338.

Aim/Introduction: Epidemiological evidence implicates formation of diffused amyloid plaques after incident of Traumatic Brain Injury as a risk factor for developing associated neurodegenerative disorders. Early detection of these plaques consequently remains vital for better regulation of these diseases. Considering this, we developed a cost-effective, homodimeric chalcone scaffold-based SPECT radiotracer which specifically binds detrimental Aβ1-42 plaques. The bifunctional chelating agent, pentapa-en-NH2 was explored for the development of SPECT agent. We hypothesise the developed bivalent homodimeric molecule to display enhanced binding affinity and blood brain barrier penetration. Materials and Methods: The bifunctional chelator was synthesised through a series of steps in high purity and further conjugated to the chalcone derivative using bivalent approach. The molecule was conjugated to 99mTc and further used for pre-clinical studies. A repetitive mild TBI mouse model was developed and uptake of tracer was studied. Results: The molecular docking studies reported multiple binding of tracer at the recognition sites of Aβ fibrils with a significantly high binding score (-12.64) as compared to known Aβ ligands. Bischalcone derivative, 6,6'-(((2-(bis(2-(4-((E)-3-(4 (dimethylamino)phenyl)acryloyl) phenoxy)ethyl)amino)ethyl)azanediyl)bis(methylene)) dipicolinic acid, (Ch)2pa was synthesized in 95% yield with high purity. Radiolabelling was carried out with 99mTc under mild conditions with 95.4% efficiency and 103-124 MBq μmol-1 specific activity. In vitro binding assay with Aβ1-42 aggregates displayed high binding affinity of (Ch)2pa. The fluorescent data displayed absorption/emission at 410/540 nm and exhibited blue shift with 10-fold increase in emission intensity on binding with Aβ aggregates. Blood kinetics performed on normal rabbit displayed fast clearance (t1/2(F) = 32 ± 0.04 min; t1/2(S) = 3h 55min ± 0.03 min). A repetitive mild TBI mice model was established and ex vivo staining of TBI mice model brain sections with (Ch)2pa showed specific binding of complex to amyloid plaques. In vivo scintigraphy displayed two-fold increase of radioligand concentration in TBI model as compared to sham mice owing to higher amyloid burden in TBI model.

Ex vivo biodistribution analysis demonstrated high blood brain barrier penetration in TBI model mice with brain uptake of 5.24 ± 0.31% ID g-1 at 2 min p.i. and 3-fold higher than brain uptake in sham mice. Conclusion: These preliminary studies reveal the enhanced amyloid binding affinity by bivalent approach and offers a new perspective in 99mTc probes for β-amyloid imaging. The study also highlights the increased amyloid burden in traumatic brain injury cases and provides a novel approach for prognosis and ultimately better regulation of TBI induced dementia.

1238. Datta, H., et al. (2001). "An unusual case of a retained metallic arrowhead in the orbit and sphenoidal sinus." Indian journal of ophthalmology 49(3): 197-198.

A case of retained metallic arrowhead in orbit and sphenoidal sinus through an unusual route is reported. The eyeball was removed because of a possible risk of sympathetic ophthalmia.

1239. Dauch, W. A., et al. (1996). "[Post-traumatic seizure prevention--results of a survey of 127 neurosurgery clinics]." Posttraumatische Anfallsprophylaxe--Die Ergebnisse einer Umfrage unter 127 neurochirurgischen Kliniken. 57(4): 190-195.

Starting in November, 1993, until January, 1994, we performed a survey among 127 Neurosurgical Departments in Austria, Germany, and Switzerland concerning the practice of antiepileptic prophylaxis in head injured patients. Seventy seven percent of the 12-item multiple choice questionnaires were completed and returned. They indicate a variety of attitudes towards prophylaxis for seizures: in 12% of the responding institutions, antiepileptic prophylaxis is given to every brain trauma patient, in 36%, no prophylaxis is carried out. and in 52% some patients receive prophylaxis while others do not. Penetrating injuries, intracranial haemorrhages and electroencephalographic abnormalities were the most frequent reasons why prophylaxis was initiated. Phenytoin is by far the most popular drug, given usually for at least three months, and in most cases monitored by routine serum level observations. Nevertheless, about three out of four neurosurgeons conceded that a general renunciation of antiepileptic prophylaxis after brain trauma might be justified. There is no uniform way in which patients are informed about a possible risk of seizures, as it may be relevant, for instance, in respect of driving abilities.

1240. Daudfar, S., et al. (2018). "Hemiplegic Syndrome After Chopstick Penetration Injury in the Lateral Soft Palate of a Young Child." The Journal of the American Osteopathic Association 118(8): 555-559.

Soft palate penetrating injuries have been reported among children, particularly in children falling with objects in their mouth. The authors present a case of a healthy 14-month-old child who fell onto a blunt-ended chopstick, the subsequent cerebrovascular accident, and the role of the osteopathic tenets thereafter. The child had an acute infarction to the region of his right middle cerebral artery secondary to right internal carotid artery occlusion. Physicians should consider the neurologic sequelae of lateral soft palate injuries and damage to the surrounding anatomical structures. A thorough, whole-patient approach to physical examination is critical.

1241. Dave, J., et al. (2011). "Serum GFAP: A potential biomarker of mild traumatic brain injury produced by repeated exposure to low level blast overpressure." Journal of neurotrauma 28(6): A118-A119.

From the shear number of reported cases that have emerged since 2002, mild traumatic brain injury (mTBI) resulting from exposure to improvised explosive devices (IEDs) represents a major medical issue for deployed military personnel. This has created an urgent need to identify potential serum/blood biomarkers of brain injury resulting from exposure to blast overpressure (BOP), one component of IEDs, which may play a role in the long-term manifestation of cognitive and other

impairments. We have previously reported cognitive impairment after a single exposure to 75 and 120 kPa BOP and a long lasting cognitive deficit in rats given 12 exposures to 40 kPa. Since 1) our WRAIR TBI/biomarker group has demonstrated serum biomarker changes in a rodent model of penetrating brain injury that 2) have also been reported to be sensitive indicators of mTBI diagnosed in human patients, the objective of the present study was to determine if repeated, once daily exposures to 75 KPa for 3 days or 40 kPa for 3 days produced any changes in targeted serum biomarkers of brain injury. Anesthetized adult male rats exposed to BOP were assessed for serum levels of GFAP, Nestin, UCH-L1 and SBDP-145 (spectrin breakdown product) by Western blot analysis. Although the results of Nestin, UCH-L1 and SBDP-145 measurements in plasma were inconclusive, a significant increase in serum GFAP was observed that was also dependent on the severity of BOP. Further studies are under progress to determine alterations in these biomarkers in brain tissue using immunocytochemical analysis. These preliminary studies suggest that serum GFAP level may be a potential candidate biomarker of lowlevel blast overpressure-mediated mTBI.

1242. Dave, J. R., et al. (2011). "Acute neuroprotective effects of glial growth factor 2 on protein changes following penetrating ballistic-like brain injury." Journal of neurotrauma 28(6): A120-A121.

Traumatic brain injury (TBI) is a significant cause of morbidity and mortality for the civilian and military populations. To date there are no approved drug treatments for TBI. Glial growth factor 2 (GGF2; ACORDA Therapeutics) is a member of the endogenous protein family known as neuregulins. Neuregulins are required for normal development of the heart and brain and have recently demonstrated neuroprotective and neurorestorative effects in stroke injury models. Therefore, GGF2 was examined for possible acute neuroprotective effects in our model of penetrating ballistic-like brain injury (PBBI). Animals (n=6/group) were dosed via i.v. infusion at 30 min postinjury with GGF2 (100 or 500 μg/kg) or vehicle control. Changes in a-2 spectrin breakdown product-145 (SBDP-145), and ubiquitin carboxyl-terminal hydrolase L1 (UCH-L1) were examined in brain and plasma at 24 hr post injury using western blot analysis. PBBI injury caused a significant increase in both of these proteins in brain tissue and in plasma ($p<0.05$). GGF2 (both doses) significantly reduced PBBI-induced increases in UCH-L1 levels in brain tissue and (high dose only) significantly reduced SBDP-145 levels in plasma ($p<0.05$). In a separate experiment, GGF2 (both doses) significantly attenuated the PBBI-mediated up-regulation of caspase-3 activity in brain tissue. Overall, the current results indicate that a single, postinjury infusion of GGF2 provides significant protection against acute (≤24 hr) PBBI-induced protein changes. Since recent studies have suggested that GGF2 may have a stronger restorative function than a protection function, optimal dosing regiments of GGF2 should be examined during the sub-acute or chronic periods in the PBBI model.

1243. Davidson, J., et al. (2015). "Post-Traumatic Brain Injury: Genetic Susceptibility to Outcome." The Neuroscientist : a review journal bringing neurobiology, neurology and psychiatry 21(4): 424-441.

It is estimated that 2% of the population from industrialized countries live with lifelong disabilities resulting from traumatic brain injury (TBI) and roughly one in four adults are unable to return to work 1 year after injury because of physical or mental disabilities. TBI is a significant public health issue that causes substantial physical and economical repercussions for the individual and society. Electronic databases (PubMed, Web of Science, Google Scholar) were searched with the keywords traumatic brain injury, TBI, genes and TBI, TBI outcome, head injury. Human studies on non-penetrating traumatic brain injuries reported in English were included. To provide health care workers with the basic information for clinical management we summarize and compare the data on post-TBI outcome with regard to the impact of genetic variation: apolipoprotein E (APOE), brain-derived neurotrophic factor (BDNF), calcium channel, voltage dependent P/Q type, catechol-O-methyltransferase (COMT), dopamine receptor D2 and ankyrin repeat and kinase domain containing 1 (DRD2 and ANKK1), interleukin-1 (IL-1), interleukin-6 (IL-6), kidney and brain expressed protein (KIBRA), neurofilament, heavy polypeptide (NEFH), endothelial nitric oxide synthase 3 (NOS3), poly

(ADP-ribose) polymerase-1 (PARP-1), protein phosphatase 3, catalytic subunit, gamma isozyme (PPP3CC), the serotonin transporter (5-HTT) gene solute carrier family 6 member (SLC6A4) and tumor protein 53 (TP53). It is evident that contradicting results are attributable to the heterogeneity of studies, thus further researches are warranted to effectively assess a relation between genetic traits and clinical outcome following traumatic injuries. Copyright © The Author(s) 2014.

1244. Davidsson, J. and M. Risling (2015). "Characterization of pressure distribution in penetrating traumatic brain injuries." Frontiers in neurology 6(MAR).

Severe impacts to the head commonly lead to localized brain damage. Such impacts may also give rise to temporary pressure changes that produce secondary injuries in brain volumes distal to the impact site. Monitoring pressure changes in a clinical setting is difficult detailed studies into the effect of pressure changes in the brain call for the development and use of animal models. The aim of this study is to characterize the pressure distribution in an animal model of penetrating traumatic brain injuries (pTBI). This data may be used to validate mathematical models of the animal model and to facilitate correlation studies between pressure changes and pathology. Pressure changes were measured in rat brains while subjected to pTBI for a variety of different probe velocities and shapes; pointy, blunt, and flat. Experiments on ballistic gel samples were carried out to study the formation of any temporary cavities. In addition, pressure recordings from the gel experiments were compared to values recorded in the animal experiments. The pTBI generated short lasting pressure changes in the brain tissue; the pressure in the contralateral ventricle (CLV) increased to 8 bar followed by a drop to 0.4 bar when applying flat probes. The pressure changes in the periphery of the probe, in the Cisterna Magna, and the spinal canal, were significantly less than those recorded in the CLV or the vicinity of the skull base. High-speed videos of the gel samples revealed the formation of spherically shaped cavities when flat and spherical probes were applied. Pressure changes in the gel were similar to those recorded in the animals, although amplitudes were lower in the gel samples. We concluded cavity expansion rate rather than cavity size correlated with pressure changes in the gel or brain secondary to probe impact. The new data can serve as validation data for finite element models of the trauma model and the animal and to correlate physical measurements with secondary injuries.

1245. Davidsson, J. and M. Risling (2019). A Model for Research on Penetrating Traumatic Brain Injuries. 149: 47-59.

The animal model presented here produces high-speed penetrating traumatic brain injuries (pen-TBI) to simulate a form of neurotrauma that is severe and is the prevailing TBI in warzones and in areas with high incidence of violence. Commonly, these neurotraumas involve laceration of brain tissue, accompanying hemorrhage, edema, and inflammation. This also occurs in the pen-TBI model designed for rats that is presented here. During trauma, a probe, constructed in one single unit in aluminum and guided by a probe holder, is propelled by a lead bullet and penetrates at high speed into the brain parenchyma of the anesthetized animal. The animal’s head is held in position in a purposely built stereotactic frame. This frame can be adjusted in position relative the tip of the probe so that the tip of the probe is positioned on the exposed dura, using three orthogonally arranged horizontal slides. This procedure will facilitate high similarity in probe penetration location. By adjusting the air pressure in the air-driven accelerator used to accelerate the lead bullet, a large range of probe velocities can be achieved; 110 m/s probe velocity is commonly used. Several probe tip shapes are available for use in the pen-TBI model; pointy, blunt, and flat. The distance the probe penetrates the brain can be controlled. A typical distance is 5.5 mm, and this distance has been found to be almost independent of probe velocity and probe tip shape. After the probe has penetrated the animal, the pen-TBI device facilitates removal of the probe without causing additional brain damage. To do so, the animal is removed using the horizontal slider on the device that moves the animal’s head away from the probe in the direction of probe travel. The pen-TBI device is easy to operate and requires limited pre-trauma and post-trauma surgery. The device induces a small cavity, primary injury in a greater volume of the brain than the cavity and

secondary injuries in an even greater volume that is several times that of the primary injury volume. The model appears to produce identical injuries in terms of appearance and dimensions in-between animals of same sex and body mass. The device also produces substantial but short-lived intracranial brain pressure changes, some 8-bar overpressure in the contralateral ventricle has been recorded, with high repeatability.

1246. Davie, S. and D. Funk (2018). "The incidence and magnitude of cerebral desaturation in traumatic brain injury." Canadian Journal of Anesthesia 65(1): S33.

Introduction Traumatic brain injury (TBI) is a leading cause of death and disability worldwide1. The current management of TBI focuses on preventing secondary neurological injury. However, further neurological injury can continue undetected, despite the appearance of normal physiologic parameters in the ICU. Cerebral oximetry utilizes near-infrared spectroscopy to measure regional cerebral oxygen saturation (rSO2) in a non-invasive, continuous manner2. Studies have shown that episodes of cerebral ischemia can be revealed with the use of cerebral oximetry monitoring3,4. It is possible that secondary neurological injury not detected by our standard ICU monitors could be detected by cerebral oximetry. The objective of our study was to determine the incidence and severity of regional cerebral oxygen desaturation in patients with TBI. Methods This study was approved by the institutional Research Ethics Board. We conducted a single-centre prospective observational study to determine the incidence and magnitude of cerebral desaturation in patients with TBI. Adult patients admitted to the Surgical Intensive Care Unit (SICU) with a diagnosis of severe non-penetrating TBI, who were being mechanically ventilated and undergoing intracranial pressure (ICP) monitoring, were assessed for study enrollment. Cerebral oximetry data was collected continuously for up to 72 hours. Mean arterial pressure, ICP and cerebral perfusion pressure were collected at 5-minute intervals during the study period. The primary outcome was the incidence and magnitude of cerebral oxygen desaturation, defined as a rSO2 value of less than 65%. Secondary outcomes include the associated changes in other monitoring parameters. Results Data from 18 patients were analyzed for cerebral desaturation. Twelve of the 18 patients (67%) experienced a cerebral desaturation. The median nadir rSO2 was 57% [interquartile range 51-62%]. In the group of patients who desaturated, the time spent below the 65% threshold was 265 [57-1277] minutes, or 8.1% [2.6-26.0] of the recording time. In all patients, the area under threshold (AUT) of 65% for cerebral saturation was moderately correlated with the area above an ICP threshold of 20 mm Hg (Pearson r = 0.72). A linear regression analysis of AUT for rSO2 of 65% and area above an ICP threshold of 20 mmHg showed an R2= 0.52. Although patients who had a decreased rSO2 spent more time with a MAP and CPP less than 65 mm Hg, these results were not statistically significant. Discussion Our study demonstrated that cerebral desaturations occurred frequently in patients with TBI, and when they occurred, it was for a long period of time. These desaturations were moderately correlated with ICP increases.

1247. Davies, G., et al. (2003). "Prehospital thoracotomy (multiple letters)." Emergency Medicine Journal 20(4): 394-395.

1248. Davies, M. A., et al. (2014). "Pharmacokinetic and pharmacodynamic analysis of preoperative therapy with dabrafenib alone and in combination with trametinib in patients with BRAF mutation-positive melanoma with metastases to the brain (BRV116521)." Journal of Clinical Oncology 32(15).

Background: Dabrafenib (D) has clinical activity in patients (pts) with BRAF V600E/K mutation-positive melanoma brain metastases (MBM). The combination of D and trametinib (T) has increased activity in pts with BRAFV600E/K mutation-positive melanoma with extracranial metastases (ECM). It is not known whether the activity of D in MBM pts is due to blood-brain barrier penetration of the D parent compound or 1 (or more) of its active metabolites. In addition, the relationships between drug levels (parent compound and metabolites) achieved in MBM, and (1) peripheral exposure and (2)

target inhibition in plasma and ECM are unknown. Methods: This international, open-label study will enroll up to 30 evaluable pts with stage IV BRAFV600E/K metastatic melanoma with untreated, resectable MBM (1-4 cm) and accessible ECM. Pts will be treated with D 150 mg twice daily (BID) for 7-14 days (cohort A, n=15) or D 150 mg BID + T 2 mg once daily for 7-14 days (cohort B, n=15), followed by resection of intracranial lesion(s) and biopsy or resection of accessible ECM(s). Blood (mandatory) and cerebrospinal fluid (CSF; optional) will also be collected on the day of surgery. If clinically indicated, pts in both cohorts will be treated with D + T starting 72 hours postsurgery until disease progression. MBM and ECM tumor tissue will be studied for levels of D (parent and metabolites) and T; expression and activation of pharmacodynamic markers and oncogenic signaling networks (protein, mRNA); DNA mutations and methylation; and immune cell infiltrates. Plasma and CSF will be studied for pharmacokinetics (PK). Blood will also be studied for circulating immune cells and cytokines. The primary objective is to assess PK in MBM, ECM and peripheral blood. Safety and efficacy will also be evaluated. The trial is currently open for accrual in the United States and Australia.

1249. Davis, A., et al. (2009). "A comparison of two cognitive test paradigms in a military-relevant traumatic brain injury model." Journal of neurotrauma 26(8): A18.

The penetrating ballistic-like brain injury (PBBI) is a military-relevant model of traumatic brain injury (TBI) that mimics the pathopysiological changes that occur in ballistic entry wounds to the head. Although cognitive tests have often been used to ascertain TBI severity and provide useful information for drug development aimed at improving patients' learning and memory, not all tests may be appropriate for different types of TBI models. In this study, we compared the performance of PBBI animals in the novel object recognition (NOR) and Morris Water Maze (MWM) tasks. The NOR task exploits the rat's natural tendency to explore novel objects over familiar objects, while the MWM task is a spatial learning and memory test. Rats were exposed to unilateral frontal PBBI or sham surgeries. One week later cognitive abilities were assessed in both the NOR and MWM tasks. For the NOR task, the rats were allowed to explore two identical objects for 5min (familiarization phase) after a 1-h retention period; one familiar object and one novel object were then presented for another 5 min exploration period (test phase). The results suggest that sham animals exhibited a novelty preference during the test phase, resulting in a higher (better) discrimination index (DI) of 0.34 ±0.089, when compared to the PBBI group which had a DI of -0.04 ±0.18, indicating they explored the familiar and novel objects equally. However, statistical analysis revealed no significant difference between the two groups, which is likely due to the large within-group variability seen in PBBI animals. Furthermore, PBBI animals were not as motivated to explore the objects as sham animals, as seen by >3x less in the total exploration time of the objects during the familiarization phase (sham = 47.4 ± 6.32 s; PBBI = 13.8 ± 2.45 s). In the same rats, the results of MWM tests (20 trials/day; 90-s trial duration; 15-min inter-trial interval) showed that PBBI produced significant cognitive impairment that was sustained over the entire course of testing. Overall mean latency (PBBI = 66.2 ± 8.5 sham = 19.6±2.3s, $p<0.05$) and swimming distance (PBBI = 1458 ± 163 sham = 495± 64 cm, $p < 0.05$) taken to locate the hidden platform was significantly longer in injured animals than in controls. Collectively, in view of the measured effect of PBBI to significantly dampen exploration, these data suggest that the MWM test, which requires a motivational component of behaviour (i.e. escape), may be more appropriate to study cognitive deficits in the PBBI model than the NOR test, which relies heavily on the animal's spontaneous exploration to navigate its surroundings.

1250. Davis, A. R., et al. (2010). "A comparison of two cognitive test paradigms in a penetrating brain injury model." Journal of neuroscience methods 189(1): 84-87.

A rat model of penetrating ballistic-like brain injury (PBBI) was recently established to study military-relevant severe traumatic brain injury (TBI). The purpose of this study was to conduct a side-by-side evaluation of two well-established cognitive testing paradigms: the novel object recognition (NOR) task and the Morris water maze (MWM) task. Accordingly, male Sprague-Dawley rats were

subjected to PBBI and their cognitive abilities were assessed at 7 and 21 days post-PBBI. Although PBBI animals had more difficulty completing both tasks compared to sham animals, their performance on the NOR task was confounded by a high degree of within-group variability that was likely due to attention deficits produced by the injury. In contrast, PBBI produced consistent, significant spatial learning deficits in the MWM task. Overall, these results suggest that the MWM task provides a more appropriate cognitive test for the PBBI model that would be useful for testing promising neuroprotective therapeutics.

1251. Davis, C. and S. Brown (2000). "Penetrating intracranial trauma in an infant secondary to a modified baby bouncer." The New Zealand medical journal 113(1118): 406.

1252. Davis, G. A., et al. (2000). "Delayed presentation of transorbital intracranial pen." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia 7(6): 545-548.

A 13 year old Fijian boy sustained a stab wound to the left orbit 3 years ago. It was not appreciated by the treating physicians in Fiji that the plastic pen had crossed from the left orbit, through the nose, right orbit and right optic nerve, into the right middle cranial fossa and lodged in the right temporal lobe and that the pen remained in situ for the past 3 years. The boy presented to Australia with a discharge from the entry wound in his left lower eyelid. The retained foreign body was not detected on computed tomography imaging, but was detected on subsequent magnetic resonance image. A combined neurosurgery/plastic surgery craniofacial approach was undertaken with successful complete removal of the retained pen, and preservation of vision in his only seeing eye.

1253. Davis, K. L., et al. (2007). "The direct economic burden of blunt and penetrating trauma in a managed care population." The Journal of trauma 62(3): 622-630.

BACKGROUND: Although the prevalence of trauma in the United States is high, data on the economic burden of this public health problem to third-party payors is limited., METHODS: Retrospective claims from a large health plan were analyzed for 12,615 adults (age >or=18 years) hospitalized for blunt or penetrating trauma between January 1, 2003 and February 1, 2005. Per patient charges were estimated for resources utilized during a 6-month period before and after initial injury. Continuous health plan enrollment during these periods was required. Three cohorts were examined: isolated traumatic brain injury (TBI); other trauma with TBI (trauma w/TBI); and other trauma without TBI (trauma w/o TBI). Patients were also stratified by Injury Severity Score (ISS) and trauma designation of the admitting hospital., RESULTS: Initial hospitalization charges ranged from $32,627 for isolated TBI to $103,667 for trauma w/TBI. Charges for initial hospitalization were highest ($199,443) among patients with the most severe injuries. Overall, initial hospitalization charges were highest among those admitted to Level I trauma centers ($68,626); for trauma w/TBI, however, initial hospitalization charges were highest among those admitted to nontrauma centers ($130,997). Charges incurred during postdischarge medical encounters ranged from $16,361 for isolated TBI to $23,761 for trauma w/TBI. Increased charges for postdischarge encounters compared with the 6-month preinjury period ranged from $6,756 for isolated TBI to $19,771 for trauma w/TBI., CONCLUSIONS: The economic burden of blunt and penetrating trauma to third-party payors is high. Efforts to reduce the incidence of trauma may result in substantial economic savings to managed care systems.

1254. Davis, K. R., et al. (1977). "Computed tomography in head trauma." Seminars in roentgenology 12(1): 53-62.

1255. Davis, N. L., et al. (2004). "Souvenir knife: a retained transcranial knife blade." The American journal of forensic medicine and pathology 25(3): 259-261.

Upon necroscopic examination of a homeless male found comatose in the street and pronounced dead at a medical center 12 hours later, a sharp tip of a knife lodged in the right parietal region of his skull was incidentally discovered. The blade transected the diploe and penetrated the cerebral cortex. Subsequent police investigation revealed that this was the remnant of a stabbing attempt on his life several months prior to his death. The cause of death was determined to be unrelated to the metallic blade fragment, thus making it a truly incidental and rare finding of a "souvenir knife." Nevertheless, since the injury sustained in the stabbing was potentially life threatening, the investigation into that assault was reopened.A case report is presented, along with a brief review of the literature on "souvenir objects."

1256. Davis, R. E. and F. F. Telischi (1995). "Traumatic facial nerve injuries: review of diagnosis and treatment." The Journal of cranio-maxillofacial trauma 1(3): 30-41.

Both blunt and penetrating craniofacial trauma may lead to severe facial nerve injury and sequelae of facial paralysis. Initial evaluation involves quantitation of motor deficits using a clinical grading system, such as the House-Brackmann scale. High resolution computed tomography is used for localization of nerve injury in suspected cases of temporal bone trauma. In the absence of gross radiographic abnormalities, electrophysiologic testing helps predict the likelihood of spontaneous recovery. In patients with deteriorating facial nerve injuries by electroneuronography, surgical exploration is the preferred management. Primary end-to-end neurorrhaphy is the preferred management for transection injuries, while facial nerve decompression may benefit other forms of high-grade nerve trauma. Secondary facial reanimation procedures, such as cranial nerve crossovers, dynamic muscle slings or various static procedures, are useful adjuncts when initial facial nerve repair is unsuccessful or impossible. A review of facial nerve trauma management and case illustrations are presented.

1257. Davison, S. P., et al. (2008). "Vascularized calvarial bone flaps and midface reconstruction." Plastic and reconstructive surgery 122(1): 10e-18e.

LEARNING OBJECTIVES: After studying this article, the participant should be able to: 1. Identify the fascial layers of the temporalis region. 2. Understand the three-dimensional nature of the orbit and upper maxillectomy defects. 3. Understand the surgical harvest of temporalis flaps and temporoparietal flaps with vascularized bone. 4. Appreciate preoperative risk factors and postoperative complications., BACKGROUND: Although vascularized calvarial bone grafts were originally explored for use in reconstruction of midface hypoplasia defects, they offer significant value in application to oncologic reconstruction of the midface., METHODS: A review of eight cases of midface reconstruction using vascularized calvarial grafts was performed to illustrate the versatility and dependability of these flaps., RESULTS: Adequate bony and soft-tissue contours were achieved with no clinical evidence of bone graft resorption. No immediate postoperative complications including infection and hematoma or seroma formation were noted. One patient experienced a delayed sinusitis from a blocked duct., CONCLUSIONS: The use of vascularized calvarial grafts supported by temporoparietal fascia, combined deep temporal fascia, and temporalis muscle provides excellent soft-tissue coverage and adequate bone stock for reconstruction of complex defects. Maintaining vascularization of the bone graft not only resists infection but also opposes resorption associated with nonvascularized grafts, particularly those in compromised wounds.

1258. Dawood, A. W. A. (2011). "Medicolegal aspects of 3 cases of bizarre self-mutilation." The American journal of forensic medicine and pathology 32(1): 35-38.

Three cases of bizarre self-mutilation are reported because of the unusual methods used and the unexpected good sequel in one of them.

1259. Dawoud, F. M., et al. (2021). "Traumatic Cerebrovascular Injuries Associated with Gunshot Wounds to the Head: A Single-Institution Ten-Year Experience." World neurosurgery 146: e1031-e1044.

BACKGROUND: Cerebrovascular injury (CVI) is a potentially devastating complication of gunshot wounds to the head (GSWH), with yet unclear incidence and prognostic implications. Few studies have also attempted to define CVI risk factors and their role in patient outcomes. We aimed to describe 10 years of CVI from GSWH and characterize these injury patterns., METHODS: Single-institution data from 2009 to 2019 were queried to identify patients presenting with dural-penetrating GSWH. Patient records were reviewed for GSWH characteristics, CVI patterns, management, and follow-up., RESULTS: Overall, 63 of 297 patients with GSWH underwent computed tomography angiography (CTA) with 44.4% showing CVI. The middle cerebral artery (22.2%), dural venous sinuses (15.9%), and internal carotid artery (14.3%) were most frequently injured. Arterial occlusion was the most prominent injury type (22.2%) followed by sinus thrombosis (15.9%). One fifth of patients underwent delayed repeat CTA, with 20.1% showing new/previously unrecognized CVI. Bihemispheric bullet tracts were associated with CVI occurrence (P = 0.001) and mortality (P = 0.034). Dissection injuries (P = 0.013), injuries to the vertebrobasilar system (P = 0.036), or the presence of >=2 concurrent CVIs (P = 0.024) were associated with increased risk of mortality. Of patients with CVI on initial CTA, 30% died within the first 24 hours., CONCLUSIONS: CVI was found in 44.4% of patients who underwent CTA. Dissection and vertebrobasilar injuries are associated with the highest mortality. CTA should be considered in any potentially survivable GSWH. Longitudinal study with consistent CTA use is necessary to determine the true prevalence of CVI and optimize the use of imaging modalities.

1260. Dawson, M. R., et al. (2000). "NG2-expressing cells in the central nervous system: are they oligodendroglial progenitors?" Journal of neuroscience research 61(5): 471-479.

Antibodies against the chondroitin sulphate proteoglycan, NG2, are increasingly being used to identify the widespread population of oligodendrocyte progenitor cells in the adult mammalian CNS. However, the specificity of this marker and the role of NG2-expressing cells in CNS function are still open to question. In this review we consider the evidence that NG2(+) cells in the CNS are part of the oligodendrocyte lineage and whether they can give rise to new oligodendrocytes following demyelination. In both the developing and mature rodent CNS, NG2(+) cells express the established oligodendrocyte lineage marker PDGF-alphaR and from P7, the late progenitor antigen O4, which persists in immature oligodendrocytes. They do not express markers of other CNS populations, such as OX42 or GFAP, at any developmental age. NG2(+) cells represent the major cycling cell population in the normal adult rat CNS, suggesting they have stem cell-like properties. NG2 immunoreactivity is upregulated as a result of physical, viral, excitotoxic and inflammatory insults to the CNS. Following demyelination NG2(+) cell number increases in the immediate vicinity of the lesion and rapid remyelination ensues. NG2 expression has also been investigated in human tissue. Multi-process bearing cells, which morphologically resemble those identified with antibodies against O4, persist in chronically demyelinated multiple sclerosis lesions.

1261. Day, L. (2001). "How nurses shift from care of a brain-injured patient to maintenance of a brain-dead organ donor." American journal of critical care : an official publication, American Association of Critical-Care Nurses 10(5): 306-312.

BACKGROUND: The responsibility of obtaining organs for transplantation rests partly on critical care nurses. How nurses balance care of critically ill, brain-injured patients with the professional responsibility to procure organs is a question of ethical and clinical importance., OBJECTIVES: To describe the experiences of critical care nurses in making the shift from caring for a brain-injured patient

identified as a potential organ donor to maintaining a brain-dead body., METHODS: An interpretive, phenomenological design was used. In 2 trauma centers, 9 critical care nurses were interviewed, and 2 of the 9 nurses were observed., RESULTS: Identification of potential organ donors is made under conditions of prognostic ambiguity. The transition from brain injury to brain death is a period of instability in which the critical care team must decide quickly whether to resuscitate a patient in order to procure organs. After a patient is brain dead, critical care nurses' relationship with and responsibility toward the patient change., CONCLUSIONS: The process of identifying potential organ donors and holding open the tentative possibility of organ procurement illustrates the practical difficulties of early referral of potential donors to organ procurement organizations. Early referral to an organ procurement organization implies a commitment to organ procurement that some nurses may hesitate to make because such a commitment changes their relationship with a brain-injured patient.

1262. Day, T. A., et al. (1998). "Management of frontal sinus fractures with posterior table involvement: a retrospective study." The Journal of cranio-maxillofacial trauma 4(3): 6-9.

Management of frontal sinus fracture has been a matter of debate. Combined fractures of the anterior and posterior walls have been managed by various techniques, including observation, open reduction and internal fixation, ablation, obliteration, and, most recently, cranialization. The earlier techniques have met with frequent complications, including sinusitis, mucopyocele, cerebrospinal fluid leak, meningitis, and brain abscess, along with various chronic pain symptoms. Cranialization of the frontal sinus was first introduced for injuries of both walls with intracranial penetration. From 1990 to 1996, frontal sinus fractures of 11 patients (10 men and 1 woman) were treated using the cranialization procedure. Based on patient history, clinical findings, radiographic diagnoses, operative techniques, and follow-ups of these patients the authors conclude that cranialization of the frontal sinus is a safe and effective method of treating posterior table frontal sinus fractures.

1263. Daya, M. (2008). "Peroneal artery perforator chimeric flap: changing the perspective in free fibula flap use in complex oromandibular reconstruction." Journal of reconstructive microsurgery 24(6): 413-418.

The fibula osteoseptocutaneous flap has undergone multiple refinements since its first description in oromandibular reconstruction. There is now a better understanding of the blood supply to the skin of the lateral aspect of the leg. Multiple free skin paddles can be harvested freestyle from the lateral aspect of the leg. The size of the flaps that can be harvested has not been clearly defined. A case report of a complex oromandibular reconstruction following a shotgun injury to the face demonstrates a way of maximizing the skin harvest. An osteoseptocutaneous fibula flap was used for the replacement of the mandible and the internal lining of the oral cavity. A larger lateral leg flap based on a musculocutaneous perforator of the peroneal artery was used for the external and full-thickness lower-lip defect. The latter flap by definition is a peroneal artery perforator flap, which to the best of my knowledge is terminology that has not been used in the English literature. The main purpose of this article is to review the blood supply of the lateral leg and how this can be utilized to reach the goals of a complex oromandibular and total lower-lip reconstruction.

1264. de Almeida Prado, P. S., et al. (2019). "Surviving a transfixing gunshot wound to the head 70 years ago." Forensic science, medicine, and pathology 15(1): 159-163.

Surviving a gunshot wound to the head is a rare event, particularly in the past when medical treatment was much less advanced than it is today. Moreover, the finding of such a case as an identified specimen within a museum collection is even more uncommon. This led us to report on this unique case in this paper as it poses a challenge to forensic anthropology and provides a unique educational oppourtunity. The skull from the Collection at the Cranium Museum in the Department of Morphology and Genetic at the Federal University of Sao Paulo (UNIFESP) dates back to 1946. For trauma

registration the bone location, severity, trauma aetiology, trauma classification, description, callus formation, periosteal reaction, degree and success of repair, and an estimate of the time elapsed since the trauma, were all assessed. To explore the case radiologically a CT scan of the skull was performed. Considering the survival of the patient and the morphology of the wound it is likely that the injury was caused by a small calibre, low-velocity gunshot. The bullet path shows an almost vertical direction on the right side of the individual's splanchno and neurocranium. The path of the projectile is consistent with a suicide attempt, although the possibility of a homicide simulating a suicide cannot be discarded. This case highlights how informative such cases can be to the practice of forensic anthropology.

1265. de Andrade, A. F., et al. (2006). "Penetrating screwdriver injury to the brainstem. Case illustration." Journal of neurosurgery 104(5): 853.

1266. De Benedictis, A., et al. (2020). "Asymptomatic intrapetrous carotid artery stenosis after a gunshot to the head." Neurology 95(23): 1057-1058.

1267. De Burgh, H. T., et al. (2012). "Incidence of significant head injury among UK armed forces personnel." Brain injury 26(4-5): 668.

Objectives: Head injuries cause significant morbidity and are a leading cause of death and disability within the general population. Although prevalence estimates of Mild Traumatic Brain Injury (mTBI) in the UK military have been published, and shown to occur at considerably lower rates than the US, little is known about more serious head injuries occurring in theatres of operations today. Military personnel are at risk of both blunt and penetrating head trauma in the combat environment as shown by US data, which shows 30,893 moderate TBI cases, 1,891 severe TBI cases and 3,175 penetrating injuries between 2000 and 2010. Aim: To describe the incidence of head injury in UK military personnel who have served in Afghanistan and Iraq from 2003 to 2011. Method: The Joint Theatres Trauma Registry (JTTR), a Ministry of Defence resource since 2003, records data for all personnel injured in operational theatres which have triggered a trauma team response. The JTTR was interrogated to identify all personnel who had sustained a head injury, either as their main injury or an additional injury. Correlations between Injury Severity Score (ISS), Glasgow Coma Score (GCS), mechanism of injury and survival outcomes were examined. Results: Injury pattern: A total of 482 military patients with head injuries were recorded between 2003 and 2011. The majority of these (397, 82%) were British Army personnel and 84% were hostile intent injuries (405). 93% of head injuries sustained in Afghanistan were of hostile intent versus 62% of head injuries in Iraq. The highest number of head injuries was seen in 2009 (117) followed by 2007 (82) and 2010 (76).Mechanism of injury: Improvised Explosive Device related injuries were the single most common cause of injury (228 in total). Survival: The overall survival rate for all personnel with head injury was 39%. For 376 personnel, head injury was their most significant injury and 59% of these were fatalities. Factors associated with a lower survival rate include: having multiple injuries to the head (90% of those with a maximum ISS head score of 6 were fatalities); a GCS of less than 9; and having a higher number of total injuries. Overall, 23 personnel were coded on ISS as unexpected survivors (score 60-75). Conclusions: Analysis of this data highlights a small but significant number of head injuries in the UK military population sustained during active duty. Significant numbers of severely injured personnel survive potentially fatal injuries. Further examination of longer-term outcomes of these survivors is needed.

1268. De Carlis, L., et al. (2016). "Donation After Cardiac Death Liver Transplantation After More Than 20 Minutes of Circulatory Arrest and Normothermic Regional Perfusion." Transplantation 100(4): e21-22.

1269. De Carvalho Oliveira, L. C., et al. (2015). "Patient management with penetrating injury by white weapon in the face. three cases report." International Archives of Otorhinolaryngology 19: S47.

Introduction: Injuries by white weapons on the face are scarcely reported in the national literature. The highest incidence occurs in male individuals between 15 and 35 years old, with prevalence for left facial. In the initial treatment, the recognition of lesions and implementing measures are made to maintain life. Imaging studies are essential for the assessment of damages and surgical planning. Must assess the extent and depth of the injuries, injuries to important structures, need for immediate reconstruction after removal of the object and the time elapsed since the trauma. Treatment involves removal of the object and repair of injuries, trying to preserve the craniofacial function and esthetics. Objective: To present the rapid and multidisciplinary management of three cases of injury by white weapon (knife) in right hemiface, not removed in the pre-hospital, in male patients, averaging 26 years old who were admitted to the Emergency Room of the Base Hospital of Federal District. Resumed report: Patients presented with the housed object that affected: the right orbit to hypopharynx; right orbit to right cervical region, with penetration into jugular vein; and right nasal dorsum to spinal canal. With the stabilized phase, the Otolaryngology teams, Head and Neck Surgery and Ophthalmology started treatment together. Conclusion: This type of trauma can result in multiple injuries of vital structures. The rapid multidisciplinary intervention, coupled with the surgical technique minimizes the risk of complications and sequelae.

1270. de Crescenzo, C., et al. (2017). "Prehospital hypertonic fluid resuscitation for trauma patients: A systematic review and meta-analysis." The journal of trauma and acute care surgery 82(5): 956-962.

BACKGROUND: Prehospital assessment of a patient's circulation status and appropriate resuscitation with intravenous fluids plays a critical role in patients with obvious hemorrhage or systolic blood pressure below 90 mm Hg., OBJECTIVES: We assessed the efficacy and safety of prehospital administration of crystalloids or colloids to improve the survival rate of trauma patients with acceptable safety profile., DATA SOURCES: We searched SCOPUS, Embase, TRIP database, Cochrane Central Register of Controlled Trials, Ovid MEDLINE, and PubMed as per search protocol from January 1, 1900 to February 12, 2015., STUDY ELIGIBILITY CRITERIA: All randomized controlled trials were considered., PARTICIPANTS AND INTERVENTIONS: All patients had penetrating or blunt trauma, excluding traumatic brain or thermal injuries. At least one of the comparators should be a crystalloid or colloid., STUDY APPRAISAL AND SYNTHESIS METHODS: Detailed search strategy was developed and utilized. Duplicates were removed from the search results. We, the co-first authors (C.d.C. and F.G.), independently reviewed the article titles and abstracts to assess eligibility. Eligible articles were downloaded for full text review to determine inclusion in the review and analysis. We (C.d.C. and F.G.) performed a methodological quality assessment of each included article. The primary outcome was mortality. The secondary outcomes included adverse events, infections, multiple organ dysfunction score, and length of stay at the hospital. Heterogeneity was measured by I value. An I value greater than 50% was considered to be substantial heterogeneity. Fixed effect analysis and random effect analysis were performed when needed., RESULTS: A total of nine trials (3,490 patients) were included in the systematic review, and six trials were included in meta-analyses. There were no significant differences between hypertonic saline with dextran and lactated Ringer's solution in 1 day using two studies (2.91; 95% CI, 0.58-14.54; p = 0.19) and 28- to 30-day survival rates using another two studies (1.47; 95% CI, 0.30-7.18; p = 0.63). Adding dextran to hypertonic saline did not increase the survival rate (0.94; 95% CI, 0.65-1.34; p = 0.71). Overall, complications were comparable between all groups., LIMITATIONS: The quality of some of the included studies is not optimal., CONCLUSIONS AND IMPLICATIONS OF KEY FINDINGS: There is no beneficial effect of hypertonic saline with or without dextran in general traumatic patients. Further trials to evaluate its benefit in patients with penetrating trauma requiring surgery are warranted., LEVEL OF EVIDENCE: Systematic review and meta-analysis, level I.

1271. De Decker, R., et al. (2019). "Uneventful survival of a rural child after penetrating cardiac injury by a thorn: a case report." European heart journal. Case reports 3(3): ytz106.

BACKGROUND: Paediatric penetrating cardiac injury is extremely rare, precluding published management guidelines, therefore warranting a case-by-case approach with learning points gleaned from each case., CASE SUMMARY: A 7-year-old boy presented to a rural hospital with a stab wound to the chest by a Withaak (Vachellia tortilis) thorn. The patient was haemodynamically stable on presentation, but a 2 cm subcutaneous, pulsatile mass was present at the cardiac apex. Echocardiography revealed a foreign body penetrating from the apex into the heart, with evidence for a fistula between a cardiac chamber and the pulsatile mass. Angiography confirmed the existence of the fistula between the right ventricle (RV) and the pulsatile mass. A controlled extraction under general anaesthaesia via median sternotomy was performed in-theatre, with blood products and cardiac bypass on standby. The patient recovered without complications and was discharged after 4 days., DISCUSSION: Our case illustrates the limitations of echocardiography in identifying the precise anatomical definition of penetrating cardiac injuries. Angiography is therefore indicated in such cases. The injury to the RV and the haemostatic effects of the in situ thorn were favourable prognostic factors. We believe that the mortality risk reduction of extraction under full control warrants the minor morbidity of a median sternotomy.

1272. De Dominicis, K., et al. (2016). "Longitudinal changes in BAX and BCL-2 in key regions of interest following penetrating traumatic brain injury in rats." Journal of neurotrauma 33: A17.

Acute alterations of the pro- and anti- apoptotic factors BAX and Bcl-2 have been well established following severe penetrating traumatic brain injury (TBI). However, changes into the subacute period have not been well described. Here, we examine longitudinal alterations of these two apoptotic factors up to one month following penetrating ballistic-like brain injury (PBBI) in specific regions of interest. Unilateral frontal PBBI was induced by inserting a probe through the right frontal cortex (FCx) and striatum (St) followed by rapid balloon inflation to create a temporary cavity. Additional animals were exposed to probe insertion without balloon inflation or sham surgery (craniotomy only). Acute motor deficits were assessed 24 hr following injury. At 24 hr, 3d, 7d, or 1m post-injury, the ipsilateral FCx, St, hippocampus (HC), and residual midbrain (RMb) were dissected for analysis of BAX and Bcl-2 expression levels by western blot. Percent change from sham was determined for PBBI and probe only animals at each time point. PBBI resulted in significant elevations of BAX at 24 hr (FCx, St, and RMb) and at 3d and 7d (FCx and St), while probe resulted in more limited elevations in BAX at 24 hr (FCx), 3d (FCx and St), and 7d (FCx). Reduced expression of Bcl-2 was observed at 7d (FCx) in both the PBBI and probe groups. Significant correlations were detected between the expression of apoptotic factors and acute motor deficits at one week post-injury. These results indicate that expression of pro- and anti- apoptotic factors remains altered one week following severe penetrating TBI. For the most part, the observed alterations in BAX and Bcl2 expression appear to be limited to areas surrounding the injury trajectory. This work establishes a timeline against which these pathological markers can be used to evaluate the efficacy of anti-apoptotic pharmacotherapies and emphasizes the need to design drug therapy treatment regimens that extend beyond the acute post-injury phase.

1273. De Dominicis, K., et al. (2016). "Regional acute and subacute alterations in GFAP, spectrin, and breakdown products following penetrating ballistic-like TBI in rats." Journal of neurotrauma 33: A16-A17.

Acute alterations of glial fibrillary acidic protein (GFAP), GFAP breakdown products (GFAP-BDPs), spectrin, and spectrin breakdown products (SBDPs) have been well studied following TBI but their longitudinal trajectory has not been well described. Here, we assess these pathology markers out to 1 month post injury following a penetrating ballistic-like brain injury (PBBI). Unilateral frontal PBBI

was induced by inserting a probe through the right frontal cortex (FCx) and striatum (St) followed by a rapid balloon inflation to create a temporary cavity. Additional animals were exposed to probe insertion without balloon inflation or sham surgery (craniotomy only). At 3d, 7d, or 1m following injury, the ipsilateral FCx, St, hippocampus (HC), and residual midbrain (RMb) were dissected for analysis by western blot. Percent change from sham was determined at each time point. PBBI produced acute increases in GFAP at 3d (FCx, St, and HC) and 7d (FCx, St, HC and RMb) that remained evident at 1m post-injury in FCx, St and RMb. Concomitantly, GFAP-BDPs were increased in all regions at 3d and 7d and remained elevated at 1m in FCx, St, and RMb. Probe insertion also resulted in significant regional specific increases in GFAP and GFAP-BDPs that were mostly resolved by 1m post-injury. At 3d post-PBBI, spectrin decreased in the FCx whereas SBDPs increased in FCx, St, and RMb. At 7d, spectrin decreased in HC while SBDPs increased in FCx, St, and RMb. At 1m, spectrin decreased and SBDPs increased in St. Probe insertion resulted in increased SBDPs at 3d in FCx and decreased spectrin at 1m. Correlation analyses between these pathology metrics and acute neuroscore were performed and significant correlations were obtained, even one month following injury. These data demonstrate that TBI pathology remains evident into the subacute period and is not limited to the area of the injury tract. This highlights the need to consider long-term interventions when assessing TBI therapeutics.

1274. De Donno, A., et al. (2009). "Manners of killing and rituals in Apulian mafia murders." Journal of forensic sciences 54(4): 895-899.

The Apulian (South of Italy) territory saw the birth of a criminal organization called Sacra Corona Unita (SCU, United Holy Crown) which transformed the rules of traditional mafia organizations. This work examined 83 victims of the SCU between 1980 and 2000. The bodies were mainly of SCU members and in some cases, of police and law enforcement officers and other citizens caught in the crossfire. Some of these were discovered; thanks to the collaboration of "repented" SCU members who became police informers. The condition of the bodies varied in relation to the date and manner of killing. In some cases anthropometric research methods were necessary. In 73% of the cases, lesions of the head were the only marks left on the body. In conclusion, the existence of some social aspects connected with the symbolisms and membership rites that characterized the origin, evolution, and decline of the SCU is stressed.

1275. De Fazio, M., et al. (2011). "Alterations in cerebral oxidative metabolism following traumatic brain injury." Neurocritical care 14(1): 91-96.

BACKGROUND: Traumatic brain injury (TBI) generates regional alterations in cerebral metabolism, leading to the potential evolution of persistent metabolic dysfunction. In the case of penetrating, firearm-related TBI, the pathophysiological mechanisms underlying these acute-phase metabolic derangements are not entirely understood-hindering the potential effectiveness of therapeutic intervention. The use of cerebral microdialysis to monitor biochemical alterations that occur, post-TBI, provides critical insight into the events that perpetuate neurological deterioration., METHODS: Cerebral microdialysis was used to monitor alterations in the brain tissue chemistry of a 22-year-old female patient who sustained a penetrating gunshot wound to the head. Extracellular glucose, lactate, pyruvate, and lactate pyruvate ratio (LPR) were monitored over the course of the first-week post-injury., RESULTS: Analysis of the microdialysate revealed sustained elevations in LPR with peaks in excess of those seen in patients who have sustained permanent ischemic injury. This interval of persistently elevated LPR was followed by a spontaneous reduction of values, to levels below the defined threshold for metabolic crisis, over a period of several days., CONCLUSIONS: Microdialysis studies may significantly improve the understanding of the metabolic alterations that occur in patients who sustain a variety of forms of neurotrauma. Ultimately, monitoring these variations in brain tissue chemistry will improve the insight into the neuropathological mechanisms underlying penetrating traumatic brain injury, and enhance the therapeutic approach of these patients.

1276. De Figueirêdo, B., et al. (2021). "Multiple sites bullet embolism as a cause of acute abdomen." Turkish Journal of Emergency Medicine 21(3): 125-128.

Bullet embolism (BE) is a rare and misdiagnosed phenomenon that can significantly affect the cardiovascular system. It occurs when a bullet enters and migrates through the body vessels in gunshot victims. We report in this article a case of a 25-year-old male patient, victim of penetrating trauma caused by a firearm projectile that presented two embolism destinations with acute ischemic repercussions: the right brachial artery and the branches of the superior mesenteric artery. We quickly performed surgical exploration to assess the level of ischemia and resect the foreign body. To the best of the authors' knowledge, this is the only case of acute vascular abdomen due to BE in the literature. There is no standard treatment for BE, and each case should be studied according to signs and symptoms while considering the risks of the destination vessel for the victim. Imaging is necessary for early diagnosis, and the medical team must be aware of multiple and extraordinary critical ischemia presentations when bullet trajectory suggests embolism.

1277. de Freminville, H., et al. (2010). "Less-lethal hybrid ammunition wounds: a forensic assessment introducing bullet-skin-bone entity." Journal of forensic sciences 55(5): 1367-1370.

Agencies all around the world now use less-lethal weapons with homogeneous missiles such as bean bag or rubber bullets. Contusions and sometimes significant morbidity have been reported. This study focuses on wounds caused by hybrid ammunition with the pathologists' flap-by-flap procedure. Twenty-four postmortem human subjects were used, and lesions caused on frontal, temporal, sternal, and left tibial regions by a 40-mm hybrid ammunition (33 g weight) were evaluated on various distance range. The 50% risk of fractures occurred at 79.2 m/sec on the forehead, 72.9 m/sec on the temporal, 72.5 m/sec on the sternum, and 76.7 m/sec on the tibia. Skin lesions were not predictors of bone fracture. There was no correlation between soft and bone tissue observed lesions and impact velocity (correlated to distance range). Lesions observed with hybrid ammunition were the result of bullet-skin-bone entity as the interaction of the projectile on skin and bone tissues.

1278. De Fries, H. O., et al. (1971). "Reconstruction of the mandible. Use of a homograft combined with autogenous bone and marrow." Archives of otolaryngology (Chicago, Ill. : 1960) 93(4): 426-432.

1279. De Girolami, U. (2014). "Introduction and classification of small vessel disease." Brain Pathology 24: 4.

Central nervous system (CNS) small vessel disease is an arbitrary subdivision that separates those groups of disorders that affect the nervous system from injury to vessels outside the parenchyma of the brain, i.e. large extra cranial vessels that supply the nervous system and intracranial vessels within the subarachnoid space, from those that penetrate the parenchyma of the brain, i.e. typically arterioles, venules and the components of the microcirculation. This operational definition serves to distinguish major pathophysiological mechanisms of stroke and corresponding clinical syndromes that differ greatly between the two groups. Three generalizations apply to most forms of CNS small vessel disease - these are disorders that affect multiple vessels throughout the neuraxis; a broad range of abnormalities accompanies the vascular injury, be it inflammatory, or predominantly non-inflammatory; the vascular lesions are associated either with focal hemorrhage or thrombosis, with corresponding parenchymal brain injury. In some, the principal clinical manifestations are those of focal neurological deficits referable to the anatomic region involved, whereas in others, syndromes of dementia (with or without associated degenerative disease), or encephalopathies, predominate. The armamentarium of new radiological imaging methods has enhanced awareness of these important causes of neurological morbidity. Some of these affect predominantly or exclusively the CNS, whereas others are systemic vascular disorders that involve the brain and spinal cord along with other organ systems. For purposes of

classification, and conceptually, these are disorders of the “microcirculation” and small blood vessels in general. The socalled “small arteries” or arterioles include perforators with diameters from 40 to 400 μ m. Some emerge from the leptomeningeal arteries, enter the brain parenchyma from the surface of the brain, and extend within to a variable depth, some reaching the deep white matter as medullary branches. Other perforators enter the brain at the base (supplying the basal ganglia and thalamus), and yet others irrigate the brainstem arising from long and short circumferential branches. For the most part, these are end-arteries with limited collateral anastomoses until the capillary network is reached.

1280. de Groot, Y. J., et al. (2011). "Remarkable changes in the choice of timing to discuss organ donation with the relatives of a patient: a study in 228 organ donations in 20 years." Critical care (London, England) 15(5): R235.

INTRODUCTION: We studied whether the choice of timing of discussing organ donation for the first time with the relatives of a patient with catastrophic brain injury in The Netherlands has changed over time and explored its possible consequences. Second, we investigated how thorough the process of brain death determination was over time by studying the number of medical specialists involved. And we studied the possible influence of the Donor Register on the consent rate., METHODS: We performed a retrospective chart review of all effectuated brain dead organ donors between 1987 and 2009 in one Dutch university hospital with a large neurosurgical serving area., RESULTS: A total of 271 medical charts were collected, of which 228 brain dead patients were included. In the first period, organ donation was discussed for the first time after brain death determination (87%). In 13% of the cases, the issue of organ donation was raised before the first EEG. After 1998, we observed a shift in this practice. Discussing organ donation for the first time after brain death determination occurred in only 18% of the cases. In 58% of the cases, the issue of organ donation was discussed before the first EEG but after confirming the absence of all brain stem reflexes, and in 24% of the cases, the issue of organ donation was discussed after the prognosis was deemed catastrophic but before a neurologist or neurosurgeon assessed and determined the absence of all brain stem reflexes as required by the Dutch brain death determination protocol., CONCLUSIONS: The phases in the process of brain death determination and the time at which organ donation is first discussed with relatives have changed over time. Possible causes of this change are the introduction of the Donor Register, the reintroduction of donation after circulatory death and other logistical factors. It is unclear whether the observed shift contributed to the high refusal rate in The Netherlands and the increase in family refusal in our hospital in the second studied period. Taking published literature on this subject into account, it is possible that this may have a counterproductive effect.

1281. de Holanda, L. F., et al. (2016). "Neurosurgical Management of Nonmissile Penetrating Cranial Lesions." World neurosurgery 90: 420-429.

OBJECTIVE: The objective of this study is to present a case series of nonmissile penetrating (NMP) injuries and to establish a workflow for an uncommon mechanism of traumatic head injury through the analysis of each case, classification of the type of lesion, management, and outcome score at follow-up., METHODS: From January 1991 to December 2008, 36,000 patients presenting with traumatic brain injury (TBI) were admitted in the Department of Neurosurgery, Hospital Antonio Targino, Campina Grande-PB, Brazil. From these patients, 11 presenting with lesions caused by NMP objects were selected., RESULTS: Among the 11 patients, 9 were men and 2 were women. Their ages ranged from 7 to 74 years old (mean age +/- SD, 29.1 +/- 22.99 years). All patients underwent neuroradiologic evaluation. The entry point was classified as natural (orbit) or artificial (skull transfixation), and we also divided the patients presenting with secondary parenchymal or vascular damage from those presenting with only lesions caused by the primary penetration into the cranium and meninges. All patients were neurosurgically treated with removal of the foreign body through craniotomy, except the patient whose object (pen) was removed without craniotomy with local anesthesia. Glasgow Coma Scale (GCS) score on admission was a statistically significant factor on

prognosis, and any patient who presented with a GCS score of 15 evolved satisfactorily, and there were no deaths in this group of patients (P = 0.04)., CONCLUSIONS: TBIs caused by NMP objects are unusual and caused by aggression, self-inflicted harm (in the case of psychiatric patients), and accident. The foreign body may enter into the skull through a natural hole (orbit, nose, mouth, or ear) or crosses the skull, causing a fracture and creating an artificial hole. Preoperative neuroradiologic assessment is paramount for the correct neurosurgical approach. The main prognostic factor for these patients is the GCS score at admission.

1282. De Jesus Encarnacion-Ramirez, M., et al. (2022). "Surgical management of a penetrating drill bit injury to the skull base." Surgical neurology international 13.

Background: Low-energy penetrating brain injuries are rarely encountered in neurosurgical practice. Immediate surgical management remains the primary treatment strategy to control potential bleeding and prevents infectious complications. Case Description: A 28-year-old man presented with an orbital injury with left-sided chemosis, amaurosis, and ophthalmoplegia following an assault. Cranial CT revealed an industrial drill bit causing a penetrating injury to the skull base. The tip of the object reached the petrous apex. CT angiography showed no signs of cerebrovascular damage. The drill bit was visualized through a frontotemporal craniotomy. It was then carefully removed under direct microscopic vision. Postoperative ceftriaxone was administered. The patient was discharged in good condition on postoperative day 6. His vision impairment remained.Conclusion: Timely access to neuroimaging diagnostics and microneurosurgical facilities allows for good outcomes in the surgical treatment of low-velocity penetrating brain injuries.

1283. de Jongh, K., et al. (2004). ""William Tell" injury: MDCT of an arrow through the head." AJR. American journal of roentgenology 182(6): 1551-1553.

1284. de Jongh, M. A. C., et al. (2013). "Response to "Benefit of Helicopter Emergency Medical Services on trauma patient mortality in the Netherlands?"." Injury 44(2): 275-276.

1285. de Jongh, M. A. C., et al. (2012). "The effect of Helicopter Emergency Medical Services on trauma patient mortality in the Netherlands." Injury 43(9): 1362-1367.

INTRODUCTION: Object of this study was to evaluate the effect of the Helicopter Emergency Medical Services (HEMS) on trauma patient mortality and the effect of prehospital time on the association between HEMS and mortality., MATERIALS AND METHODS: Trauma patients admitted to a level 1 trauma centre and treated on-scene by the HEMS and Emergency Medical Services (EMS) between 2003 and 2008 were included (n = 186). A control group treated by EMS only (n = 186) was created by matching on ISS, age and severe traumatic brain injury (TBI). Mortality was compared by calculating odds ratios (OR) and numbers needed to treat (NNT), with adjustment for prehospital coded Revised Trauma Score. The effect of prehospital time mortality was tested by a logistic regression. Analyses were made for patients with and without TBI., RESULTS: The OR of early trauma fatality for the HEMS/EMS versus EMS-only groups was 0.8 for patients both with TBI (95% CI 0.4-1.7; NNT: 22) and without TBI (95% CI 0.2-3.3; NNT: 273). The risk of in-hospital mortality was non-significantly higher for patients with TBI in the HEMS/EMS group (OR = 1.3; 95% CI 0.6-2.7; NNT: -15) compared to the EMS-only group and non-significantly lower for patients without TBI (OR = 0.9; 95% CI 0.3-2.5; NNT: 129). After adjustment for prehospital time, the risk of early trauma fatality for patients with TBI treated by the HEMS decreased (OR = 0.6; 95% CI 0.3-1.6). The risk of in-hospital mortality for these patients decreased from 1.3 to 0.8 (95% CI 0.4-2.0). The effect of the HEMS on patients without TBI did not change after adjustment for prehospital time., DISCUSSION: HEMS treatment is associated with a non-significantly higher risk of in-hospital mortality for patients with TBI and a non-significantly

lower risk for patients without TBI. This increased risk of mortality in TBI patients is attributable to the increased prehospital time. These results indicate that HEMS does not have a positive impact on survival.

1286. de la Grandmaison, G. L., et al. (2001). "Frequency of bone lesions: an inadequate criterion for gunshot wound diagnosis in skeletal remains." Journal of forensic sciences 46(3): 593-595.

A retrospective study was carried out on 130 fatalities due to gunshot wounds to determine whether the combined absence of bone damage and projectile in a skeleton is sufficient to eliminate a diagnosis of gunshot wound. Our findings showed that bone lesions were present in about 90% of the cases and were associated with intracorporeal projectile(s) in about 70% of the cases. The presence or absence of bone lesions seemed independent of the gun characteristics, the shot conditions, and the type of death. The cause of death was predominantly brain injury in cases with bone lesions whereas thoracic, abdominal, and peripheral vascular causes were more frequently encountered in cases without bone damage. We concluded that the combined absence of bone lesions and intracorporeal projectile (about 5% in our series) cannot exclude a diagnosis of death secondary to gunshot wounds.

1287. De Mukhopadhyay, K., et al. (2011). "Unraveling the molecular signature that drives breast cancer-induced brain metastasis in a mouse xenograft model." Cancer Research 71(8).

Brain metastases are most feared complication in breast cancer (BCa). Nearly 20% of patients with advanced BCa are eventually diagnosed with brain lesions, making breast tumors the main source of metastatic brain disease in women. Presently available treatment regimens are not capable of significantly treating the BCa-induced brain metastases due to their inability to penetrate the blood brain barrier. Rodent model systems have been reported for brain metastasis in BCa but the current models for brain metastasis have limitations. As such, there is a need of an efficient model system that can significantly contribute towards our understanding of different factors from both host and tumor leading to brain metastasis. Previously we isolated and characterized B6TC cells, derived from the stable spontaneous fusion of MDA-MB-231/GFP/Neo and ZR-75-1/GFP/puro in mouse bone marrow microenvironment. The low ER-expressing B6TC has propensity to metastasize to brain in addition to lung and bone, to express CD44 and ALDH, and to form mammospheres indicating its stem cell-like features. In this study using B6TC, we have developed an efficient and novel mouse model for studying BCa-induced brain metastasis. We performed RNA microarray to identify genes whose RNA levels are significantly altered in B6TC cells by greater than 2-fold at the false discovery rate of 0.001, when compared to the parental metastatic MDA-MB-231 or non-aggressive ZR-75-1 cells. Interestingly we identified genes like MMP1, HB-EGF, ST3GAL1, PTGS2, ITGA3, and CXCR4 implicated in metastasis regulation. Then we derived a Luc-GFP transfected B6TC line and enriched it by 4 successive in vivo passages to obtain a highly aggressive B6TC/Luc-GFP cell line with 100% brain metastatic frequency. A second round of RNA microarray was performed with highly brain metastatic B6TC/Luc-GFP and parental B6TC cells to derive a core signature of up- and down-regulated genes to select unique potential brain metastatic genes by comparing two sets of microarray data. Apart from potent brain metastatic genes detected earlier, we identified ZEB2, an EMT activator, a crucial promoter for metastasis, and a modulator of TGF beta signaling pathway, which shows up-regulation over successive in-vivo passages. Further analyses are underway to establish a refined signature of BCa-induced brain metastasis in our novel model system. Our study is significant in that they suggest potential brain metastasis genes for BCa. This will not only provide valuable insight into molecular mechanism of BCa-induced brain metastasis but also lay the foundation to identify novel prognostic and therapeutic markers of brain metastases, leading ultimately to the discovery of novel molecularly targeted drugs to prevent and eradicate BCa metastasis initiation, progression and recurrence.

1288. De Mukhopadhyay, K., et al. (2012). "Determining the molecular mechanism of the breast cancer-induced brain metastasis and a role of a novel pan-TGF-β inhibitor as a potential therapy for brain metastasis in a mouse xenograft model." Cancer Research 72(24).

Breast cancer (BCa) is the most common malignant disease in women in the U.S. Nearly 20% of patients with advanced BCa are eventually diagnosed with brain lesions, which is a devastating complication in patients with BCa over-expressing EGF receptor family members including Her2 positive and triple negative breast cancer. It is the most feared complication of BCa in part because are not capable of significantly treating the BCa-induced brain metastases due to the inability of the available treatment regimens to effectively penetrate the blood brain barrier (BBB) and also due to our limited knowledge on cellular and molecular mechanisms that drive the homing to and growth in the brain of BCa cells. Therefore, there is a need of efficient model system that can significantly contribute towards our understanding of different factors from both host and tumor leading to brain metastasis. We have recently isolated a novel BCa cell line B6TC that was generated through fusion between human BCa, MDA-MB-231 and ZR-75-1 cells in mouse bone marrow. This B6TC cell line showed higher propensity to metastasize to brain than its parental cells when inoculated through intracardiac injection in female athymic nude mice. In order to generate a highly brain metastatic breast cancer model for mechanistic research, we subjected the B6TC cells through four rounds of selection for cells that were capable of trans-endothelial cell invasion to obtain cells that could invade through BBB. This in vitro selected cell line was further subjected through three rounds of in vivo selection for cells that were capable of metastasizing to the brain and the cells after third round selection was named N3LR, which has the highest potential to cause brain metastasis. In searching for genes and pathways that may contribute to the increased brain metastasis of N3-LR cell with microarray analysis, we found that the transforming growth factor-beta (TGFβ) signaling pathway is upregulated in N3-LR cell in comparison with B6TC cell, in addition to the EGF and prostaglandin signaling pathways that have been reported to be associated with brain metastatic breast cancer cells. Functional comparison also showed that N3-LR cell was more migratory than B6TC cell and more responsive to TGFβ-induced phosphorylation of Smad3 as well as migration, suggesting that TGFβ signaling may contribute to the increased brain metastatic potential. We next investigated whether metastatic tumor growth in the brain microenvironment can be inhibited by systemic administration of a potent pan-TGFβ inhibitor, BGERII- a recombinant fusion protein containing the endoglin domain of betaglycan (BGE) and the extracellular domain of RII. The animals were inoculated intracardically with N3LR, the most potent subline of highly metastatic B6TC cells, and were then treated with vehicle or BGERII systemically via i.p. injection right after the inoculation. After three weeks, the BGERII treated group showed lower brain metastasis incidence and tumor burden as detected by whole mouse bioluminescence and GFP imaging. Further analyses to understand the underlying molecular and regulatory mechanism of brain metastasis and its intervention in our mouse model is underway for the discovery of novel molecularly targeted drugs to prevent and eradicate BCa metastasis initiation, progression and recurrence.

1289. De Mukhopadhyay, K., et al. (2012). "Delineating the molecular signature of the breast cancer-induced brain metastasis and the role of a novel pan-TGF-β inhibitor to block brain metastasis in a mouse xenograft model." Cancer Research 72(8).

Breast cancer (BCa) is the most common malignant disease in women in U.S. Nearly 20% of patients with advanced BCa is eventually diagnosed with brain lesions. The available treatment regimens are not capable of significantly treating the BCa-induced brain metastases due to their inability to penetrate the blood brain barrier. The exact molecular mechanism for metastases of BCa into brain is unknown. The current rodent model systems for BCa brain metastasis have limitations. Therefore, there is a need of efficient model system that can significantly contribute towards our understanding of different factors from both host and tumor leading to brain metastasis. Previously we reported estrogen-independent B6TC cell, derived from the stable spontaneous fusion of MDA-MB-231 and ZR-75-1 cells in mouse bone-marrow microenvironment, which has propensity to metastasize to brain when inoculated through intracardiac route, and express stem cell-like features. In this study using B6TC, we have

developed an efficient and novel mouse model for studying BCa-induced brain metastasis and investigated the role of a potent pan-TGF-β inhibitor, BGERII, for blocking brain metastasis. We have generated three cell lines from B6TC through three successive rounds of inoculation in mouse and isolation of brain metastatic cells. Each round of selection enhanced the brain metastatic propensity. An initial microarray analysis identified genes implicated in metastasis regulation- MMP1, HB-EGF, ST3GAL1, PTGS2, ITGA3, and CXCR4, showing significant up-regulation in B6TC compared to its parental MDA-MB-231 and ZR-75-1 cells. Analyses of second round of RNA microarray, performed with three sub-lines of B6TC with successively enhanced brain metastatic propensity over generations, identified some molecular pathways, including TGF beta signaling pathway that are associated with enhanced brain metastasis. We next investigated whether metastatic tumor growth in the brain microenvironment can be inhibited by systemic administration of a potent pan-TGF-β inhibitor, BGERII- a recombinant fusion protein containing the endoglin domain of betaglycan (BGE) and the extracellular domain of RII. The animals were inoculated intracardically with N3LR, the most potent sub-line of highly metastatic B6TC cells and were then treated with vehicle or BGERII systemically via i.p. injection right after the inoculation. After three weeks, the BGERII treated group showed lower brain metastasis incidence and tumor burden as detected by whole mouse bioluminescence and GFP imaging. Further analyses to understand the underlying molecular and regulatory mechanism of brain metastasis and its intervention in our mouse model is underway for the discovery of novel molecularly targeted drugs to prevent and eradicate BCa metastasis initiation, progression and recurrence.

1290. De Mukhopadhyay, K. and L. Z. Sun (2013). "Delineating the molecular mechanism of the breast cancer-induced brain metastasis and a role of a novel pan-TGF-B inhibitor as a potential therapy for brain metastasis." Journal of Cell Communication and Signaling 7(1): 88-89.

Breast cancer (BCa) is the most common malignant disease in women in the U.S. Nearly 20 % of patients with advanced BCa are eventually diagnosed with brain lesions, which is a devastating complication in patients with BCa over-expressing EGF receptor family members including Her2 positive and triple negative breast cancer. It is the most feared complication of BCa in part because are not capable of significantly treating the BCa-induced brain metastases due to the inability of the available treatment regimens to effectively penetrate the blood brain barrier (BBB) and also due to our limited knowledge on cellular and molecular mechanisms that drive the homing to and growth in the brain of BCa cells. Therefore, there is a need of efficient model system that can significantly contribute towards our understanding of different factors from both host and tumor leading to brain metastasis. We have recently isolated a novel BCa cell line B6TC that was generated through fusion between human BCa, MDA-MB-231 and ZR-75-1 cells in mouse bone marrow. This B6TC cell line showed higher propensity to metastasize to brain than its parental cells when inoculated through intracardiac injection in female athymic nude mice. In order to generate a highly brain metastatic breast cancer model for mechanistic research, we subjected the B6TC cells through four rounds of selection for cells that were capable of trans-endothelial cell invasion to obtain cells that could invade through BBB. This in vitro selected cell line was further subjected through three rounds of in vivo selection for cells that were capable of metastasizing to the brain and the cells after third round selection was named N3LR, which has the highest potential to cause brain metastasis. In searching for genes and pathways that may contribute to the increased brain metastasis of N3-LR cell with microarray analysis, we found that the transforming growth factor-beta (TGFβ) signaling pathway is up-regulated in N3-LR cell in comparison with B6TC cell, in addition to the EGF and prostaglandin signaling pathways that have been reported to be associated with brain metastatic breast cancer cells. Functional comparison also showed that N3-LR cell was more migratory than B6TC cell and more responsive to TGFβ-induced phosphorylation of Smad3 as well as migration, suggesting that TGFβ signaling may contribute to the increased brain metastatic potential. We next investigated whether metastatic tumor growth in the brain microenvironment can be inhibited by systemic administration of a potent pan-TGFβ inhibitor, BGERII- a recombinant fusion protein containing the endoglin domain of betaglycan (BGE) and the extracellular domain of RII. The animals were inoculated intracardiacally with N3LR, the most potent sub-line of

highly metastatic B6TC cells, and were then treated with vehicle or BGERII systemically via i.p. injection right after the inoculation. After 3 weeks, the BGERII treated group showed lower brain metastasis incidence and tumor burden as detected by whole mouse bioluminescence and GFP imaging. Further analyses to understand the underlying molecular and regulatory mechanism of brain metastasis and its intervention in our mouse model is underway for the discovery of novel molecularly targeted drugs to prevent and eradicate BCa metastasis initiation, progression and recurrence.

1291. de Oliveira Barbosa, M. D., et al. (2012). "Treatment strategy in a child with a retained bullet in the cerebellomedullary cistern." Journal of neurosurgery. Pediatrics 10(3): 192-194.

A 6-year-old girl was admitted to our emergency room because of a gunshot wound in the posterior craniocervical junction. On admission, she was alert, but left hemiplegia and right hemiparesis were noted. Cranial CT scanning showed a retained bullet in the cerebellomedullary cistern without bone destruction. Moreover, fourth ventricle hemorrhage was observed. There were no signs of acute hydrocephalus. The patient underwent suboccipital craniectomy and C-1 laminectomy for bullet removal. Postoperatively, the patient experienced significant neurological improvement. To the best of the authors' knowledge, this is the first documented case of a patient with a retained bullet in the cerebellomedullary cistern. The management strategies in such a unique case are discussed.

1292. de Oliveira-Souza, R., et al. (2001). "Executive amnesia in a patient with pre-frontal damage due to a gunshot wound." Neurocase 7(5): 383-389.

This paper reports the case of a young patient with extensive pre-frontal damage in whom we tested the hypothesis that intensive training improves executive performance as assessed by the Wisconsin Card Sorting Test (WCST). As long as her declarative memory, complex perceptual abilities and global cognitive status were spared, we surmised that any deficit in executive learning would have occurred in relative isolation. We showed that her abnormal performance on the WCST, both on the standard as well as on the post-instruction condition, was due to an impairment of shifting attention across perceptual dimensions (extra-dimensional). In contrast, her ability to shift attention within perceptual categories (intra-dimensional) was spared, as were her declarative memory, object and visuospatial perception, oral language comprehension and praxis (ideomotor, tool use and constructional). This case supports the hypothesis that executive amnesia is a type of amnesic disorder distinct from the classic amnesic syndrome due to mamillo-temporomedial damage. As such, it is probably closely related to procedural learning and may depend on the same fronto-subcortical loops that mediate the actual execution of behaviour.

1293. De Ponte, F. S., et al. (1995). "[Bicoronal approach in the management of frontal sinus fractures]." L'approccio bicoronale nel trattamento delle fratture del seno frontale. 44(11): 507-514.

The frontal sinus is located at the level of the junction between the naso-ethmoido-orbital region, the cranial vault and the skull base and plays a particularly important role in the biomechanics of the centro-facial region. It represents a locus minoris resistentiae placed between the fronto-orbital frame, whose resistance to trauma is good, and the thin posterior fronto-ethmoidal structures. Fractures of the frontal sinus more frequently involve the anterior wall of the frontal sinus and, occasionally, also the posterior wall and the base of the sinus. Where the fracture involves the anterior sinsu wall alone, surgical reduction is indicated to correct cosmetic defects arising from an altered bone profile, either via bicoronal access or by direct attack when there are skin lesions too. If the fracture extends to the posterior wall of the sinus without causing bone displacement or dural lesion, most authors agree that only the fractures of the anterior wall should be treated to avoid obliterating the sinus cavity. When the fracture of the posterior wall is comminuted with displacement of bone fragments, there are usually dural lesions too; in this event, once dural plasty has been performed, it is necessary to cranialize the frontal sinus by demolishing its posterior wall. Fractures of the skull base, associated with a high

frequency of lesion or obstruction of the sinusal ostio and severe infective complication, require cranialization of the sinus that is also separated from the cranial cavity using a median-pedicled pericranial flap. To control the point of fracture, a rigid fixation system can be employed (microplates) or osteosynthesis with metal wires that restore the eurhythm of the frontal-orbital region and simultaneously guarantee good stability of the repositioned fragments.

1294. de Santana Santos, T., et al. (2011). "Fracture of the coronoid process, sphenoid bone, zygoma, and zygomatic arch after a firearm injury." The Journal of craniofacial surgery 22(6): e34-37.

A rare case of fracture of the coronoid process, sphenoid bone, zygoma, and zygomatic arch caused by a firearm is described. A 25-year-old man was hit in the face with a bullet, resulting in restricted mouth opening, difficulty chewing, and pain when opening the mouth. The clinical examination revealed a perforating wound in the right parotid region. A computed tomographic scan revealed a comminuted fracture of the left coronoid process with the bullet stopping in the intact left coronoid process. Treatment was bilateral coronoidectomy associated with speech therapy and was successful. Details of the clinical signs, computed tomography, treatment, and follow-up are presented.

1295. De Santis, G., et al. (1992). "[Hemimandibular reconstruction via an autologous transplant of vascularized fibula. A report of a clinical case]." Ricostruzione di un emicorpo mandibolare mediante trapianto autologo di perone vascolarizzato. Presentazione di un caso clinico. 41(1-2): 41-49.

The authors illustrate the advantage of vascularised as opposed to conventional edges in the reconstruction of the jaw, focusing in particular on the use of a fibular autologous transplant. After a rapid description of the surgical technique used to remove the graft, they report a case of mandibular reconstruction in a young patient who had been involved in a shooting accident which had led to the loss of the left of this jaw.

1296. de Silva, D. J. and G. E. Rose (2011). "Orbital blowout fractures and race." Ophthalmology 118(8): 1677-1680.

PURPOSE: To examine the type of orbital blowout fracture and its variation with race., DESIGN: Retrospective review of computed tomography (CT) scans and demography in an unselected cohort of patients with orbital blowout fractures., PARTICIPANTS: Patients with a high-resolution CT scan of adequate quality for analysis who presented with an orbital blowout fracture to the Orbital Clinic at Moorfields Eye Hospital. Patients with fractures involving the orbital rim or the cranium, or with penetrating injuries of the globe or orbit, were omitted from the study., METHODS: Demographic and ethnic information was collected for each patient, and the orbital scans were reviewed by a single observer. On the basis of coronal and axial imaging, a fracture was classified as affecting up to 4 areas: the floor lateral to the infraorbital canal (area 1, "A1"), the floor medial to the canal ("A2"), the maxillo-ethmoidal strut ("inferomedial" strut, "A3"), and the medial wall blowout fracture ("A4"); with fractures involving the inferomedial strut, it was noted whether there was displacement or rotation of the strut. Ethnic origin was classified as Caucasian, Afro-Caribbean, or Asian (Oriental or Indian)., MAIN OUTCOME MEASURES: The proportion of different walls involved in orbital blowout fractures within 3 ethnic groups., RESULTS: A total of 152 patients (125 men, 82%) had imaging adequate for analysis; 103 (68%) were Caucasian, 19 (12%) were Afro-Caribbean, and 30 (20%) were Asian. Caucasians most commonly had floor fractures (A1 or A2 in 56 orbits, 54%) compared with 10 of 103 purely medial fractures (A4, 10%); in contrast, medial fractures were the most common type in Afro-Caribbean patients (7/19 cases, 37%), and purely floor fractures occurred in only 2 cases (10%) ($P<0.005$). Asian patients had results similar to those for Caucasian patients, with isolated floor fractures being the most common (14/30 cases, 47%)., CONCLUSIONS: Most blowout fractures involve the orbital floor in Caucasian and Asians, whereas in Afro-Caribbeans the most common site for fracture is the medial wall., FINANCIAL DISCLOSURE(S): The author(s) have no proprietary or commercial interest in any

materials discussed in this article.

1297. De Silva, G. S., et al. (2014). "Lack of identifiable biologic behavior in a series of porcine mesh explants." Surgery 156(1): 183-189.

INTRODUCTION: Biologic matrices used in abdominal wall reconstruction are purported to undergo remodeling into connective tissue resembling native collagen. Key steps in that process include inflammatory response at the mesh/tissue interface, cellular penetration, and neovascularization of the matrix, followed by fibroblast proliferation and collagen deposition. We aimed to examine the concept of biologic mesh remodeling/regeneration in a series of explanted porcine biologic meshes., MATERIALS AND METHODS: A cohort of patients who underwent removal of porcine biologic mesh was identified in a prospective database. Mesh/tissue samples were analyzed using standard hematoxylin/eosin and Masson's trichrome staining. Main outcome measures included: inflammatory response at the mesh/tissue interface, foreign body reaction (FBR), cellular penetration, neovascularization, and new collagen deposition. All evaluations were performed by a blinded senior pathologist using established grading scales., RESULTS: A total of 14 cases with implant time ranging from 4 to 33 months were identified and analyzed. All meshes were placed as intraperitoneal underlay. There were 7 non-cross-linked and 7 cross-linked grafts. Cross-linked grafts were associated with mild FBR and moderate fibrous capsule formation. Similarly, non-cross-linked grafts had mild-to-moderate FBR and encapsulation. Furthermore, non-cross-linked grafts were associated with no neovascularization and minimal peripheral mesh neocellularization. Cross-linked grafts demonstrated neither neovascularization nor neocellularization. Although no grafts were associated with any quantifiable new collagen deposition within the porcine biologic matrix, minimal biodegradation/remodeling was observed at the periphery of the non-cross-linked grafts only., CONCLUSION: The biologic behavior of porcine meshes is predicated on their ability to undergo mesh remodeling with resorption and new collagen deposition. In the largest series of human biologic explants, we detected no evidence of xenograft remodeling, especially in the cross-linked group. Although underlay mesh placement and other patient factors may have contributed to our findings, the concept of porcine biologic mesh regeneration does not seem to be prevalent in the clinical setting.

1298. de Souza, A. (2020). "New-onset tic disorder following circumscribed brain injury." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia 75: 234-239.

Adult-onset tics represent either a secondary tic disorder ("tourettism") or a late presentation of childhood tics, which may have been previously unrecognised. Head trauma has been recognised as an infrequent cause of adult-onset tic disorder, which exhibits variable temporal relationship to the inciting injury and response to therapy. We present a patient who presented with late-onset tics seven years after a circumscribed brain injury, responding well to antidopaminergic treatment. A review of all the previously reported cases of post-traumatic tic disorder is provided. Our patient is unusual in that the injury presumed to be responsible for the development of tics was of a very focal nature, akin to previously described tic disorder following vascular insults. We discuss the rare occurrence of tourettism after such focal brain lesions and analyse the insights this provides into the anatomical substrates underlying tic disorders.

1299. De Souza, R. B., et al. (2013). "Pourfour du Petit syndrome caused by traumatic pseudo-aneurysm of the internal carotid artery." Journal of Pediatric Neurology 11(3): 189-191.

Pourfour du Petit syndrome, or reverse Horner syndrome, is described as an overactive sympathetic nervous system, being characterized by mydriasis, eyelid retraction, and hyperhidrosis. We described a case of Pourfour du Petit syndrome after cervical injury by gunshot, with a little review

about this rare syndrome. Angiography revealed dissection and formation of pseudo aneurysm of the left carotid artery. We believe that this lesion caused hyper-stimulation of the left cervical sympathetic chain, resulting in reverse Horner syndrome or Pourfour du Petit syndrome. There was reversal of symptoms spontaneously after 3 wk. © 2013 IOS Press and the authors.

1300. de Souza, R. B., et al. (2013). "Traumatic brain injury by a firearm projectile: a 16 years experience of the neurosurgery service of Santa Casa de Sao Paulo." Revista do Colegio Brasileiro de Cirurgioes 40(4): 300-304.

OBJECTIVE: To evaluate the epidemiology and prognostic factors associated with traumatic brain injury by a firearm projectile (FAP)., METHODS: We reviewed the medical records of 181 patients in the Department of Neurosurgery of Santa Casa de Sao Paulo (Sao Paulo Holy House) diagnosed with traumatic brain injury (TBI) resulting from FAP from January 1991 to December 2005. Were evaluated: age, sex, Glasgow Coma Scale (GCS) on admission, brain region affected by the FAP, type of injury (penetrating or tangential), type of treatment and outcome, based on GCS. The relationship between therapeutic strategy and outcome was analyzed using the Chi-square test with Yates correction. The Fisher test was used to verify the same correlation individually for each group stratified by GCS on admission., RESULTS: Of the 181 patients, 85% were male (n = 154) and 15% female (n = 27). Mean age was 31.04 years (+/- 10.98). The mostly affected brain region was the frontal lobe (27.6%), followed by temporal (24.86%) and occipital (16.57%) ones. Of the TBIs evaluated, 16% were tangential and 84%, penetrating., CONCLUSION: Patients undergoing surgical treatment had better outcome than those submitted to conservative treatment, and patients who were more severe at admission (GCS 3-8) have better results with the neurosurgical procedure.

1301. De Tommasi, A., et al. (2006). "Emergency surgery in a severe penetrating skull base injury by a screwdriver: case report and literature review." World journal of emergency surgery : WJES 1: 36.

BACKGROUND: Very few cases of severe penetrating injuries to the skull base with a seemingly innocuous object have been described in the literature. Of the cases reported, only ten involve a penetrating screwdriver. However, the choice of therapeutic management, whether it be emergency surgical or non-surgical removal of the penetrating object as well as the selected surgical approach remain quite controversial., CASE PRESENTATION: The authors describe the case of a severe penetrating skull base injury caused by a screwdriver, following an accidental fall from a ladder. The patient was admitted in Glasgow Coma Scale (GCS) 11 with a cerebrospinal fluid (CSF) leak in the right maxillary area. The tri-dimensional computerized tomography (3-D CT) scan revealed an oblique trajectory of the screwdriver shank through the skull base. The authors opted for an emergency surgical extraction of the object. A contra-lateral pterional approach was successfully performed and a two-year follow-up showed no neurological deficits., CONCLUSION: The reported case supports the choice of emergency surgical removal of the object in penetrating skull base injuries involving the anterior skull base with neurovascular lesions. Surgical aspects of the pterional approach, and in particular the left pterional approach as well as other cranio-facial approaches in severe penetrating skull base injuries are discussed.

1302. de Tribolet, W., et al. (1979). "Brain abscess after transnasal intracranial penetration of a paint-brush." Surgical neurology 11(3): 187-189.

The case of a brain abscess caused by intracranial, transnasal penetration of a paint-brush is presented. The danger that such foreign bodies may remain unnoticed, especially in children, is stressed. Cure was achieved by total resection of the abscess capsule.

1303. de Villiers, J. C. and A. R. Grant (1985). "Stab wounds at the craniocervical junction." Neurosurgery 17(6): 930-936.

Between 1976 and 1984, 11 patients with stab wounds at the craniocervical junction were seen in the Department of Neurosurgery at Groote Schuur Hospital. The injury usually occurred in males, and the left side was predominantly involved. Because of the anatomical features of this region, the penetrating instrument is deflected by the occipital squama into the atlantooccipital or atlantoaxial interspace, and an almost predictable syndrome occurs. The dura mater is penetrated, so that cerebrospinal fluid leakage and meningitis are common complications (meningitis occurred in 5 patients). A meningocele may develop at this site and did occur in 4 patients, but only 2 required surgical repair. Because of the exposed position of the vertebral artery at this level, this vessel was injured in 4 patients; an arteriovenous fistula developed in 2, vertebral artery occlusion occurred in 1, and a false aneurysm developed in another patient. The neurological deficit varied in magnitude, was often transient, affected the upper limbs more than the lower, was asymmetrical (suggestive of lateralized injury), and at times showed a remarkable tendency to recover. Awareness of the existence of this syndrome may help in forestalling complications. The only warning sign may be an insignificant wound in the suboccipital or retromastoid region.

1304. De Witte, O., et al. (1995). "[Association of traumatic cortical aneurysm of the middle cerebral artery and spontaneous aneurysm of the trifurcation of the same cerebral artery]." Association d'un anevrisme traumatique sylvien cortical et d'un anevrisme spontane de la trifurcation sylvienne sous-jacente. 41(6): 432-435.

Traumatic aneurysms constitute a very small percentage of all intracranial aneurysms. A high mortality results of a catastrophic rupture and they run an unpredictable course. Traumatic aneurysms usually involve the large basal arteries or the middle meningeal arteries. We report a case of an association of a traumatic aneurysm with a congenital aneurysm located on the same middle cerebral artery. At our knowledge, it is the first described case of the literature.

1305. Deakin, C. and G. Davies (1994). "Defining trauma patient subpopulations for field stabilization." European journal of emergency medicine : official journal of the European Society for Emergency Medicine 1(1): 31-33.

Despite several large studies, the scoop and run versus field stabilization debate in prehospital trauma care continues. It is unlikely that all trauma patients are best treated by either field stabilization or scoop and run and the most effective form of prehospital care may be dependent upon the type of injuries sustained. Studies suggest that penetrating trauma involving major vascular injury may be best treated by scoop and run since advanced life support (ALS) measures serve only to delay time to definitive surgical treatment. Conversely, patients with head injuries may benefit from rapid ALS performed on scene in order to control airway and breathing problems, and reduce intracranial pressure prior to transport. Between these two groups of patients lie those with blunt trauma in whom scoop and run may be most appropriate if there is major vascular damage or those in whom field stabilization may offer the patient a greater chance of survival if blood loss is not a life-threatening problem.

1306. DeAngelis, D. D. and J. H. Oestreicher (1999). "Traumatic enucleation from a high-pressure water jet." Archives of ophthalmology (Chicago, Ill. : 1960) 117(1): 127-128.

1307. Deb, S., et al. (2000). "Stab wounds to the head with intracranial penetration." The Journal of trauma 48(6): 1159-1162.

1308. DeBono, R., et al. (1998). "The survival of human skin stored by refrigeration at 4 degrees C in McCoy's 5A medium: does oxygenation of the medium improve storage time?" Plastic and reconstructive surgery 102(1): 78-83.

To establish the viable storage time of human skin stored by refrigeration at 4 degrees C in McCoy's 5A medium and to establish whether oxygenating the medium improves the viable storage time, the following experiment was conducted. Eighty discs of human split-thickness skin graft, each 3 mm in diameter, were stored in 40 sterile sealable containers under four different conditions: in 0.9% saline, in McCoy's 5A medium, in oxygenated McCoy's 5A medium, and in carbon dioxide supplemented McCoy's 5A medium. Skin graft viability was assessed using tissue culture. Skin stored in saline was viable for only 1 week, whereas skin stored in McCoy's 5A medium and in oxygenated McCoy's 5A medium was viable for 4 weeks. Skin stored in carbon dioxide supplemented McCoy's 5A solution did not even survive the first week. These findings show that McCoy's 5A medium allows at least 4 weeks of viable human skin storage by refrigeration at 4 degrees C. Furthermore, oxygenating the medium does not seem to improve the viable storage time, and carbon dioxide supplementation is detrimental. The advantages of skin storage by refrigeration and the implications of the above findings are discussed. A clinical case in which split-thickness skin was stored for approximately 5 weeks and still resulted in good graft take is quoted as an example of our experience with the use of McCoy's 5A medium.

1309. Debus, E. S. and R. T. Grundmann (2020). "Acute carotid part 3: artery injury." Gefasschirurgie 25(5): 356-363.

Objective: In the present overview, the aim was to comment on the evidence-based treatment of penetrating and blunt carotid injuries. Method: Literature search in PubMed for the years 2010 to 2019 under the keywords “Carotid artery [Title] AND injury [Title/Abstract]”. Results: There are only a few guideline recommendations for the treatment of penetrating carotid injuries; injuries to zone II of the artery between the angle of the mandible and the bottom of the cricoid cartilage, which are rare in Europe, are mostly treated by open surgery. On the other hand, zone I or III injuries may benefit from endovascular management. For blunt injuries, conservative treatment with anticoagulation/platelet aggregation inhibitors is the first management strategy; in grade 3 injuries endovascular treatment seems to be useful—provided it is performed in centers where there is great expertise. In an overview of the value of the endovascular treatment of traumatic internal carotid artery pseudoaneurysms, road traffic accidents (51%) and assaults (gunshots, stabs, or blasts, 12%) were the most common causes of injury. Most of the patients were treated with a covered stent graft; coils, self-expanding stents, and detachable occlusion balloons were also used. The total success rate of pseudoaneurysm occlusion was 84%. The reported peri-procedural morbidity rate was calculated to be 6%, and the reported perioperative mortality rate was 1.2%. Treatment method of choice postoperatively was platelet aggregation inhibitors (either single or dual) for at least 3 months. Iatrogenic carotid injuries are rare; they are particularly observed after endoscopic endonasal surgery. Conclusion: Preferably, despite the increasing propagation of endovascular techniques, penetrating carotid injuries should continue to be treated by open surgery. In the case of blunt injuries, on the other hand, non-operative management is the first priority.

1310. DeChamplain, R. W. (1973). "Mandibular reconstruction." Journal of oral surgery (American Dental Association : 1965) 31(6): 448-462.

1311. DeCuypere, M., et al. (2016). "Pediatric intracranial gunshot wounds: the Memphis experience." Journal of neurosurgery. Pediatrics 17(5): 595-601.

OBJECTIVE Penetrating brain injury in civilians is much less common than blunt brain injury but is more severe overall. Gunshot wounds (GSWs) cause high morbidity and mortality related to penetrating brain injury; however, there are few reports on the management and outcome of intracranial

GSWs in children. The goals of this study were to identify clinical and radiological factors predictive for death in children and to externally validate a recently proposed pediatric prognostic scale. METHODS The authors conducted a retrospective review of penetrating, isolated GSWs sustained in children whose ages ranged from birth to 18 years and who were treated at 2 major metropolitan Level 1 trauma centers from 1996 through 2013. Several standard clinical, laboratory, and radiological factors were analyzed for their ability to predict death in these patients. The authors then applied the St. Louis Scale for Pediatric Gunshot Wounds to the Head, a scoring algorithm that was designed to provide rapid prognostic information for emergency management decisions. The scale's sensitivity, specificity, and positive and negative predictability were determined, with death as the primary outcome. RESULTS Seventy-one children (57 male, 14 female) had a mean age of 14 years (range 19 months to 18 years). Overall mortality among these children was 47.9%, with 81% of survivors attaining a favorable clinical outcome (Glasgow Outcome Scale score >= 4). A number of predictors of mortality were identified (all $p < 0.05$): 1) bilateral fixed pupils; 2) deep nuclear injury; 3) transventricular projectile trajectory; 4) bihemispheric injury; 5) injury to >= 3 lobes; 6) systolic blood pressure < 100 mm Hg; 7) anemia (hematocrit < 30%); 8) Glasgow Coma Scale score <= 5; and 9) a blood base deficit < -5 mEq/L. Patient age, when converted to a categorical variable (0-9 or 10-18 years), was not predictive. Based on data from the 71 patients in this study, the positive predictive value of the St. Louis scale in predicting death (score >= 5) was 78%. CONCLUSIONS This series of pediatric cranial GSWs underscores the importance of the initial clinical exam and CT studies along with adequate resuscitation to make the appropriate management decision(s). Based on our population, the St. Louis Scale seems to be more useful as a predictor of who will survive than who will succumb to their injury.

1312. DeDominicis, K., et al. (2017). "Longitudinal profile of GFAP, alpha-ii-spectrin, and their breakdown products in rat CSF after probe insertion or penetrating TBI." Journal of neurotrauma 34(13): A19-A20.

Biofluid based biomarkers hold great potential for tracking severe TBI progression. Increased CSF levels of glial fibrillary acidic protein (GFAP), alpha-II-spectrin, and their break-down products (BDPs) have been described acutely after TBI. However, their use as subacute-chronic biomarkers is unclear. This work conducted longitudinal analyses of GFAP, alpha-II-spectrin, and their BDPs following severe TBI. Penetrating ballistic-like brain injury (PBBI) was induced by inserting a probe through the right frontal pole followed by rapid balloon inflation to create a temporary cavity. Additional rats sustained a less severe probe insertion without balloon inflation (probe) or were exposed to craniotomy alone (sham). CSF was collected 24 h, 3 d, 7 d, 1m, or 3m after injury and concentrated with centrifugal spin-filters. GFAP, alpha-II-spectrin, and BDPs were assessed by Western blot and/or ELISA. Based on western blots, alpha-II-spectrin and its BDPs were not elevated following probe injury but PBBI led to widespread elevation compared to sham. Full length protein (280kDa) was significantly elevated at 24 h and 3 d following PBBI. SBDP145-150 were robustly increased at 24 h-1 m. SBDP-120 was detected at 3 d. ELISAs indicated that GFAP levels were not significantly upregulated at 24 h or 3 d. At 7 d-3 m, GFAP was not detected in the majority of samples. To confirm these results, western blots were performed to determine if full length GFAP or its BDPs could be ascertained. These data indicate that GFAP-BDPs were significantly increased at 24 h following PBBI. In accordance with ELISA quantitation, GFAP and its BDP were not detectable in most samples collected at 7 d-3 m. However, nearly half of PBBI rats at 1m and 10% of sham rats at 3m did display the characteristic banding of GFAPBDPs. These data indicate that elevation in injury-induced biomarkers remain detectable in CSF as late as 1m following PBBI. Alpha-IIspectrin and its SBDP145-150, as opposed to GFAP, may have greater utility as acute-chronic CSF biomarkers.

1313. DeDominicis, K. E., et al. (2018). "Cerebrospinal fluid biomarkers are associated with glial fibrillary acidic protein and αII-spectrin breakdown products in brain tissues following penetrating ballistic-like brain injury in rats." Frontiers in neurology 9(JUL).

Treatments to improve outcomes following severe traumatic brain injury (TBI) are limited but may benefit from understanding subacute-chronic brain protein profiles and identifying biomarkers suitable for use in this time. Acute alterations in the well-known TBI biomarkers glial fibrillary acidic protein (GFAP), αII-spectrin, and their breakdown products (BDPs) have been well established, but little is known about the subacute-chronic post-injury profiles of these biomarkers. Thus, the current study was designed to determine the extended profile of these TBI-specific biomarkers both in brain tissue and cerebral spinal fluid (CSF). Protein abundance was evaluated in brain tissue samples taken from regions of interest and in CSF at 24 h, 3 days, 7 days, 1 month, and 3 months following severe TBI in rats. Results showed increased full length GFAP (GFAP-FL) and GFAP-BDPs starting at 24 h that remained significantly elevated in most brain regions out to 3 months post-injury. However, in CSF, neither GFAP-FL nor GFAP-BDPs were elevated as a consequence of injury. Regional-specific reduction in αII-spectrin was evident in brain tissue samples from 24 h through 3 months. In contrast, SBDP-145/150 was robustly elevated in most brain regions and in CSF from 24 h through 7 days. Correlation analyses revealed numerous significant relationships between proteins in CSF and brain tissue or neurological deficits. This work indicates that TBI results in chronic changes in brain protein levels of well-known TBI biomarkers GFAP, αII-spectrin, and their BDPs and that SBDP-145/150 may have utility as an acute-chronic biomarker.

1314. Dehghani, S., et al. (2014). "Intracranial meningioma at the site of a previous cranial penetrating trauma due to shrapnel." The Journal of craniofacial surgery 25(2): e125-127.

Meningiomas are common and mostly benign intracranial tumors, which originate from arachnoid cells of the meninges, and account for approximately 25% of all primary intracranial tumors. Many external etiological factors have been described as etiology of meningioma in the literature, one of which is head trauma. However, trauma as a cause of meningioma remains a controversial subject. Here, a case of a patient with posttraumatic meningioma, who was wounded 25 years before, is presented. The assessment of the clinical characteristics of the patient and those reported in the literature seem to confirm that, in some cases, head trauma may be a factor contributing to the development of meningioma.

1315. Dekker, A. P., et al. (2014). "An unusual transorbital penetrating injury and principles of management." Craniomaxillofacial trauma & reconstruction 7(4): 310-312.

The objective of this study was to present an unusual low velocity transorbital penetrating injury. The study design was a clinical record (case report). A 38-year-old gentleman tripped and fell face first onto the wing of an ornamental brass eagle. This penetrated the inferomedial aspect of the right orbit, breaching the lamina papyracea to extend into the ethmoid sinuses and reaching the dura of the anterior cranial fossa. The foreign body was removed in theater under a joint ophthalmology and ENT procedure. The patient was left with reduced visual acuity in the right eye but no other long-term sequelae. Transorbital penetrating injury presents unusual challenges to investigation and management requiring a multidisciplinary approach to prevent significant morbidity and mortality. If managed well the prognosis is good.

1316. Del Castillo-Calcaneo, J. D., et al. (2016). "Traumatic brain injury with a machete penetrating the dura and brain: Case report from southeast Mexico." International journal of surgery case reports 23: 169-172.

INTRODUCTION: Traumatic Brain Injury (TBI) is a major cause of death and disability in our society, we present the first case report of non-missile penetrating (NMP) cranial trauma with a machete in Mexico, and our objective by presenting this case is to prove the usefulness of recently proposed algorithms in the treatment of NMP PRESENTATION OF CASE: We present the case of a 47 year old woman who received a machete hit to the right side of her head during an assault., she arrived fully

conscious to the emergency department (ED), computed tomography was performed and based on the findings of this study and in accordance to recently proposed algorithms for managing NMP cranial trauma a craniotomy was performed, at follow-up the patient presented wtih minor neurological disability in the form of left hemiparesis., DISCUSSION: Non-missile penetrating (NMP) lesions are defined as having an impact velocity of less than 100m/s, causing injury by laceration and maceration, An algorithm for treating NMP cranial trauma has been recently published in the Journal World Neurosurgery by De Holanda et al., in this case we followed the algorithm in order to provide best care available for our patient with good results., CONCLUSION: The use of current algorithms for managing NMP cranial trauma has proved to be very useful when applied on this particular case. GCS on admission is an important prognostic factor in NMP cranial trauma.

1317. del Cerro, M. and A. A. Monjan (1979). "Unequivocal demonstration of the hematogenous origin of brain macrophages in a stab wound by a double-label technique." Neuroscience 4(9): 1399-1404.

1318. Del Rosario Munoz Ramirez, M., et al. (2011). "Clinical brain death in a patient with severe brain injury without cerebral angio graphic criteria." Critical care medicine 39: 249.

Case Reports: Brain death is defined as the irreversible cessation of all functions of the entire brain including the brain stem, and is based in a clinical assessment. In several countries a confirmatory tests are required by law. A selective four vessels angiography is the standard of confirmatory tests and may show lack of contrast opacification of the internal carotid arteries beyond the carotid siphon, and filling of the vertebral arteries but no beyond, their intracranial penetration. Case: A 35-year old woman was transferred from an outside hospital 24 hours after suffering a head gunshot wound with brain parenchyma protruding through a left parietal skull defect. On admission GSC 3, in the next 48 hours she developed brain death. Apnea testing documented an increase of PaCO2 above 60 mm Hg. She was considered a medico-legal case and candidat for organ donation. The confirmatory test was made by cerebral angiography which reported patency of the bilateral carotid arteries displaying filling of the middle cerebral artery and through the anterior cerebral artery, passage of contrast media to the contralateral carotid system. Patency of the basilar artery was observed with passage of contrast media through the posterior communicanting artery to the contralateral carotid artery. However, no cerebral parenchymogram in capillary and venous phase was observed. The organ donation process could not carry out because of legal statements of the Mexican Health Law. Conclusions: Arterial blood flow does not exclude brain death, and cerebral blood flow occurs in those conditions where the intracranial pressure is less than intravascular pressure as in decompressive crani-ectomy or like in this case by skull defects. The absence of the cerebral deep venous dranaige or parenchymogram may be consistent with brain death and the medical staff should be aware of this findings to avoid losing time for brain death declaration in case of organ transplant.

1319. Del Signore, A., et al. (2011). "Trauma induced complete sinonasal separation and subsequent frontoethmoid mucocele formation." Laryngoscope 121(SUPPL. 5): S359.

Educational Objective: At the conclusion of this presentation, the participant should be able to recognize trauma as a potential cause of sinus mucoceles and discuss the options for management. Objectives: To highlight a unique presentation and subsequent management of a frontoethmoid mucocele caused by trauma. Study Design: Case report and literature review. Methods: The patient chart, including history, physical examination, radiologic imaging, operative report and pathologic results, was reviewed. A literature search was performed; appropriate Englishlanguage papers were identified and reviewed. Results: The patient is a 40-year-old woman who suffered a gunshot wound to the nasal region 15 years prior to presentation. At that time, she was managed surgically, including enucleation of one eye. She presently developed preseptal cellulitis of the remaining eye; a CT scan

demonstrated a large frontoethmoid mucocele with complete sinonasal separation caused by scarring. Using a combined endoscopic and open approach, a drainage pathway was successfully created to the nasal cavity and a stent placed, with subsequent resolution of the infection. Although trauma is a known etiology of mucoceles, a literature review failed to find any other reported cases caused by such distinct separation of the nasal cavity and sinuses. Conclusions: This case represents a unique illustration of the pathogenesis of mucocele formation in the setting of complete separation of the frontal and ethmoid sinuses from nasal cavity. It emphasizes the importance of thorough evaluation and management of craniofacial trauma involving the paranasal sinuses. Surgical obliteration or serial imaging to monitor for mucocele formation should be performed for cases resulting in such significant derangement of the normal drainage pathways.

1320. Del Verme, J., et al. (2020). "Classification of orbitocranial wooden foreign body penetration injuries: what to do when they violate the intracranial space? A systematic review." Journal of neurosurgical sciences 64(2): 190-199.

INTRODUCTION: Orbitocranial wooden foreign body (OWF) penetrations are rare but challenging occurrences that may violate the intracranial space resulting in brain damage and hemorrhagic, as well as infectious, complications. Moreover, there is a specific subset of cases of OWF penetrations that are particularly challenging to treat. Although there are well-defined management guidelines for pure intraorbital localization, there is not yet a defined treatment protocol for foreign bodies reaching the intracranial space. However, their removal performed either directly or through craniotomy, is often easily attainable given the condition that all necessary precautions are accounted for., EVIDENCE ACQUISITION: After having treated a 48-year-old man with a transorbital OWF penetration injury at our neurosurgical department, we systematically reviewed the last 15 years of literature to define and summarize the best management strategy. Multiple databases were searched for case reports and case series involving patients with intraorbital and transorbital OWF penetration injuries. For each study, we extracted data on age, sex, imaging modality, type of wood (processed vs. unprocessed), location of periorbital and intracranial entry site, treatment type ("pull and see" or "open and see"), antibiotic therapy, and complications., EVIDENCE SYNTHESIS: We classified transorbital OWFs into two categories: transorbital with only cavernous sinus involvement and transorbital with more extensive intracranial involvement. We described what we believed was the most appropriate management conduct in each case., CONCLUSIONS: Grounded on our experience and on the review of the literature, we suggest, based on the anatomical localization of the OWF, a classification system for OWFs which is coupled with a tailored treatment strategy for each case. These suggestions are made to provide surgeons with direction on the correct management of such rare but challenging occurrences.

1321. Delank, K. W. and W. Stoll (1997). "[Swelling in the scar area after orbital margin injury]." Schwellung im Narbenbereich nach Verletzung am Orbitarand. 45(11): 936-937.

1322. Delank, K. W., et al. (1998). "[Swelling in the area of a scar after injury to the orbital wall. Occult foreign body]." Schwellung im Narbenbereich nach Verletzung am Orbitarand. Okkulter Orbitafremdkorper. 95(2): 122-123.

1323. Delannoy, Y., et al. (2013). "Typical external skull beveling wound unlinked with a gunshot." Forensic science international 226(1-3): e4-8.

Lesions of the cranial vault resulting from firearms are traditionally described in forensic medical literature with many reports illustrating atypical bone lesions carried out to the skull by gunshot wounds. The authors present this report which illustrates an external beveled skull wound, associated with internal beveling damage, caused by a stabbing injury. A partially buried human skeleton was

found in a forest. The examining of the skull revealed a hole resembling the exit wound caused by a bullet and two other smaller stab wounds. No typical entering bullet wound and no other bone lesions were found. During the course of the investigation, one of the perpetrators admitted to hitting the victim, using a sickle, and to hiding the body. For this purpose, he dragged the corpse with the sickle still implanted in the skull, using it as a hook. Upon retrieving the sickle, a piece of cranial vault was removed, thus creating an external beveled wound. In order to identify the mechanism which brought about this kind of lesion, experimental work was carried out on a human skull. In this particular case, the tip of the sickle penetrated into the bone, creating a lesion that would typically be produced with a stabbing instrument when applied with vertical force. When the body was dragged, using the sickle as a hook, this was a hand-produced vertical force, which was applied in the opposite direction. It caused the tearing of a piece of bone and the creation of an outer bevel. This atypical lesion should be made known to medical examiners and pathologists in order to help investigating and understanding of the circumstances of injuries.

1324. Delannoy, Y., et al. (2016). "The mechanism of the keyhole lesion reassessed: An experimental approach." Journal of forensic and legal medicine 37: 1-7.

The initial description of the keyhole defect was detailed as a peculiar gunshot entrance wound in the cranial vault due to firearm discharge in a tangential path. This injury may be described in two parts: a rounded section with inner table beveling and a triangular section with outer table beveling. We report a case of a gunshot skull wound "keyhole" shaped, appeared to have been made perpendicularly to the bone. Performing an experimental study on cranial bones with shots made perpendicularly to the skull approved this hypothesis, and bone injuries were then architecturally characterised using high-resolution micro computed tomography. The singular link between the tangential gunshot path and the keyhole pattern has been refuted several times, and some authors have hypothesised that there is an important role for concentric fractures that occur far away from the initial impact point of the bullet. Micro computed tomography analysis of the bone showed these keyhole defect features with a particular high description. Then, the whole pattern has a spider-web effect, and these concentric fractures could explain the keyhole pattern even in a perpendicular gunshot path.

1325. Deliverska, E. G. (2014). "Mechanism of injury- A significant com-ponent in evaluation of maxillofacialtraumatic patients status." Journal of IMAB - Annual Proceeding (Scientific Papers) 20(1): 478-483.

Knowing the injury mechanisms is of extreme importance for correct diagnostic evaluation. Specific injury models can be related to exactly determine trauma mechanisms. Understanding the way of injury may be a key to solving the occult injuries. Thus, some life threatening injuries may be diagnosed without present clinical symptoms at the moment of examination. Purpose: The aim of our study is to analyse the risk factors for arising of associated maxillofacial trauma injuries (AMFI) Material and methods: A total of 352 traumatic patients were retrospectively and prospectively examined for the period 05. 2005 - 12. 2011, treated at the Department of Oral and maxillofacial surgery at the St. Anna University Hospital, Sofia, whereas AMFI were determined in 129 patients Results: Our study results indicate that most often, RTA are a reason for a combined trauma at the age group of 20-29, followed by the age group of 30-39, and less in the age group of 40-49. The most often reasons for combined traumas are RTA(road traffic accident) and IPV(interpersonal violence), each of which has a relative share, significantly higher than the other reasons (x2, r{cyrillic}<0.001). Our study results indicate that following a RTA, the most common combined trauma is CrT - 31 patients, followed by muscular skeletal system trauma - 11, equal number of eye injuries and polytrauma - 4 patients, spinal cord trauma - 1, and more than one concomitant injury - 1. When analyzing the mutual relation between aetiology and combined trauma, the most common reasons are included (RTA and thrash) as well as combined traumas (neurosurgical, MSS trauma and eye trauma). Conclusion: Data analysis in our study

indicates that trauma mechanism is the most important factor that imposes the need of CT examination, especially in intoxicated and disorientated patients, as well as in unconscious patients.

1326. Della Sala, S. (2011). "A daguerreotype of Phineas Gage?" Cortex; a journal devoted to the study of the nervous system and behavior 47(4): 415.

1327. Dell'Aquila, A., et al. (2003). "Actual trend in firearms injures of the cranio-maxillo-facial region." IJCI - International Journal of Clinical Investigation 11(2-4): 41-44.

Firearms induce severe morfhological and structural alteration on both soft and bony tissues of the cranio-maxillo-facial region, and it's therefore essential to restore their previous functionality. This lesions must be evaluated precisely through clinical and instrumental diagnostic examinations, preferably with a three-dimensional construction C.T. scan. The appropiate managment of ballistic facial injuries is conservative in low velocity injuries, while is aggressive in high-]energy avulsive trauma. In this cases is actually preferred a initial primary repair of existing tissues, serial conservative debridment and early definitive reconstruction.

1328. DeLong, G. R. (2002). "Mid-gestation right basal ganglia lesion: clinical observations in two children." Neurology 59(1): 54-58.

OBJECTIVE: To describe the neurobehavioral syndrome in two children with destruction of the right basal ganglia ostensibly from amniocentesis needle penetration at 17 weeks of gestation., BACKGROUND: Early-life unilateral lesions of the basal ganglia are rare and the resulting syndrome not described., METHODS: Both children had repeated clinical assessments, MRI and (18)F-fluorodeoxyglucose PET scans, and psychometric and achievement testing over 10 years., RESULTS: Right basal ganglia destruction was similar and virtually coextensive in both children; optic nerve and oculomotor dysfunction were disparate. One had a right temporal pole porencephalic cyst with anomalous overlying cortex. The clinical syndrome included left hemiparesis with distal spasticity and without hypotrophy; extraocular movement disorders; severe episodic disinhibition, impulsiveness, hitting reflexively, and extreme emotional lability. Outbursts of screaming and cursing resembled "sham rage." Both had mild intellectual retardation with competent language but poor nonverbal and visual-spatial abilities, visual memory, and daily living and socialization skills., CONCLUSIONS: The shared behavioral and cognitive syndrome is most reasonably attributed to the right basal ganglia lesions, which were complete and coextensive in both, whereas other lesions were partial, milder, and disparate. Early destruction of the right basal ganglia may preclude normal development of right hemisphere functions without evidence of plasticity and appears associated with intense disinhibition and impulsiveness of aggressive attack activities and with general lability and dyscontrol of emotion.

1329. DelRosso, L. M., et al. (2014). "Sleep-wake pattern following gunshot suprachiasmatic damage." Journal of clinical sleep medicine : JCSM : official publication of the American Academy of Sleep Medicine 10(4): 443-445.

BACKGROUND: The suprachiasmatic nucleus (SCN) plays a critical role in maintaining melatonin and sleep-wake cycles., METHODS/PATIENT: We report a case of 38-year-old woman who, after gunshot wound to the right temple, developed a sleep complaint of multiple nocturnal awakenings and several naps throughout the day., RESULTS: Computerized tomography and magnetic resonance imaging revealed bilateral optic nerve and optic chiasm damage. Diagnostic polysomnography and actigraphy revealed an irregular sleep wake rhythm., CONCLUSIONS: We speculate concurrent damage of the SCN and optic nerves bilaterally resulted in the posttraumatic irregular sleep-wake rhythm.

1330. Delrue, S., et al. (2016). "Surgical Management and Hearing Outcome of Traumatic Ossicular Injuries." The journal of international advanced otology 12(3): 231-236.

OBJECTIVE: The purpose of this study was to investigate etiological, clinical, and pathological characteristics of traumatic injuries of the middle ear ossicular chain and to evaluate hearing outcome after surgery., MATERIAL AND METHODS: Thirty consecutive patients (31 ears) with traumatic ossicular injuries operated on between 2004 and 2015 in two tertiary referral otologic centers were retrospectively analyzed. Traumatic events, clinical features, ossicular lesions, treatment procedures, and audiometric results were evaluated. Air conduction (AC), bone conduction (BC), and air-bone gap (ABG) were analyzed preoperatively and postoperatively. Amsterdam Hearing Evaluation Plots (AHEPs) were used to visualize the individual hearing results., RESULTS: The mean age at the moment of trauma was 27.9+/-17.1 years (range, 2-75 years) and the mean age at surgery was 33.2+/-16.3 years (range, 5-75 years). In 10 cases (32.3%), the injury occurred by a fall on the head and in 9 (29.0%) by a traffic accident. Isolated luxation of the incus was observed in 8 cases (25.8%). Dislocation of the stapes footplate was seen in 4 cases (12.9%). The postoperative ABG closure to within 10 and 20 dB was 30% and 76.7%, respectively., CONCLUSION: Ossicular chain injury by direct or indirect trauma can provoke hearing loss, tinnitus, and vertigo. As injuries are heterogeneous, they require a tailored surgical approach. In this study, the overall hearing outcome after surgical repair was favorable.

1331. Delteil, C., et al. (2018). "Tangential cranial ballistic impact: An illustration of the limitations of post-mortem CT scan?" Legal medicine (Tokyo, Japan) 32: 61-65.

Post-mortem imaging has become more frequently used in forensic procedures, notably in a ballistic context. Despite many advances in this field, the interpretation of computed tomography (CT) can be a very complex matter. Our case illustrates the difficulties of interpretation after quasi-tangential cranial ballistic impact and keyhole wounds. These wounds are difficult to visualize on CT and are among the factors complicating the precise determination of ballistics. These sources of error remind us that CT findings must be interpreted in close comparison with autopsy findings.

1332. Demer, J. L. (2011). "Reply." Journal of AAPOS 15(5): 506-507.

1333. Demetriades, A. K. and M. C. Papadopoulos (2007). "Penetrating head injury in planned and repetitive deliberate self-harm." Mayo Clinic proceedings 82(5): 536.

44-year-old man presented to his local emergency department wearing a baseball cap and complaining of headaches that had progressively worsened over the preceding 11 weeks. After we provided generous analgesia and performed simple investigations that failed to identify a diagnosis, the patient removed his cap to reveal an assortment of metallic objects embedded in his scalp. Plain radiographs showed 11 nails penetrating into his brain. A detailed history revealed a diagnosis of paranoid schizophrenia, and the patient confirmed that he had hammered a nail into his head each week for the past 11 weeks to rid him of evil. The nails were removed with the patient under general anesthesia, and he made an uncomplicated recovery with no neurological deficits.

1334. Demetriades, A. K., et al. (2008). "Fatal cerebral ischaemia by embolization of a gunshot fragment from an extracranial penetrating injury." British journal of neurosurgery 22(2): 298.

1335. Demetriades, D., et al. (1998). "Initial evaluation and management of gunshot wounds to the face." The Journal of trauma 45(1): 39-41.

BACKGROUND: The literature on early management of gunshot wounds (GSWs) to the face is scant, with only six series reported in the English-language literature in the last 12 years. In the current study, we present a large series from a busy trauma center in an effort to identify early diagnostic and therapeutic problems and recommend management guidelines., METHODS: Retrospective analysis was done for all GSWs of the face during a 4-year period. Data were obtained from the Trauma Registry and Trauma Patient Summary hard copies., RESULTS: During the study period, there were 4,139 admissions for GSWs, with 247 (6%) involving the face. An associated brain trauma was found in 42 patients (17.0%), and cervical spine fracture was found in 20 patients (8.1%) with GSWs to the face. In 43 patients (17.4%), there was a need for emergency airway control because of local hematoma or edema. Angiography was performed in 70 patients (28.3%) for evaluation of a large hematoma or continuous bleeding, and in 10 of these patients successful embolization of bleeders was achieved. No patient required operative control of bleeding from facial structures. Overall, only 96 patients (38.9%) underwent operation for soft-tissue repair or reduction of facial bone fractures. There were 36 deaths (14.5%) from severe brain injury or severe bleeding from associated chest or abdominal injuries. No death occurred in isolated GSWs to the face., CONCLUSION: Most civilian GSWs can safely be managed nonoperatively. Airway control is required in a significant number of patients and should be established very early. Bleeding from the face is best controlled angiographically. The brain and cervical spine should be aggressively assessed radiologically because of the high incidence of associated trauma.

1336. Demetriades, D., et al. (2006). "Early prediction of mortality in isolated head injury patients: a new predictive model." The Journal of trauma 61(4): 868-872.

BACKGROUND: To construct a predictive model of survival in isolated head injury patients, on the basis of easily available parameters that are independent risk factors for survival outcome., METHODS: Trauma registry-based study of head injury patients who had no other major extracranial injuries and were not hypotensive at admission. A predictive model of probability of death was constructed using discriminant analysis, on the basis of admission Glasgow Coma Scale (GCS) score, head Abbreviated Injury Score (AIS), age, and mechanism of injury., RESULTS: The study included 7,191 patients with head trauma. The overall correct classification rate of the proposed predictive model was 94.2% as compared with 89.0% of the admission GCS score ($p < 0.05$) and 92.8% of the head AIS ($p < 0.05$). The correct classification rate of the predictive model developed for the severe head trauma (GCS score 4-8) patients was 79.9%, as compared with 72.6% using the admission GCS score alone or 75.1% ($p < 0.05$). A one-page, easy to use table summarizing the predicted mortality on the basis of GCS score, head AIS, mechanism of injury, and age was developed., CONCLUSIONS: The proposed model has a significantly better predictive power, especially in severe head trauma, than the extensively used GCS and head AIS. A simple table on the probability of death of a particular patient based on admission GCS score, head AIS, mechanism of injury and age of patient can provide instant information.

1337. Demetriades, D., et al. (2004). "Mortality prediction of head Abbreviated Injury Score and Glasgow Coma Scale: analysis of 7,764 head injuries." Journal of the American College of Surgeons 199(2): 216-222.

BACKGROUND: We assessed the prognostic value and limitations of Glasgow Coma Scale (GCS) and head Abbreviated Injury Score (AIS) and correlated head AIS with GCS., STUDY DESIGN: We studied 7,764 patients with head injuries. Bivariate analysis was performed to examine the relationship of GCS, head AIS, age, gender, and mechanism of injury with mortality. Stepwise logistic regression analysis was used to identify the independent risk factors associated with mortality., RESULTS: The overall mortality in the group of head injury patients with no other major extracranial injuries and no hypotension on admission was 9.3%. Logistic regression analysis identified head AIS, GCS, age, and mechanism of injury as significant independent risk factors of death. The prognostic value of GCS and head AIS was significantly affected by the mechanism of injury and the age of the

patient. Patients with similar GCS or head AIS but different mechanisms of injury or ages had significantly different outcomes. The adjusted odds ratio of death in penetrating trauma was 5.2 (3.9, 7.0), p < 0.0001, and in the age group > or = 55 years the adjusted odds ratio was 3.4 (2.6, 4.6), p < 0.0001. There was no correlation between head AIS and GCS (correlation coefficient -0.31)., CONCLUSIONS: Mechanism of injury and age have a major effect in the predictive value of GCS and head AIS. There is no good correlation between GCS and head AIS.

1338. Demetriades, D., et al. (2004). "Outcome and prognostic factors in head injuries with an admission Glasgow Coma Scale score of 3." Archives of surgery (Chicago, Ill. : 1960) 139(10): 1066-1068.

HYPOTHESIS: To identify significant risk factors associated with mortality in patients with a Glasgow Coma Scale score of 3., DESIGN: Trauma registry study., SETTING: Level I urban trauma center., PATIENTS: A total of 760 patients with head injury with an admission Glasgow Coma Scale score of 3. Analysis was performed in all patients and in only patients who reached the hospital alive and had no major extracranial injuries (exclusion of patients with a chest or abdominal Abbreviated Injury Score [AIS] >3)., MAIN OUTCOME MEASURES: Stepwise logistic regression analysis was used to identify independent risk factors associated with mortality., RESULTS: Blunt trauma accounted for 477 (63%) and penetrating trauma for 283 (37%) of the 760 head injuries. Penetrating trauma was significantly more likely to be associated with a lack of vital signs on admission (15% vs 9%; P = .03). Overall mortality was 76% (94% for penetrating injuries and 65% for blunt injuries; P<.001). Overall, 79% of patients had a head AIS of 4 or greater. Mortality in the subgroup was 64% (320/497) and was significantly higher in penetrating vs blunt trauma (89% vs 52%; P<.001). Penetrating trauma, high head AIS, hypotension on admission, and age older than 55 years were independent significant risk factors associated with mortality. Only 10% of the 177 survivors had good functional outcome at hospital discharge. Eighty-six patients (17% of those with vital signs on admission) became organ donors., CONCLUSIONS: Patients with head injury with an admission Glasgow Coma Scale score of 3 have a poor prognosis. Mechanism of injury, head AIS, hypotension on admission, and age play a critical role in outcome. These patients are an important source of organ donation and should be evaluated and resuscitated aggressively.

1339. Demetriades, D., et al. (2004). "Trauma fatalities: time and location of hospital deaths." Journal of the American College of Surgeons 198(1): 20-26.

BACKGROUND: Analysis of the epidemiology, temporal distribution, and place of traumatic hospital deaths can be a useful tool in identifying areas for research, education, and allocation of resources., STUDY DESIGN: Trauma registry-based study of all traumatic hospital deaths at a Level I urban trauma center during the period 1993 to 2002. The time and hospital location where deaths occurred were analyzed according to mechanism of injury, age, Glasgow Coma Score, and body areas with severe injury (Abbreviated Injury Scale [AIS] >/= 4). Logistic regression analysis was used to identify risk factors associated with death at various times after admission., RESULTS: During the study period there were 2,648 hospital trauma deaths. The most common body area with critical injuries (AIS >/= 4) was the head (43%), followed by the chest (28%) and the abdomen (19%). Overall, 37% of victims had no vital signs present on admission. Chest AIS >/= 4, penetrating trauma, and age greater than 60 years were significant risk factors associated with no vital signs on admission. Patients with severe chest trauma (AIS >/= 4) reaching the hospital alive were significantly more likely to die within the first 60 minutes than were patients with severe abdominal or head injuries (17% versus 11% versus 7%). In patients reaching the hospital alive, the time and place of death varied according to mechanism of injury and injured body area. Deaths caused by severe head trauma peaked at 6 to 24 hours, and deaths caused by severe chest or abdominal trauma peaked at 1 to 6 hours after admission., CONCLUSIONS: The temporal distribution and location of trauma deaths are influenced by the

mechanism of injury, age, and the injured body area. These findings may help in focusing research, education, and resource allocation in a more targeted manner to reduce trauma deaths.

1340. Demir, O., et al. (2012). "Transcranial injury: Case report." Turkiye Klinikleri Journal of Medical Sciences 32(5): 1496-1500.

Penetrating cranial injury is a potentially life-threatening condition. Shell and shrapnel fragments are the most common cause of high velocity penetrating head injuries. The pathophysiological consequences of penetrating head injuries depend on the kinetic energy and trajectory of the object. If the velocity of the penetrating object is high enough, the object shape and sharpness is not very important for penetrance. We reported a case of transcranial injury caused by a broken wooden shovel handle. The Glasgow Coma Scale score of the patient was 4 in the emergency department. Wooden shovel handle had entered through the right maxillary region, penetrated the brain and come out of the skull through the right parietal bone. Surgery was planned according to the radiological studies. Expeditious removal of the foreign body was carried out by craniotomy. The patient died on postoperative day 3. A number of high velocity transcranial injuries have been reported in the literature, but to the best of our knowledge, there was no report on transcranial injury with a wooden shovel handle. © 2012 by Türkiye Klinikleri.

1341. Demirbilek, H. and M. N. Ozbek (2012). "Multiple pituitary hormone deficiency due to gunshot injury in a 6-year-old girl." Hormone Research in Paediatrics 78: 307-308.

Background: Gunshot injuries of cranial area has an extremely high mortality rate. Herein we present a girl who living with a bullet on the posterior sellar region and causes multiple pituitary hormone deficiency. Case: A 6-year-old girl was admitted to our clinic with the complaint of headache, polyuria and polydypsia. Her previous history revealed that she was healthy until 5 months ago. In that date, while she was playing in the garden she was injured from her head with a foreign object. Radiological examination revealed a bullet in her skull (Figure). Thus it was thought a gunshot injury. Since the bullet was adjacent to a vital region of brain, she considered inoperable. Thereafter, she was living with a bullet in her brain. Her complaints had started after that. At the time of admission her height was 113.5 cm (25th-50th p), weight was 21 kg (50th p). Other physical findings were normal. Her 24 hour urine output was 4.5 L. Water deprivation test showed failure to concentrate urine. After a test dose nasal desmopressin (5 mcg) urine output decreased and urine osmolarity increased. She was considered central diabetes insipitus and her complaints were resolved with a maintenance dose of desmopressin. Evaluation of other pituitary hormone revealed central hypothyroidism (free T4:0.5 ng/dl(0.7-1.26) and TSH:1.1 mIU/ml). Low dose ACTH test showed normal adrenal function. Very low growth rate (0.2 cm/6 months) during follow up suggested growth hormone(GH) deficiency. Growth hormone stimulation tests for the diagnosis of GH are going on. Now except for mentioned hormonal deficiencies and a slight headache she has not suffering from her bullet in here brain. Conclusion: Present case was found interesting in here outcome of gunshot injury which causes pituitary hormone deficiency. However, although she had a life threatening injury to be alive still may be a chance for she. (Figure presented) .

1342. Demirci, S., et al. (2014). "Evaluation of shotgun suicides in Konya, Turkey between 2000 and 2007." The American journal of forensic medicine and pathology 35(1): 45-49.

The number of the suicides is increasing all around the world. In this study, the cases autopsied between 2000 and 2007 in The Konya Branch of Forensic Medicine Council were retrospectively investigated. Fifty-seven shotgun suicides were determined. The cases were evaluated in terms of their demographic characters, site of entrance wound, the type of the cartridge used, shooting distance, the place of incident, the place of death, motive for suicide, and the presence of previous suicide attempts. The most preferred site of entrance wound was the head with 34 cases (59.7%). Of 34 cases in which the

entrance wound was on the head, there was indirect mandibular fracture in 16 cases (47.1%). In 11 cases (19.3%), there observed small ecchymosed abrasions on the finger surfaces, which are thought to have resulted from the trigger kicking back during triggering or the finger having been stuck between the trigger and the trigger guard. It is concluded that there is a need for a legal regulation that makes obtaining of shotguns more difficult and the people who have them are to be educated not to keep them in easily accessible places.

1343. Demirci, S., et al. (2008). "Deaths caused by mole guns: three case reports." International journal of legal medicine 122(4): 323-325.

Possession of firearms is limited because of the technological requirements in production and strict laws. However, anyone can manufacture a handmade firearm by following simple instructions and has no legal liability. A mole gun is an unusual weapon used to kill moles in agricultural areas. It propels pellets in a similar way as a shotgun. This study presents three cases of death caused by mole guns. Two of the cases were accidental, and the other case was suicidal. The first case involved a 51-year-old man who was checking the mole gun when it fired, injuring his left eye and the left region of his face. He died in the hospital after 3 days of medical treatment. The second case was a 78-year-old man, who had been intermittently treated for depression over the last 15 years. He died instantly after placing the mole gun vertically against his head and firing it. The third case was a 43-year-old man who had been trying to set up a mole gun device in his potato field when the weapon accidentally discharged. The victim was injured seriously and died in the hospital a short time later. In conclusion, because the mole gun may cause lethal wounds in humans when fired from a short distance, the researchers believe that its production and use should be in accordance with firearms laws.

1344. Demontis, R., et al. (2019). "Case report of sudden death after a gunshot wound to the C2 vertebral bone without direct spinal cord injury: Histopathological analysis of spinal-medullary junction." Forensic science international 301: e49-e54.

Gunshot wounds (GSW) are one of the most common causes of penetrating spinal injury, however few data are available regarding GSW causing an indirect fatal nervous tissue injury, such as that induced by the concussive force secondary to the bullet penetration. This report describes a rare case of a death following a GSW spine injury at the level of C2 vertebral body, without direct contact with the spinal cord, as seen with computed tomography scan performed soon after the death. At autopsy, vertebral canal and dura mater, as well as spinal cord and medulla oblongata, appeared devoid of pathologies and/or lesions, major viscera were unaltered. The cause of death was attributed to a cardiorespiratory arrest subsequent to the GSW injury of the C2 vertebral bone. Histopathological analysis of spinal cord and medulla oblongata was performed by means of conventional stainings, and glial fibrillary acidic protein (GFAP) and Neurofilaments 200kD (NF) immunohistochemistry. Histological alterations stood out against a tissue with no other evident sign of neuropathology, and could be observed from the caudalmost part of the medulla oblongata to the level of the inferior olivary nucleus. Main structural changes were found in the white matter, involving often the adjacent gray matter, where they appeared as multiple scattered areas of degeneration, lacking the usual staining affinity, and showing a disrupted fibrillary pattern as evidenced by myelin staining, and GFAP- and NF-immunolabelling. The shock wave secondary to the impact on the C2 vertebral bone is likely to have been the cause of a widespread neuronal-axonal histopathological damage at the spinal-medullary junction and caudal medulla oblongata that is compatible with a severe fatal respiratory dysfunction and dysregulation of the autonomic pathways subserving the control of blood pressure and cardiac activity.

1345. Dempsey, L. C., et al. (1977). "Stab wounds of the brain." The Western journal of medicine 126(1): 1-4.

Unlike the penetrating injuries to the brain caused by missiles, injuries by stabbing are largely restricted to the wound tract. Early recognition, debridement and judicious antibiotic therapy can limit or prevent complications in the management of stab wounds. Among the common sequelae of stab wounds of the brain are pneumocephalus, meningitis, intracerebral hemorrhage and direct blood vessel or nerve injury.

1346. Demuren, O. A. and D. S. Mehta (1997). "Spontaneous gun pellet migration in the brain." West African journal of medicine 16(2): 117-120.

Majority of airgun injuries in the Kingdom of Saudi Arabia are accidental and involve children and adolescents. Potentially lethal penetrating injuries to the head often result from airguns. Computed tomography (CT) is the imaging modality of choice to determine the location of the pellet, and any associated brain parenchymal damage or haematoma formation. CT is also useful in demonstrating the fracture at the entry site of the pellet and any bone fragment which may be propelled into the brain. Although there have been a few case reports of spontaneous migration of metallic foreign body within the brain in the world literature, this case highlight the speed with which it can occur, even in a patient on complete bed rest.

1347. Denbsky, G. and H. Fischer (1972). "[Postmortal blood adrenalin level]." Postmortaler Adrenalin-Gehalt im Blut. 114(45): 1993-1996.

1348. Deng, D., et al. (2015). "Conventional and contrast-enhanced ultrasound assessment of craniocerebral gunshot wounds." Genetics and molecular research : GMR 14(2): 3345-3354.

This study aimed to investigate the characteristic features of craniocerebral gunshot wounds by conventional ultrasound (CUS) and evaluate the efficacy of contrast-enhanced ultrasound (CEUS) in differentiation of tissue condition in wounds. Twenty crossbreed dogs (treatment: N = 15; control: N = 5) were used in the study. Pipe-shaped hyperechoes of varying size were found by CUS in most of the treated animals. The echoic areas were distinct from the neighboring brain tissue and did not change with time. CEUS revealed that the pipe-shaped echo was unenhanced in majority of the injured brains and the surrounding tissue was either heterogeneously enhanced or unenhanced. Pathological analysis confirmed that the contrast-filling-defect area indicated necrotic tissue and the heterogeneous minimally enhanced areas indicated degenerative tissue. CUS imaging enabled detection of hematomas and CEUS indicated that the filling defect was in the center of the hematoma, with enhancement gradually increasing towards the periphery. CUS could effectively detect a wound tract, hematoma, and the craniocerebral area injured by a gunshot, while CEUS could accurately reveal necrotic tissue in the injured area and differentiate the degenerative from normal tissue.

1349. Deng, H., et al. (2018). "Pediatric firearm-related traumatic brain injury in United States trauma centers." Journal of Head Trauma Rehabilitation 33(3): E84.

Objective Pediatric firearm-related deaths are a national public health concern in the United States and a leading cause of deaths in the American youth. In particular, outcomes following gunshot wounds to the head (GSWH) remain in need of systematic characterization. Here we analyze pediatric GSWH from a population-based sample to identify predictors of prolonged hospitalization, morbidity and mortality. Methods Pediatric GSWH patients were extracted from the National Sample Program of the National Trauma Data Bank, years 2003-2012. Predictors included injury intent, firearm choice, injury site, age, Charlson Comorbidity Index (CCI), sex, race, health insurance, geographic region, trauma center level, isolated TBI, emergency department (ED) hypotension, Glasgow Coma Scale (GCS), and Injury Severity Score (ISS). Multivariable regression was performed for outcome measures including hospital length of stay (HLOS), ICU LOS, complications, mortality, and discharge disposition.

Statistical significance was assessed at $\alpha < 0.001$ to correct for multiple comparisons. Results A weighted sample of 2,847 pediatric GSWH were included. Age was 14.8±3.3 years and 59.0% were severe TBI (GCS 3-8). Assault intent (63.0%), handgun weapon (45.6%), and residential area (40.6%) were of highest incidence. Mean HLOS was 11.6±14.4 days and ICU LOS was 9.3±10.3 days for survivors at discharge. Blood pressure (BP), GCS, and ISS were significant predictors across all outcome measures. Overall mortality was 45.1%; by intent, suicides associated with worse outcomes and the highest mortality (71.5%); by firearm type, shotgun mortality was the highest (56.5%). Versus handgun, hunting rifle resulted in greater odds of complications but lower odds of death; shotgun resulted in better odds of discharge to home for survivable injuries. When compared to injury at a residential area, injury on the street/highway resulted in greater odds of death and injury at a recreational/sport site resulted in longer ICU LOS. Outcomes varied with insurance, including the private/commercially insured having lower odds of mortality versus the other insurances. Compared to the Midwest, the South had higher odds of complications and lower odds of discharge to home, the Northeast had higher odds of mortality and lower odds of discharge to home, and the West experienced shorter ICU LOS and lower odds of complications. Age was associated with the likelihood of being discharged to home; CCI and race associated with odds of mortality. Compared to level I trauma center, level II trauma center had lower odds of discharge to home. Conclusions Hypotension, injury severity, injury intent, and firearm type are important prognostic variables in pediatric firearm-related TBI. Demographics, level of trauma center and geographic region also associated with outcomes. Improved understanding of pediatric GSWH is critical to promoting increased awareness of firearm injuries as a public health concern, and reducing its debilitating injury burden to patients, families, and healthcare systems.

1350. Deng, H., et al. (2019). "Adult Firearm-Related Traumatic Brain Injury in United States Trauma Centers." Journal of neurotrauma 36(2): 322-337.

Civilian firearm injury is an important public health concern in the United States. Gunshot wounds to the head (GSWH) remain in need of update and systematic characterization. We identify predictors of prolonged hospital length of stay (HLOS), intensive care unit length of stay (ICU LOS), medical complications, mortality, and discharge disposition from a population-based sample using the National Sample Program (NSP) of the National Trauma Data Bank (NTDB), years 2003-2012. Statistical significance was assessed at alpha < 0.001 to correct for multiple comparisons. In total, 8148 adult GSWH patients were included extrapolating to 32,439 national incidents. Age was 36.6 +/- 16.4 years and 64.4% were severe traumatic brain injury (TBI; Glasgow Coma Scale [GCS] score 3-8). Assault (49.2%), handgun (50.3%), and residential injury (43.2%) were of highest incidence. HLOS and ICU LOS were 7.7 +/- 14.2 and 5.7 +/- 13.4 days, respectively. Overall mortality was 54.6%; suicide/self-injury was associated with the highest mortality rate (71.6%). GCS, Injury Severity Score, and hypotension were significant predictors for outcomes overall. Medicare/Medicaid patients had longer HLOS compared to private/commercial insured (mean increase, 4.4 days; 95% confidence interval [2.6-6.3]). Compared to the Midwest, the South had longer HLOS (mean increase, 3.7 days; [2.0-5.4]) and higher odds of complications (odds ratio [OR], 1.7 [1.4-2.0]); the West had lower odds of complications (OR, 0.6; [0.5-0.7]). Versus handgun, shotgun (OR, 0.3; [0.2-0.4]) and hunting rifle (OR, 0.5; [0.4-0.8]) resulted in lower mortality. Patients with government/other insurance had higher odds of discharging home compared to private/commercially insured (OR, 1.7; [1.3-2.3]). In comparison to level I trauma centers, level II trauma centers had lower odds of discharge to home (OR, 0.7; [0.5-0.8]). Our results support hypotension, injury severity, injury intent, firearm type, and U.S. geographical location as important prognostic variables in firearm-related TBI. Improved understanding of civilian GSWH is critical to promoting increased awareness of firearm injuries as a public health concern and reducing its debilitating injury burden to patients, families, and healthcare systems.

1351. Deng, H., et al. (2019). "Pediatric firearm-related traumatic brain injury in United States trauma centers." Journal of neurosurgery. Pediatrics: 1-11.

OBJECTIVE: Pediatric firearm injury is a leading cause of death and disability in the youth of the United States. The epidemiology of and outcomes following gunshot wounds to the head (GSWHs) are in need of systematic characterization. Here, the authors analyzed pediatric GSWHs from a population-based sample to identify predictors of prolonged hospitalization, morbidity, and death., METHODS: All patients younger than 18 years of age and diagnosed with a GSWH in the National Sample Program (NSP) of the National Trauma Data Bank (NTDB) in 2003-2012 were eligible for inclusion in this study. Variables of interest included injury intent, firearm type, site of incident, age, sex, race, health insurance, geographic region, trauma center level, isolated traumatic brain injury (TBI), hypotension in the emergency department, Glasgow Coma Scale (GCS) score, and Injury Severity Score (ISS). Risk predictors for a prolonged hospital stay, morbidity, and mortality were identified. Odds ratios, mean increases or decreases (B), and 95% confidence intervals were reported. Statistical significance was assessed at alpha < 0.001 accounting for multiple comparisons., RESULTS: In a weighted sample of 2847 pediatric patients with GSWHs, the mean age was 14.8 +/- 3.3 years, 79.2% were male, and 59.0% had severe TBI (GCS score 3-8). The mechanism of assault (63.0%), the handgun as firearm (45.6%), and an injury incurred in a residential area (40.6%) were most common. The mean hospital length of stay was 11.6 +/- 14.4 days for the survivors, for whom suicide injuries involved longer hospitalizations (B = 5.9-day increase, 95% CI 3.3-8.6, p < 0.001) relative to those for accidental injuries. Mortality was 45.1% overall but was greater with injury due to suicidal intent (mortality 71.5%, p < 0.001) or caused by a shotgun (mortality 56.5%, p < 0.001). Lower GCS scores, higher ISSs, and emergency room hypotension predicted poorer outcomes. Patients with private insurance had lower mortality odds than those with Medicare/Medicaid (OR 2.4, 95% CI 1.7-3.4, p < 0.001) or government insurance (OR 3.6, 95% CI 2.2-5.8, p < 0.001). Management at level II centers, compared to level I, was associated with lower odds of returning home (OR 0.3, 95% CI 0.2-0.5, p < 0.001)., CONCLUSIONS: From 2003 to 2012, with regard to pediatric TBI hospitalizations due to GSWHs, their proportion remained stable, those caused by accidental injuries decreased, and those attributable to suicide increased. Overall mortality was 45%. Hypotension, cranial and overall injury severity, and suicidal intent were associated with poor prognoses. Patients treated at level II trauma centers had lower odds of being discharged home. Given the spectrum of risk factors that predispose children to GSWHs, emphasis on screening, parental education, and standardization of critical care management is needed to improve outcomes.

1352. Deng, H., et al. (2019). "Pediatric firearm-related traumatic brain injury in United States trauma centers." Clinical neurosurgery 66: 39.

INTRODUCTION: Firearm injury is a leading cause of death and disability in the American youth. Epidemiology and outcomes following gunshot wound to the head (GSWH) are in need of systematic characterization. Here, we analyzed pediatric GSWH to identify predictors of prolonged hospitalization, morbidity and mortality. METHODS: All patients < 18 yr with GSWH in the National Sample Program (NSP) of the National Trauma Data Bank (NTDB) from 2003 to 2012 were identified. Variables included injury intent, firearm choice, injury site, age, sex, race, health insurance, geographic region, trauma center level, isolated TBI, emergency department (ED) hypotension, Glasgow Coma Scale (GCS), and Injury Severity Score (ISS). Outcomes were hospital length of stay (HLOS), morbidity and mortality. Odds ratios (OR), mean increase/decrease (B), and 95% confidence intervals (CI) were reported. Statistical significance was assessed at a < 0.001 accounting for multiple comparisons. RESULTS: In a weighted sample of 2847 pediatric GSWHs, age was 14.8 ± 3.3 yr, 79.2% were male, and 59.0% had severe traumatic brain injury (TBI; Glasgow Coma Scale [GCS] score 3-8). Assault (63.0%), handgun as firearm (45.6%), and injury in residential areas (40.6%) were most common. HLOS was 11.6 ± 14.4 d for the survivors, for which suicide injuries had longer hospitalization (B = 5.9 day increase, 95% CI [3.3-8.6], P < .001) relative to accidents. The overall mortality was 45.1%, and was greater with suicide intent (mortality = 71.5%, P < .001) and shotgun as firearm (mortality = 56.5%,

P < .001). Lower GCS, higher ISS, and hypotension predicted poorer outcomes. Management at level II centers was associated with lower odds of returning home (OR = 0.3, [0.2-0.5], P < .001). CONCLUSION: From 2003 to 2012, the proportion of accidental injuries decreased while suicides increased. The overall mortality was 45%, with hypotension, cranial and overall injury severity, and suicide intent being associated with poor prognosis. Patients treated at level II trauma centers had lower odds of being discharged home. Improved risk screening, parental education and standardization of critical care management are needed.

1353. Deng-Bryant, Y., et al. (2011). "Neuroprotective effects of amnion-derived cellular cytokine suspension in an experimental model of penetrating ballistic-like brain injury." Journal of neurotrauma 28(6): A44.

Previous work has shown that amnion-derived multipotent progenitor (AMP) cells are neuroprotective in a rat model of penetrating ballistic- like brain injury (PBBI). To some extent, this neuroprotection may be mediated by the sustained secretion of AMP cell-derived neurotrophic factors which are abundant in the amnion-derived cellular cytokine suspension (ACCS) medium. To test this hypothesis, we investigated 1) the bioactive stability and neuroprotective capacity of ACCS on cultured embryonic cortical neurons treated with staurosporine (an apoptosis-inducer) and 2) the effects of chronic ACCS delivery (via Alzet osmotic pumps) on PBBI-induced motor and cognitive deficits. Results confirmed that ACCS is thermally stable for at least one week at 37°C and demonstrated that co-treatment with ACCS facilitated neurite outgrowth (i.e. neuroplasticity) in an in vitro model of apoptotic cell death. Chronic delivery of ACCS or control medium (1µl/hr or 5µl/hr) into the cerebral ventricles was initiated within 30min following PBBI. Rotarod motor function assessments and Morris water maze (MWM) spatial learning tests were performed at 1, 2, 3, or 4 weeks for each respective group. The high dose (5µl/hr) of ACCS improved rotarod performance (10, 15 and 20rpm) at 1 and 2 weeks post injury with a significant effect at 2 weeks ($p < 0.05$). However, this infusion rate resulted in some mortality possibly due to the buildup of cerebral spinal fluid. The low dose (1µl/hr) of ACCS (which exhibited no signs of toxicity) produced extended therapeutic effects evident out to 3 weeks post-injury on the rotarod test ($p< 0.05$) with the optimal effect observed again at 2 weeks post-injury. Chronic ACCS infusion (at either dose) failed to produce significant improvement on MWM performance at any time point tested. Collectively, our results support the hypothesis that the neuroprotective effects of AMP cells may be partially mediated through a sustained delivery of neurotrophic factors.

1354. Deng-Bryant, Y., et al. (2016). "Global metabolomics analysis in rats following penetrating ballistic-like brain injury." Journal of neurotrauma 33: A54.

There is increasing interest in metabolic management in the treatment of traumatic brain injury (TBI) patients. However, clinical studies have yielded mixed results, in part due to the complex pathological responses of the neurometabolic network. This study was designed to profile the metabolomes in rat brain tissue, cerebrospinal fluid (CSF), and serum following penetrating ballistic-like brain injury (PBBI). Rats received either a sham craniotomy or a PBBI. Ipsilateral frontal cortices, CSF, and serum were collected at 30 min, 6 h, 24 h, 72 h, and 7d post-injury (n = 6/group/time-point). High throughput mass spectrometry-based metabolomics was performed to determine the entire metabolome. Metabolomics profiling detected a total of 535, 448, and 629 biochemicals in the brain tissue, CSF, and serum respectively. Immediately following injury at 30 min, the percentage of biochemicals significantly altered compared to sham in the three biological compartments were 23.2% (brain), 4.7% (CSF), and 9.1% (serum) of total biochemicals ($p < 0.05$); this quickly elevated to 51.0-65.0% (brain), 8.5-21.0% (CSF), and 13.4-28.5% (serum) starting at 6 h and lasting out to 7d post-injury ($p < 0.05$). Importantly, biochemical pathway analysis showed a significant and complex metabolic response of the brain to severe TBI that includes osmotic stress, imbalance in multiple neurotransmitters, increase in glycolytic metabolism, depletion of creatine stores, and enhanced complex lipid hydrolysis.

Additionally, principal component analysis (PCA) revealed a distinct separation between sham and PBBI samples starting from 6 h post-injury in brain tissues and serum samples, indicating a PBBI metabolic profile that is different from the sham in these two compartments. Interestingly, this distinct PBBI metabolic profile was only observed at 6 h post-injury in the CSF, and was absent at other time points. Overall, the comprehensive metabolomics analysis of the traumatically injured brain tissue, and the comparison of its compositions in the CSF and peripheral circulation have defined a pathological metabolic profile that is different from a normal physiological state, which provides crucial information for the advancement of translating metabolomics to the clinical setting.

1355. Deng-Bryant, Y., et al. (2014). "Region-specific impairment of cerebral mitochondrial bioenergetics following penetrating ballistic-like brain injury in rats." Journal of neurotrauma 31(12): A94.

Mitochondria play a pivotal role in secondary brain damage mechanisms following traumatic brain injury (TBI), which have positioned themselves as leading target for therapeutic intervention. This study was designed to assess regional cerebral mitochondrial bioenergetics following penetrating ballistic-like brain injury (PBBI). Sprague-Dawley rats received either sham injury (craniotomy; n = 11) or unilateral frontal PBBI (10% injury severity; n = 15). Rats were euthanized at 2 hr post-injury, and brain regions of interest were dissected and processed for mitochondrial Ficoll isolation. The Seahorse Bioscience XFe24 Flux Analyzer was used to evaluate mitochondrial bioenergetics. Outcome metrics include mitochondrial oxygen consumptions during: ADP/pyruvate/malate-induced complex-I respiration (State III), oligomycin-induced minimal complex-I respiration (State IV), uncoupler (2,4-dinitrophenol)-stimulated maximal complex-I respiration (State V-I), and succinate/rotenone-induced complex-II respiration (State V-II). Regional differences intrinsic to cortex, striatum and hippocampus were compared in the uninjured brains (sham control). The results show that cortex exhibited significantly higher State III respiration compared to striatum and hippocampus ($p < 0.05$). Additionally, hippocampus showed lower State IV ($p < 0.05$) and State V-I respiration ($p = 0.07$) compared to cortex and striatum, indicative of a differential profile of basal mitochondrial function across normal (sham) brain regions. Subsequently, the region-specific response to PBBI was compared to sham controls. No between-group differences were detected in complex-I function measured by State III and State IV respiration across all regions tested. However, complex-I maximal respiration measured by State V-I respiration was significantly reduced in cortex (34%; $p < 0.05$ vs. sham) and striatum (51%; $p < 0.05$ vs. sham), but not hippocampus, demonstrating an acute (2 hr postinjury) onset of bioenergetic failure in cortex and striatum following PBBI. No differences were detected in State V-II respiration, which suggests complex-II function was not compromised at this time point post-PBBI. Overall, the results indicate that PBBI produced region-specific mitochondrial bioenergetic deficits that are unique to the penetrating, temporary cavity mechanism. Furthermore, the results demonstrate an acute onset of PBBI-induced mitochondrial dysfunction which underscores the importance of early therapeutic intervention targeting mitochondrial bioenergetics for neuroprotection.

1356. Deng-Bryant, Y., et al. (2014). "Penetrating ballistic-like brain injury promotes time-dependent cell proliferation in adult rat hippocampus." Journal of neurotrauma 31(12): A118.

Research has shown that the adult hippocampus retains the ability to produce neural precursor cells and replace lost cells in response to brain injuries. The current study examined the time course of penetrating ballistic-like brain injury (PBBI)-induced cell proliferation in adult rat hippocampus. Unilateral frontal PBBI (10% injury severity) or craniotomy (sham control) was performed on isoflurane anesthetized Sprague-Dawley rats. To evaluate cell proliferation at specific post-injury time points, BrdU (50 mg/kg x 3 i.p. injections delivered at 4 h-intervals) was initiated at 24 h prior to each experimental endpoint. At 24 h, 48 h, 72 h and 7 days post-injury rats were perfused and brains were processed for fluorescence immunostaining for BrdU, GFAP and Iba1. Minimal levels of BrdU-positive cells were detected in the brains of sham controls, and at 24 h and 7 days post-PBBI. However, a

dramatic increase of BrdU-labeled cells was detected at 48 h and 72 h post-PBBI in ipsilateral and contralateral hippocampal dentate gyri (DG). Further analysis was conducted to evaluate the spatial distribution of BrdU-positive cells in hippocampal DG at 48 h and 72 h post-PBBI. The results indicate that the majority of the BrdU-positive cells were located throughout molecular layer and hilus in the DG, accompanied by a few BrdU-positive cells scattered in the subgranular zone where neural stem cells reside. Molecular layer and hilus in the DG are regions where gliogenesis mainly occurs and therefore, the majority of the BrdU-labeled cells observed in the current study are potentially gliogenic. To confirm this, additional cellular markers for astrocyte (i.e. GFAP) and microglia (i.e. Iba1) were used to confirm the phenotype of these newly generated cells following PBBI. BrdU-positive cells were primarily co-labeled with Iba1, and to a lesser extent, with GFAP, suggesting that they are proliferating microglia and astrocytes. Overall, the robust upregulation of glial proliferation during acute phases after PBBI may reflect an increasingly unfavorable environment for newborn neurons, potentially leading to further cell loss.

1357. Deng-Bryant, Y., et al. (2016). "Methods of Drug Delivery in Neurotrauma." Methods in molecular biology (Clifton, N.J.) 1462: 89-100.

The central nervous system (CNS) is protected by blood-brain barrier (BBB) and blood-cerebrospinal-fluid (CSF) barrier that limit toxic agents and most molecules from penetrating the brain and spinal cord. However, these barriers also prevent most pharmaceuticals from entering into the CNS. Drug delivery to the CNS following neurotrauma is complicated. Although studies have shown BBB permeability increases in various TBI models, it remains as the key mitigating factor for delivering drugs into the CNS. The commonly used methods for drug delivery in preclinical neurotrauma studies include intraperitoneal, subcutaneous, intravenous, and intracerebroventricular delivery. It should be noted that for a drug to be successfully translated into the clinic, it needs to be administered preclinically as it would be anticipated to be administered to patients. And this likely leads to better dose selection of the drug, as well as recognition of any possible side effects, prior to transition into a clinical trial. Additionally, novel approach that is noninvasive and yet circumvents BBB, such as drug delivery through nerve pathways innervating the nasal passages, needs to be investigated in animal models, as it may provide a viable drug delivery method for patients who sustain mild CNS injury or require chronic treatments. Therefore, the focus of this chapter is to present rationales and methods for delivering drugs by IV infusion via the jugular vein, and intranasally in preclinical studies.

1358. Deng-Bryant, Y., et al. (2015). "Treatment with amnion-derived cellular cytokine solution (ACCS) induces persistent motor improvement and ameliorates neuroinflammation in a rat model of penetrating ballistic-like brain injury." Restorative neurology and neuroscience 33(2): 189-203.

PURPOSE: The present work compared the behavioral outcomes of ACCS therapy delivered either intravenously (i.v.) or intracerebroventricularly (i.c.v.) after penetrating ballistic-like brain injury (PBBI). Histological markers for neuroinflammation and neurodegeneration were employed to investigate the potential therapeutic mechanism of ACCS., METHODS: Experiment-1, ACCS was administered either i.v. or i.c.v. for 1 week post-PBBI. Outcome metrics included behavioral (rotarod and Morris water maze) and gross morphological assessments. Experiment-2, rats received ACCS i.c.v for either 1 or 2 weeks post-PBBI. The inflammatory response was determined by immunohistochemistry for neutrophils and microglia reactivity. Neurodegeneration was visualized using silver staining., RESULTS: Both i.v. and i.c.v. delivery of ACCS improved motor outcome but failed to improve cognitive outcome or tissue sparing. Importantly, only i.c.v. ACCS treatment produced persistent motor improvements at a later endpoint. The i.c.v. ACCS treatment significantly reduced PBBI-induced increase in myeloperoxidase (MPO) and ionized calcium binding adaptor molecule 1 (Iba1) expression. Concomitant reduction of both Iba1 and silver staining were detected in corpus callosum with i.c.v. ACCS treatment., CONCLUSIONS: ACCS, as a treatment for TBI, showed promise with regard to functional (motor) recovery and demonstrated strong capability to modulate

neuroinflammatory responses that may underline functional recovery. However, the majority of beneficial effects appear restricted to the i.c.v. route of ACCS delivery, which warrants future studies examining delivery routes (e.g. intranasal delivery) which are more clinically viable for the treatment of TBI.

1359. Deng-Bryant, Y., et al. (2012). "Comparison of intravenous and intracerebroventricular administration of amnion-derived cellular cytokine solution in a rat model of penetrating ballistic-like brain injury." Journal of neurotrauma 29(10): A171-A172.

Introduction Previous work indicates that the neuroprotective effects of Amnionderived Multipotent Progenitor (AMP) cells may be mediated through the sustained secretion of AMP cell-secreted factors (Amnion-derived Cellular Cytokine Solution; ACCS). This study compared the neuroprotective efficacy of different routes of ACCS administration following penetrating ballistic-like brain injury (PBBI). Methods Isoflurane-anesthetized rats received either sham or PBBI surgery. ACCS was delivered directly into the CSF (intracerebroventricular; i.c.v.) or intravenously (i.v.) within 15m post-PBBI. Chronic i.c.v. infusion of ACCS was delivered via Alzet osmotic pumps using a continuous flow rate of 1ll/hr (∗100 ll/kg daily) for 1 week. For i.v. administration, PBBI animals were given bolus infusions of ACCS (2 ml/kg) at 15m and 6h post-injury and twice daily thereafter (∗4 ml/kg daily) for 5 consecutive days. Motor and cognitive outcome were assessed on the rotarod (7 and 14 days post-injury) and Morris water maze (MWM; 14-18 days post-injury) tasks respectively. Results Results showed that the continuous i.c.v. infusion of ACCS into the CSF significantly improved motor outcome on the rotarod task as evidenced by an increased latency to fall ($p < 0.05$). In contrast, i.v. administration of ACCS failed to produce significant improvement in motor outcome. Under these test conditions, neither the i.c.v. or i.v. route of ACCS administration showed efficacy on improving cognitive performance on the MWM task. Conclusions Overall the results of this study indicate that chronic i.c.v. ACCS delivery improves motor but not cognitive outcome in the PBBI model. However, the beneficial effects of ACCS were not apparent following i.v. delivery indicating that blood-brain-barrier (BBB) permeability may be a mitigating factor. Further work evaluating (1) intrathecal administration as an alternate CSF delivery route and (2) the ability of ACCS to penetrate both the intact and compromised BBB is ongoing.

1360. Denneny, J. C., 3rd and W. D. Davidson (1987). "Combined otolaryngological and neurosurgical approach in treating sinus fractures." The Laryngoscope 97(5): 633-637.

Frontal sinus injury in patients with closed head trauma is significant. Fractures of the anterior and posterior table as well as injury to the nasofrontal duct system requiring exploration, and often times obliteration of the frontal sinus, are not uncommon. Some patients present with frontal sinus damage along with intracranial pathology that requires craniotomy for treatment of the intracranial problem. In these patients, the neurosurgeon typically performs a bifrontal scalp flap to expose the cranium. A bone flap that transects the superior margin of the frontal sinus is then elevated and removed. This allows direct visualization of the anterior and posterior sinus walls and both nasofrontal ducts, subsequently facilitating reduction of fractures, debridement, and obliteration or ablation, if necessary, without creating another bone flap. The surgeon gets an overall picture of the sinus without the added trauma associated with the creation of an osteoplastic flap.

1361. Dennis, M. J. (2009). "Exodontia for the general dentist: complications." Today's FDA : official monthly journal of the Florida Dental Association 21(10): 14-19.

1362. Depolo, A. (2000). "Colorectal war injuries." Przeglad lekarski 57 Suppl 5: 124-126.

1363. Derakhshanrad, N., et al. (2015). "Case report: Combination therapy with mesenchymal stem cells and granulocyte-colony stimulating factor in a case of spinal cord injury." Basic and Clinical Neuroscience 6(4): 299-305.

Introduction: Various neuroregenerative procedures have been recently employed along with neurorehabilitation programs to promote neurological function after Spinal Cord Injury (SCI), and recently most of them have focused on the acute stage of spinal cord injury. In this report, we present a case of acute SCI treated with neuroprotective treatments in conjunction with conventional rehabilitation program. Methods: A case of acute penetrative SCI (gunshot wound), 40 years old, was treated with intrathecal bone marrow derived stem cells and parenteral Granulocyte-Colony Stimulating Factor (G-CSF) along with rehabilitation program. The neurological outcomes as well as safety issues have been reported. Results: Assessment with American Spinal Injury Association (ASIA), showed neurological improvement, meanwhile he reported neuropathic pain, which was amenable to oral medication. Discussion: In the acute setting, combination therapy of G-CSF and intrathecal Mesenchymal Stem Cells (MSCs) was safe in our case as an adjunct to conventional rehabilitation programs. Further controlled studies are needed to find possible side effects, and establish net efficacy.

1364. Derdyn, C., et al. (1990). "Craniofacial trauma: an assessment of risk related to timing of surgery." Plastic and reconstructive surgery 86(2): 238-237.

Following the retrospective analysis of approximately 4000 head-injury patients, 49 were identified with a combination of displaced facial fractures and significant cerebral trauma. The purpose of this study was to define clinical and radiographic features in these patients that are associated with a poor prognosis, which in turn might influence the timing of facial fracture repair. The presence of an upper-level facial fracture, low Glasgow coma score, intracranial hemorrhage, displacement of normally midline cerebral structures, and multisystem trauma was associated with a statistically significant poorer prognosis. Additionally, in demographically similar groups of patients (age, sex, concomitant injury) preselected for intracranial pressures of less than 15 mmHg at the time of surgery, no significant difference in survival was appreciated in patients who underwent early (0 to 3 days), middle (4 to 7 days), or late (greater than 7 days) surgical repair. Early surgical repair of facial fractures in these circumstances does not appear to have a negative impact on recovery.

1365. D'Errico, S., et al. (2011). "A novel macabre ritual of the Italian Mafia ('Ndrangheta): covering hands with gloves and burying the corpse with burnt lime after execution." The American journal of forensic medicine and pathology 32(1): 44-46.

'Ndrangheta is one of the famous "4 Mafias," which typically insists in Southern Italy. A particular case of 'Ndrangheta-related homicide double execution by means of multiple gunshots is presented. To the best of our knowledge, this is the first report of `Ndrangheta's homicidal modality (covering hands with gloves and burying) as a macabre ritual. In homicides committed by criminal organization, the method used as well as the positioning of the body follow a macabre ritual laden with significance and intending to be an admonition to other persons.

1366. Derums, V. I. (1980). "[X-ray morphological characteristics of the traumatic bone injuries and wounds of the inhabitants of the ancient Baltic region]." Rentgenomorfologicheskaia kharakteristika travmaticheskikh povrezhdenii i ranenii kostei zhitelei drevnei Pribaltiki. 42(2): 64-68.

Altogether 4492 skeletons of the people who inhabited the Baltic region during various epochs--from the end of the mesolithic period up to the XVIII century A. D. were examined. A total of 30 injuries, 15 wounds, 10 cranial trepanations and 78 bone fractures were revealed. Most of the injuries and wounds showed signs of regeneration, knitting consolidation was quite adequate that is partially accounted for by proficiency of people's doctors. It was established that lances and arrows of ancient inhabitants of the Baltic region were of great penetrative strength.

1367. Desai, R., et al. (2021). "Removal of a penetrating tree branch in the orbitofrontal region: A unique application of an orbitofrontal craniotomy through a supraciliary brow approach." Journal of Neurological Surgery Part B: Skull Base 82(SUPPL 2).

Orbitocranial penetrating injury (OPI) including with wooden objects is a well-described mechanism of brain injury. Thisreport describes unique application of an orbitofrontal craniotomy through a supraciliary brow approach to remove awooden stick penetrating through the orbit into the frontal lobe. A 51-year-old male presented after a traumatic event inwhich tree branch penetrated his face beneath the left eye, through the left orbit and into his frontal lobes. He did notexperience loss of consciousness and was neurologically intact with preserved vision and ocular motility. Computedtomography (CT) and CT angiogram of the head revealed an isodense hollow cylindrical object penetrating though the leftorbit through the left frontal lobe extending into the frontal horn of the right lateral ventricle abutting the left anteriorcerebral artery with minimal intraventricular hemorrhage and no evidence of arterial injuries. The patient was treated with broad spectrum antibiotic and antifungal coverage and underwent an orbitofrontal craniotomythrough a supraciliary brow approach for extraction of the foreign body, with incisions and positioning as below. The lateralbold curvilinear marking is the position of the supraciliary incision in a prominent forehead skin crease (single arrow). Thefurthest lateral dotted marking (double arrows) approximates the position of the branch of the left facial nerve to thefrontalis muscle. The medial curvilinear marking (white arrowhead) is the estimated lateral limit of frontal sinus which wasoutlined with the surgical navigation system to avoid entry into the frontal sinus. The lateral curvilinear incision (redarrows) is the planned incision for a larger frontotemporal craniotomy if additional exposure was necessary, a small portionof which was used in this case to harvest temporalis fascia for dural closure. After placement of a lumbar drain, a left orbitofrontal craniotomy was performed and an extradural, subfrontal dissection ofthe anterior fossa floor revealed the wooden stick traversing intracranially. In conjunction with the oculoplastics teamworking extracranially, the wooden stick was removed in two pieces by delivery through the puncture wound inferior to theorbit. Postoperative 3D CT reconstruction portrays the minimally invasive craniotomy with affixed plating and cranioplasty withoutsignificant bony defect. Postoperatively, the patient had a right frontalis palsy that resolved within 10 weeks. Intraoperative cultures grew Enterococcus casseliflavus , Bacillus cereus , Pseudomonas abietaniphila , and fungal species including Aspergillus niger , Alternaria species , and an unidentified dematiaceous mold. He was treated with an extended course of antimicrobialtherapy which included an initial intravenous course of vancomycin, ertapenem, and posaconazole transitioned to oraldoxycycline, ciprofloxacin, and isavuconazole after MRI 1 month postoperatively demonstrated source control. At 6 monthspostoperatively, the patient was prescribed lifelong suppressive isavuconazole. He remains neurologically intact at mostrecent postoperative visit, approximately 14 months postoperatively.

1368. Desai, R., et al. (2021). "Removal of a Penetrating Tree Branch in the Orbitofrontal Region-A Unique Application of an Orbitofrontal Craniotomy Through a Supraciliary Brow Approach." Operative neurosurgery (Hagerstown, Md.) 21(4): E386-E391.

BACKGROUND AND IMPORTANCE: Orbitocranial penetrating injury (OPI) is associated with neurological, infectious, and vascular sequalae. This report describes unique application of an orbitofrontal craniotomy through a supraciliary approach to remove a wooden stick penetrating through the orbit and frontal lobe, postoperative management, and antimicrobial therapy., CLINICAL PRESENTATION: A 51-yr-old male presented after a tree branch penetrated beneath his eye. He had no loss of consciousness and was neurologically intact with preserved vision and ocular motility. Computed tomography (CT) and CT angiogram revealed an isodense hollow cylindrical object penetrating though the left orbit and left frontal lobe. The object extended into the right lateral ventricle, abutting the left anterior cerebral artery. There was minimal intraventricular hemorrhage without arterial injury. The patient was treated with broad-spectrum antimicrobial coverage. The foreign body was removed and the

dural defect repaired via an orbitofrontal craniotomy through a supraciliary eyebrow incision. He was treated with an extended course of antimicrobial therapy, and after 18 mo remained neurologically intact., CONCLUSION: OPI are a subset of penetrating brain injuries with potential for immediate injury to neurovascular structures and delayed complications including cerebrospinal fluid leak and infection. Treatment includes attempted complete removal of the foreign body and antimicrobial therapy. An orbitofrontal craniotomy through a supraciliary eyebrow incision may be effective in selected patients.

1369. Desai, U. R., et al. (1993). "Perfluorocarbon liquid in traumatic vitreous hemorrhage and retinal detachment." Ophthalmic surgery 24(8): 537-541.

Patients with penetrating ocular trauma also may have severe vitreous hemorrhage and associated retinal detachment. Removing the hemorrhage and repairing the detachment can be a difficult surgical problem. Besides the limited surgical view due to the hemorrhage, an incomplete separation of the posterior hyaloid membrane can allow the detached retina to be drawn toward the port of the vitrectomy instrument, producing an inadvertent retinal tear. We have used perfluoroperhydrophenanthrene (Vitreon) to manage three cases of penetrating ocular trauma with concurrent retinal detachment and a partial vitreous detachment, either at the time of surgery or as noted ultrasonographically. The perfluorocarbon liquid helped to separate the partially detached posterior hyaloid membrane and flatten the detached retina. This maneuver simplified removal of the vitreous hemorrhage and management of the retinal detachment.

1370. Desbordes, J. M., et al. (1982). "[Intracranial penetration of a gastric tube. A propos of a case]." Penetration intra-cranienne d'une sonde gastrique. A propos d'un cas. 1(2): 191-192.

1371. DesChamps, G. T., Jr. and J. U. Morano (1991). "Intracranial bullet migration--a sign of brain abscess: case report." The Journal of trauma 31(2): 293-295.

An unusual case of migration of an intracranial bullet fragment within a brain abscess is reported. Movement of the bullet was first detected on skull films, and the significance of this finding on plain radiographs is emphasized.

1372. DeSoucy, E. S., et al. (2017). "Review of 54 Cases of Prolonged Field Care." Journal of special operations medicine : a peer reviewed journal for SOF medical professionals 17(1): 121-129.

BACKGROUND: Prolonged field care (PFC) is field medical care applied beyond doctrinal planning time-lines. As current and future medical operations must include deliberate and contingency planning for such events, data are lacking to support efforts. A case review was conducted to define the epidemiology, environment, and operational factors that affect PFC outcomes., METHODS: A survey distributed to US military medical providers solicited details of PFC encounters lasting more than 4 hours and included patient demographics, environmental descriptors, provider training, modes of transportation, injuries, mechanism of injury, vital signs, treatments, equipment and resources used, duration of PFC, and morbidity and mortality status on delivery to the next level of care. Descriptive statistics were used to analyze survey responses., RESULTS: Surveys from 54 patients treated during 41 missions were analyzed. The PFC provider was on scene at time of injury or illness for 40.7% (22/54) of cases. The environment was described as remote or austere for 96.3% (52/54) of cases. Enemy activity or weather also contributed to need for PFC in 37.0% (20/54) of cases. Care was provided primarily outdoors (37.0%; 20/54) and in hardened nonmedical structures (37.0%; 20/54) with 42.6% (23/54) of cases managed in two or more locations or transport platforms. Teleconsultation was obtained in 14.8% (8/54) of cases. The prehospital time of care ranged from 4 to 120 hours (median 10 hours), and five (9.3%) patients died prior to transport to next level of care., CONCLUSION: PFC in the prehospital

setting is a vital area of military medicine about which data are sparse. This review was a novel initial analysis of recent US military PFC experiences, with descriptive findings that should prove helpful for future efforts to include defining unique skillsets and capabilities needed to effectively respond to a variety of PFC contingencies. Copyright 2017.

1373. D'Esposito, M., et al. (1995). "Amnesia following traumatic bilateral fornix transection." Neurology 45(8): 1546-1550.

There is controversy regarding the effect of isolated fornix damage on human memory. We report a patient who suffered a traumatic penetrating head injury that resulted in a significant and persistent anterograde amnesia. CT revealed a lesion that involved the region of the proximal, posterior portion of both fornices without evidence of damage to other hippocampal pathways or to other structures known to be critical for memory, such as the hippocampus, thalamus, or basal forebrain. The unique location of the lesion in this patient provides evidence supporting the role of isolated fornix lesions in amnesia.

1374. Detorakis, E. T., et al. (2004). "Pneumocephalus and presumed meningitis following inconspicuous penetrating periocular trauma." Acta ophthalmologica Scandinavica 82(5): 603-605.

PURPOSE: To report a case of serious intracranial complications in an adolescent youth following a seemingly trivial periocular injury., METHODS: An adolescent youth was examined and discharged after a small penetrating injury to his left medial canthus. He later presented with blurred vision, nausea and mild pyrexia and underwent a computed tomography (CT) scan of the head and orbits as well as a lumbar puncture., RESULTS: The CT scan revealed a fracture in the cribriform plate of the ethmoid bone and the medial orbital wall, as well as pneumocephalus. The lumbar puncture revealed 3000 white cells/mm3 in the cerebrospinal fluid (CSF). After treatment with meningitic doses of intravenous antibiotics, a significant improvement was noted., CONCLUSIONS: A CT scan, instead of an ordinary head radiograph, may be considered as a first-choice mode of diagnosis in evaluating even inconspicuous penetrating periocular wounds. Early administration of meningitic doses of antibiotics may significantly improve prognosis.

1375. Detorakis, E. T., et al. (2012). "Unexpected finding in ocular surface trauma: a large intraorbital foreign body (bullet)." Acta medica (Hradec Kralove) 55(2): 100-103.

Sometimes intraorbital foreign bodies lead to unexpected findings. A 16-year old boy was referred due to ocular surface trauma. A conjunctival laceration was detected at the level of the left caruncle with associated left exotropia, reduced adduction as well as a preretinal hemorrhage along the nasal periphery of the fundus. A blow-out fracture of the medial orbital wall was suspected and a CT scan of the orbits was scheduled which revealed the presence of a large intraorbital foreign body. The removal of the intraorbital foreign body (which proved to be a bullet) and precautionary laser photocoagulation along the nasal periphery of the left eye were performed. Ocular surface trauma may reveal unexpected findings, such as an intraorbital foreign body, requiring investigation by a CT scan.

1376. Devi, B. I., et al. (1993). "Penetrating orbitocranial injuries--report of two cases." Indian journal of ophthalmology 41(2): 84-86.

1377. Devulapalli, K. K., et al. (2018). "Utility of Repeat Head CT in Patients with Blunt Traumatic Brain Injury Presenting with Small Isolated Falcine or Tentorial Subdural Hematomas." AJNR. American journal of neuroradiology 39(4): 654-657.

BACKGROUND AND PURPOSE: In blunt traumatic brain injury with isolated falcotentorial subdural hematoma not amenable to neurosurgical intervention, the routinely performed, nonvalidated practice of serial head CT scans frequently necessitates increased hospital resources and exposure to ionizing radiation. The study goal was to evaluate clinical and imaging features of isolated falcotentorial subdural hematoma at presentation and short-term follow-up., MATERIALS AND METHODS: We performed a retrospective analysis of patients presenting to a level 1 trauma center from January 2013 to March 2015 undergoing initial and short-term follow-up CT with initial findings positive for isolated subdural hematoma along the falx and/or tentorium. Patients with penetrating trauma, other sites of intracranial hemorrhage, or depressed skull fractures were excluded. Patient sex, age, Glasgow Coma Scale score, and anticoagulation history were obtained through review of the electronic medical records., RESULTS: Eighty patients met the inclusion criteria (53 males; 27 females; median age, 61 years). Of subdural hematomas, 57.1% were falcine, 33.8% were tentorial, and 9.1% were mixed. The mean initial Glasgow Coma Scale score was 14.2 (range, 6-15). Isolated falcotentorial subdural hematomas were small (mean, 2.8 mm; range, 1-8 mm) without mass effect and significant change on follow-up CT (mean, 2.7 mm; range, 0-8 mm; P = .06), with an average follow-up time of 10.3 hours (range, 3.9-192 hours). All repeat CTs demonstrated no change or decreased size of the initial subdural hematoma. No new intracranial hemorrhages were seen on follow-up CT., CONCLUSIONS: Isolated falcotentorial subdural hematomas in blunt traumatic brain injury average 2.8 mm in thickness and do not increase in size on short-term follow-up CT. Present data suggest that repeat CT in patients with mild traumatic brain injury with isolated falcotentorial subdural hematoma may not be necessary.

1378. Dewangan, N. K. and A. Sharma (2021). "Validation of the Revised Neuroimaging Radiological Interpretation System for Acute Traumatic Brain Injury in Adult and Pediatric Population." Indian Journal of Neurotrauma 18(1): 32-37.

Aim Our study aimed to validate the revised neuroimaging radiological interpretation system (NIRIS), which would standardize the interpretation of noncontrast head CT of acute traumatic brain injury (TBI) patient and consolidate imaging finding into ordinal severity categories that would not only inform specific patient management actions but could also be used as a clinical decision support tool. Methods We retrospectively studied dispositions and their outcomes of consecutive patients brought to the Sawai Man Singh Hospital Trauma Centre, Jaipur, India, by any means of transport and who underwent a noncontrast CT scan for suspected TBI between April and December 2018. Results The revised NIRIS correctly predicted disposition and outcome in 62.9% (750/1192) of patients. After excluding patients with OMEI (other major extracranial injuries) and OMII (other major intracranial injuries), a correct prediction was observed in 88.3% (670/758) of patients. After excluding OMEI and OMII, the predictability of revised NIRIS in the adult population is 87.6% (446/509), while predictability in the pediatric population is 92.1% (224/249). Conclusion Revised NIRIS is a good tool for predicting patient dispositions, to specific management categories, and outcomes in TBI patients after noncontrast CT head.

1379. DeWeese, W. O., et al. (1976). "Pellet-gun brain wound complicated by Clostridium Perfringens meningitis." Surgical neurology 5(4): 253-254.

A ten-year-old male was hospitalized for a pellet-gun wound to the brain. He developed Clostridial meningitis within eighteen hours in spite of radical debridement and prophylactic antibiotics. However, successful recovery was obtained with high levels of penicillin and chloromycetin antibiotic therapy.

1380. Deyle, S., et al. (2011). "Collateral damage--penetrating head injury and orbital injury: a case report." The American journal of forensic medicine and pathology 32(3): 215-218.

We report a case of an accidental death or potential suicide by revolver with subsequent injury of another person. A 44-year-old man shot himself in the head while manipulating his .38 caliber special revolver in the kitchen in the presence of his wife, standing approximately 1.5 m next to him. After passing through the husband's head, the lead round-nose bullet entered the region underneath his wife's left eye. When the bullet left the man's head, it retained the energy to penetrate the soft tissue at this distance, including the skin and thin bone plates like the orbital wall. Owing to the low energy of the projectile, the entry wound was of atypical in shape and without loss of tissue. Only a small line--resembling a cut--was externally visible. The man died in the hospital from his injuries; his wife suffered visual loss of her left eye.

1381. D'Hermies, F., et al. (2001). "[Orbital wooden foreign body]." Corps etranger vegetal intra-orbitaire. 24(5): 517-521.

A 76-year-old-female patient fell in her garden, inducing a right orbital wound in which no foreign body was primarily found. As pain and diplopia followed the orbital trauma, a CT-scan was performed, disclosing a linear external foreign body in the right orbit. An anterior orbitotomy was performed to remove an 18-mm-long wooden foreign body. Histopathology of the tissue surrounding the foreign body showed an inflammatory fibrous tissue with small granulomas around telluric particles. Improvement after the operation was dramatic with complete disappearance of diplopia the day following surgery. Antibiotics were prescribed and tetanus prophylaxis was performed.

1382. Di Prospero, N. A., et al. (1998). "Suramin disrupts the gliotic response following a stab wound injury to the adult rat brain." Journal of neurocytology 27(7): 491-506.

Reactive gliosis, observed in numerous pathological states, leads to the formation of a glial scar that is believed to impede axonal regeneration. Astrocyte reactivity can be initiated both in vitro and in vivo by various cytokines. Thus, the aim of this study was to investigate if suramin, a polysulfonated napthylurea that has been shown to inhibit the binding of many different cytokines to their cell surface receptors, could attenuate the glial response after brain injury. A single dose of suramin (5 microl, 75 microM) or saline vehicle was injected intracerebrally through the same needle used to make the stab wound at the time of lesioning. Suramin-treated animals showed an obvious reduction in several parameters of CNS inflammation: cellular proliferation, GFAP levels, and tenascin-C immunoreactivity were reduced in suramin-treated as compared to control animals at early time points. GFAP immunoreactivity was strikingly reduced at 3 days after injury, as confirmed by Western blot analysis. This reduction was transient, however, in that the difference in GFAP expression between suramin-treated and control animals was less apparent at 7 days and had disappeared by 30 days after injury. Likewise, fewer BrdU-positive cells were noted in treated versus control tissue at 1 and 3 days, but this difference was not significant by 7 days. Moreover, tenascin immunoreactivity was significantly diminished at 24 h as confirmed by Western blot analysis in suramin-treated lesion areas, which is analogous to our observations that suramin can antagonize tenascin expression by cultured astrocytes treated with bFGF. In addition, examination of the corpus callosum of saline-treated animals 30 days post-trauma revealed a disruption of the fiber tract within the lesion site, while suramin-treated animals displayed numerous fibers spanning the lesion. These results demonstrate that a single injection of suramin transiently inhibits the gliotic response, which may be sufficient to ameliorate subsequent tissue damage.

1383. Di Rita, A., et al. (2022). "Airgun Wound with Superior Sagittal Sinus Involvement in a Child: Case Report and Review of the Literature." Pediatric neurosurgery 57(2): 133-137.

INTRODUCTION: Although still considered quite harmless, nonpowder guns (NPG) may cause severe head injuries in children. We present the case of a depressed skull fracture with superior sagittal sinus involvement following NPG injury. Decision-making and surgical management are discussed, and

the current literature concerning NPG-related pediatric head injuries is reviewed., CASE PRESENTATION: A 4-year-old boy hit by a compressed-air rifle came to our center. CT scan showed a depressed skull fracture of the occipital bone on the midline and intracranial penetration of some fragments of the pellet. CT angiography documented a compression of the superior sagittal sinus without thrombosis. Soon after hospital admission, the patient showed deterioration of the neurological status suggesting intracranial hypertension. Surgery was performed with fracture elevation, removal of metal fragments, and wound debridement. The patient had a full recovery without subsequent neurological deficits., DISCUSSION/CONCLUSION: Modern airguns may produce severe penetrating head injuries in children. Parents and physicians should be aware of the danger of NPG. Depressed skull fracture and dural venous sinus involvement can occur, and even a stable neurological condition may worsen. In such instances, a thorough preoperative assessment including vascular imaging is mandatory. The surgical risk is not negligible due to the possible injury of the sinus wall and subsequent intraoperative bleeding. This has to be weighted against potential complications of the penetrating injury, such as infection, sinus thrombosis, and intracranial hypertension. Our case suggests that prompt surgical treatment can be a safe and effective option.

1384. Di Roio, C., et al. (2000). "Craniocerebral injury resulting from transorbital stick penetration in children." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery 16(8): 503-507.

OBJECTS: Two children were admitted to hospital for treatment of craniocerebral injury with transorbital penetration., METHODS: One child aged 6 years and 6 months had poked a chopstick in his orbit. There was no report of either a palpebral or an ocular wound. He had subsequently developed a meningeal syndrome with a cerebral abscess managed by needle aspiration biopsy and intravenous antibiotics. The other child, aged 4, had fallen onto a metal rod. He presented with a palpebral wound, motor disorders and coma, all due to a frontal intracerebral hematoma. There was an improvement in outcome without complications of an infectious nature or motor sequelae., CONCLUSIONS: Such head injuries are rare. Clinical, radiological and ophthalmological investigations must be performed, including computed tomography (CT) scan or cerebral magnetic resonance imaging (MRI) with antibiotic treatment for suspected microorganisms.

1385. Diamond, E. F. and I. Linacre (1990). "Determination of death." The Linacre quarterly 57(4): 46-58.

1386. Dias, J., et al. (2021). "Thromboelastography for the evaluation and management of patients with traumatic brain injury." Research and Practice in Thrombosis and Haemostasis 5(SUPPL 2).

Background : Traumatic brain injury (TBI) is frequently associated with coagulopathy and increased mortality risk. Thromboelastography can provide rapid coagulation assessment and may be particularly useful in distinguishing coagulapathic TBI (CTBI) profiles and severity, aiding goal-directed treatment of CTBI patients. Aims : To conduct a systematic review and outcomes analysis to assess the utility of thromboelastography for evaluation and management of CTBI patients. Methods : A systematic literature search was performed on PubMed and EMBASE to identify clinical studies of adult patients with TBI assessed using thromboelastography. Articles were screened using predefined inclusion and exclusion criteria. Demographic, diagnostic, laboratory, treatment, and outcome data were extracted for comparison and an aggregate analysis performed to compare the effect of CTBI management with thromboelastography versus conventional coagulation assays (CCA) on 28-day mortality. Results : Searches identified 303 non-duplicate publications with seven additional manuscripts identified by the authors. After screening and review, 29 publications were identified with relevant data on the use of thromboelastography in CTBI patients. Results showed that thromboelastography identified hypercoagulable patterns in TBI patients. Notably, the K-value, α angle

and MA values consistently differed from established reference ranges. Furthermore, thromboelastography parameters differed between TBI subtypes; penetrating TBI was associated with increased likelihood of coagulopathy, evidenced by significant differences in all TEG parameters (except R time), compared with blunt TBI. Thromboelastography assays were also able to predict a range of clinical outcomes including mortality, neurosurgical intervention, and bleeding complications, with evidence for improved outcomes following thromboelastography guided blood transfusion in TBI patients. Two studies were identified for an aggregate analysis, and demonstrated a significant mortality benefit of using viscoelastic testing to guide resuscitation in TBI patients compared to CCA (Figure 1). Conclusions : Thromboelastography may have an important role in both the diagnosis and management of patients with TBI. Further studies are needed to define optimal use.

1387. Diaz, J., et al. (2011). "Changes in brain and ventricle volumes after decompressive craniectomy in patients with severe traumatic brain injuries." Journal of neurotrauma 28(6): A93.

Fluctuations in brain volume are apparent in patients with severe traumatic brain injuries (TBI) who have undergone decompressive craniectomy (DC). Here we describe the changes in brain and ventricular volumes that result fromDC during the acute phase of the injury.Wholebrain CT scans were compiled for decompressed patients with severe non-penetrating TBI (Glasgow Comma Scale<8 n=9, female=1, mean age=36.7). Brain and ventricular volumes were quantified for week one post-DC using the software Analyze 10.0. Preliminary data do not reveal significant variations in brain volume during the first postoperatory week, and indicate a significant decrease in ventricular volume at the second post-operatory day (p=0.004, paired samples t-test). No significant correlations were found between changes in brain and ventricular volumes (r=-0.139, n=36, p=0.420, Pearson's correlation test). Further evaluations will reassess the present results in a larger patient pool, and will examine the contributions of edema, hemorrhage, and extra-ventricular cerebrospinal fluid to brain herniation.

1388. Diaz-Arrastia, R., et al. (2009). "Posttraumatic epilepsy: the endophenotypes of a human model of epileptogenesis." Epilepsia 50 Suppl 2: 14-20.

Posttraumatic epilepsy is a common complication of traumatic brain injury (TBI), occurring in up to 15-20% of patients with severe brain trauma. Trauma accounts for approximately 5% of chronic epilepsy in the community. Because it is a common condition, and because of the relatively short latency period between injury and onset of chronic seizures, posttraumatic epilepsy represents a good model to test antiepileptogenic therapies. However, several well-conducted clinical trials have failed to demonstrate antiepileptogenic efficacy for several common anticonvulsants. Posttraumatic epilepsy can arise through a number of mechanisms, which often coexist within a single patient. Penetrating brain injury produces a cicatrix in the cortex and is associated with a risk of posttraumatic epilepsy of approximately 50%, whereas nonpenetrating head injury may produce focal contusions and intracranial hemorrhages, and is associated with a risk of posttraumatic epilepsy of up to 30%. Furthermore, closed head injury often produces diffuse concussive injury, with shearing of axons and selective damage to vulnerable brain regions, such as the hippocampus. The clinical, neurophysiologic, imaging, and neuropathologic features or epileptogenicity differ between these alternate mechanisms. It is likely that better understanding of the subtypes of epilepsy resulting from brain trauma will be required to successfully identify antiepileptogenic therapies.

1389. Diaz-Daza, O., et al. (2003). "Endovascular therapy of traumatic vascular lesions of the head and neck." Cardiovascular and interventional radiology 26(3): 213-221.

Pseudoaneurysm and fistula formation are well-documented complications of arterial vascular injury and may be associated with significant morbidity and mortality. The purpose of this manuscript is to review the presentation and therapy of patients with traumatic vascular injuries of the head and neck. Eight patients were admitted to a Level 1 Trauma Center and diagnostic angiography of the carotid

artery and vertebral circulation was performed. The mechanisms of injury included motor vehicle accident, gunshot wound, stab wound and aggravated assault. Cause of trauma, vascular lesion, endovascular therapy and outcome were analyzed retrospectively. The angiographic findings, clinical presentation and hospital course were reviewed. There were eight patients, seven males and one female, aged 17-65. Four patients (50%) had multiple lesions; four had pseudoaneurysms, two with fistula formation and two with active arterial hemorrhage. A total of 17 lesions were embolized using coils. Polyvinyl Alcohol (PVA), Gelfoam or a combination. Two of the 17 lesions received stents. Six of the eight patients remained clinically improved or stable at varying follow-up intervals. One of the four patients who presented with penetrating trauma and neurological deficits had resolution of right hemiplegia at the 8th month follow-up. One of the four patients who sustained blunt trauma and carotid-cavernous fistula presented with a new pseudoaneurysm at the 2-month post-embolization follow-up. The evolution of diagnostic neuroangiographic techniques provides opportunities for endovascular therapy of traumatic vascular lesions of the head and neck that are minimally invasive, attractive options in selected cases.

1390. Dichtel, W. J., et al. (1984). "Lateral mandibulotomy: a technique of exposure for penetrating injuries of the internal carotid artery at the base of the skull." The Laryngoscope 94(9): 1140-1144.

Injuries to the internal carotid artery are rare but are frequently fatal or associated with significant neurologic sequelae. Exposure for surgical repair of penetrating injuries to the internal carotid artery at the base of the skull is difficult because of the overlying ramus of the mandible and the facial nerve. In the past, these injuries have been treated by techniques such as occlusion of the artery with a Fogarty balloon catheter, or subluxation of the temporomandibular joint to gain access to the arterial injury. Based on techniques previously reported for extirpation of parapharyngeal space tumors, we describe lateral mandibulotomy for exposure of penetrating carotid artery injuries at the base of the skull. The technique affords relatively rapid and adequate exposure of these injuries allowing ligation, or in selected cases, arterial repair.

1391. Dick, B. and V. Hessemer (1993). "[Scanning electron microscopy examination of 87 pre-injection blunted retrobulbar cannulas]." Rasterelektronenmikroskopische Untersuchung von 87 prae injectionem abgestumpften Retrobulbarkanulen. 90(4): 372-375.

UNLABELLED: The use of blunt cannulas for retrobulbar injection (retro) is recommended to reduce the risk of retrobulbar hemorrhage and globe perforation. Retro cannulas with blunt tips--so-called Atkinson needles--are commercially available. They can also be produced by being blunted on a sterile surface immediately before injection., METHODS: In a prospective study, all retro cannulas (0.5 x 40 mm, Steriseal) used over 8 days in our hospital were collected after being blunted on a sterile Petri dish, followed by injection. Subsequently, scanning electron microscopic examination was performed. 20 unused retro needles were examined for control., RESULTS: 62% (n = 54) of the 87 used retro cannulas were satisfactory, i.e., the tips were blunted, exhibiting no undesirable hooks. 29% (n = 25) of the retro cannulas demonstrated moderate deformation, 9% (n = 8) stronger deformation of the needle tip. No complications occurred after any of the 87 injections., CONCLUSIONS: Blunting of retro cannulas immediately before injection is a possible alternative to commercially available needles with blunt tips. However, this procedure has to be performed carefully to avoid potential detrimental deformation of the needle tip, which can be detected in a low percentage by means of the scanning electron microscope.

1392. Dielert, E. and P. Stroinigg (1978). "[Consequences of gunshot injuries of the face (author's transl)]." Folgezustande nach Schussverletzungen im Kiefer-Gesichtsbereich. 26(12): 414-418.

During a 5 year period 59 patients with gunshot wounds were treated in the Department of Maxillo-facial Surgery at Munich University. Two patients, who developed local problems secondary to

latent infection due to missiles retained for 31 and 32 years, are presented. These missiles were surgically removed. Today, compared to the past, the interval between the gunshot injury and the surgical removal of the missile from the mandible because of the use of antibiotics and improved surgery may be considerable.

1393. Dieterich, H.-J., et al. (2003). "Penetration of intravenous hydroxyethyl starch into the cerebrospinal fluid in patients with impaired blood-brain barrier function." Anesthesia and analgesia 96(4): 1150-1154.

UNLABELLED: Hypovolemic patients with impairment of the blood-brain barrier may receive IV hydroxyethyl starch (HES) to stabilize cardiovascular function and to increase cerebral perfusion pressure. It is not known whether HES can penetrate into the cerebrospinal fluid (CSF) under those conditions. We investigated plasma and CSF levels of HES after IV infusion in patients with suspected disturbance of the blood-brain barrier. Eight adult patients were studied who were being treated for head trauma or subarachnoid hemorrhage, with an external CSF drain in place. All patients exhibited radiographic signs of blood-brain barrier impairment diagnosed by cerebral computed tomography. After IV infusion of 500 to 1000 mL of HES 200,000/0.5, plasma HES levels were measured. Additionally, all CSF that was drained within 8 h after the HES infusion was collected, and HES concentrations were measured. All patients had detectable HES plasma concentrations (3.41 to 9.95 mg/mL). In contrast, no HES could be detected in the CSF of any patient. These data indicate that IV HES 200,000/0.5 does not penetrate into the CSF in patients with disturbed blood-brain barrier function after subarachnoid hemorrhage or head trauma. Further study is required to determine whether HES penetrates into the intracranial interstitium, despite the absence of HES in the CSF., IMPLICATIONS: Patients may receive IV hydroxyethyl starch (HES) after head trauma or subarachnoid hemorrhage. The results of the present study indicate that in patients with suspected blood-brain barrier impairment, HES does not penetrate from the plasma into the cerebrospinal fluid.

1394. Dietz, H. (1980). "[Perforating orbito-frontal injuries (author's transl)]." Uber orbito-frontale perforierende Verletzungen. 23(6): 219-223.

In spite of the severity of the injury, perforating orbito-frontal injuries have often been overlooked on account of their very scanty clinical symptoms. For this reason they are particularly dangerous. The historic, aetiological, diagnostic and clinical aspects of the lesion are discussed. Experiences from the literature are reported as well as our own observations. In nearly all of our 15 personal cases there was initially a CSF fistula and a brain injury; in all six of the late cases there had been three or more attacks of meningitis and in five the diagnosis was only made after a brain abscess had developed.

1395. Diggs, C. L. (1986). "Recognition and nursing care of organ donors." Journal of emergency nursing 12(4): 205-209.

1396. Dijkstra, S., et al. (2000). "Up-regulation of CD81 (target of the antiproliferative antibody; TAPA) by reactive microglia and astrocytes after spinal cord injury in the rat." The Journal of comparative neurology 428(2): 266-277.

We examined the expression of CD81 (also known as TAPA, or target of the antiproliferative antibody) after traumatic spinal cord injury in the rat. CD81, a member of the tetraspanin family of proteins, is thought to be involved in reactive gliosis. This is based on the antiproliferative and antiadhesive effects of antibodies against CD81 on cultured astrocytes, as well as its up-regulation after penetrating brain injury. CD81 expression following dorsal hemisection of the spinal cord was determined immunohistochemically at time points ranging from 1 day to 2 months postlesion (p.l.). In

the unlesioned cord a low background level of CD81 was observed, with the exception of the ependyma of the central canal and the pia mater, which were strongly CD81-positive. One day p.l., CD81 was diffusely up-regulated in the spinal cord parenchyma surrounding the lesion site. From 3 days onward, intensely CD81-positive round cells entered the lesion site, completely filling it by 7 days p.l. Staining with the microglial markers OX-42 and Iba1 revealed that these cells were reactive microglia/macrophages. At this time, no significant CD81 expression by GFAP-positive reactive astrocytes was noted. From the second week onward, CD81 was gradually down-regulated; i.e., its spatial distribution became more restricted. The CD81-positive microglia/macrophages disappeared from the lesion site, leaving behind large cavities. After 2 months, astrocytes that formed the wall of these cavities were strongly CD81-positive. In addition, CD81 was present on reactive astrocytes in the dorsal funiculus distal from the lesion in degenerated white matter tracts. In conclusion, the spatiotemporal expression pattern of CD81 by reactive microglia and astrocytes indicates that CD81 is involved in the glial response to spinal cord injury. Copyright 2000 Wiley-Liss, Inc.

1397. Dikmen, S. S., et al. (2009). "Cognitive outcome following traumatic brain injury." The Journal of head trauma rehabilitation 24(6): 430-438.

OBJECTIVE: To determine whether an association exists between traumatic brain injury (TBI) sustained in adulthood and cognitive impairment 6 months or longer after injury., DESIGN: Systematic review of the published, peer-reviewed literature., RESULTS: From 430 articles, we identified 11 primary and 22 secondary studies that examined cognitive impairment by using performance measures for adults who were at least 6 months post-TBI. There was clear evidence of an association between penetrating brain injury and impaired cognitive function. Factors that modified this association included preinjury intelligence, volume of brain tissue lost, and brain region injured. There was also suggestive evidence that penetrating brain injury may exacerbate the cognitive effects of normal aging. We found clear evidence for long-term cognitive deficits associated with severe TBI. There was suggestive evidence that moderately severe brain injuries are associated with cognitive impairments. There was inadequate/insufficient evidence to determine whether an association exists between a single, mild TBI and cognitive deficits 6 months or longer postinjury., CONCLUSION: In adults, penetrating, moderate, and severe TBIs are associated with cognitive deficits 6 months or longer postinjury. There is insufficient evidence to determine whether mild TBI is associated with cognitive deficits 6 months or longer postinjury.

1398. Di-Luciano, A., et al. (2019). "Challenging Surgical Approach to a Lost Inferior Rectus Muscle Following Penetrating Orbital Trauma." Journal of pediatric ophthalmology and strabismus 56: e49-e52.

A 37-year-old man suffered a penetrating left orbital injury with rupture of the inferior rectus muscle and avulsion of the optic nerve. The orbit was explored and the inferior rectus muscle stump was identified 25 mm from the limbus. Despite this, the muscle was successfully reattached and the patient achieved satisfactory postoperative alignment. [J Pediatr Ophthalmol Strabismus. 2019;56:e49-e52.]. Copyright 2019, SLACK Incorporated.

1399. DiMaio, V. J., et al. (1987). "Use of scanning electron microscopy and energy dispersive X-ray analysis (SEM-EDXA) in identification of foreign material on bullets." Journal of forensic sciences 32(1): 38-47.

The authors report two cases in which examination of foreign material embedded in or adherent to bullets provided critical information in the reconstruction of a crime scene. Analysis of small particles by scanning electron microscopy (SEM) and energy dispersive X-ray analysis (EDXA) can be accomplished without destruction or injury of the particles. In one case, the detection and identification of mineral fragments embedded near the nose of a bullet provided conclusive evidence that the bullet had ricocheted from a fireplace before striking the victim. In the second case, analysis of particles from

two bullets identified them as them as bone fragments, thus proving which shots fired from a police officer's gun had killed a suspected burglar. SEM-EDXA has not been widely used to identify such material on bullets, but should be considered a potentially powerful tool in forensic science.

1400. Dimitrov, M., et al. (1996). "The effects of frontal lobe damage on everyday problem solving." Cortex; a journal devoted to the study of the nervous system and behavior 32(2): 357-366.

The prefrontal cortex plays an especially important role in human social-cognitive behavior. It has been difficult to quantify deficits in this domain in patients with frontal lobe lesions using standardized psychological instruments. We administered the Everyday Problem Solving Inventory (EPSI), which is composed of a range of scenarios depicting everyday social problems and their possible solutions, to a group of patients with frontal lobe lesions who were required to rate each of 4 possible solutions to each problem for their effectiveness. Our sample consisted of 27 normal controls (NCs), 33 patients with focal frontal lobe lesions (FLL), and 3 patients with frontal lobe dementia (FLD). The performance of the FLL patients on the EPSI instrument was also compared with their performance on traditional neuropsychological tests. The results indicated that the FLD patients' EPSI rank ordering of social problem solutions was uncorrelated with the performance of NCs and about half of the FLL patients EPSI rank orderings of solutions also varied substantially from those of the NCs. These same FLL patients also had the lowest scores, compared to FLL patients whose judgements on the EPSI were similar to that of the NCs, on a set of neuropsychological tasks sensitive to frontal lobe dysfunction. There was no obvious relationship between locus of lesion within the frontal lobes and performance on the EPSI. These results suggest that some patients with prefrontal lobe lesions may have impaired social judgement that can be directly revealed through the use of a conventional psychological inventory such as the EPSI.

1401. Dimopoulou, I., et al. (2003). "High prevalence of decreased cortisol reserve in brain-dead potential organ donors." Critical care medicine 31(4): 1113-1117.

OBJECTIVE: To investigate the adrenocortical function in brain-dead patients, potential organ donors., DESIGN: Prospective study., SETTING: Intensive care units in two teaching hospitals., PATIENTS: A total of 37 patients (28 men, nine women) with severe brain injury, having a mean age of 42 +/- 18 yrs, were included in the study. Group A consisted of 20 brain-injured patients who did not deteriorate to brain death. Group B included 17 brain-injured patients who were brain dead; of these, ten patients developed brain death during ICU stay and seven patients were admitted to the ICU after clinical brain death., INTERVENTIONS: In all patients (group A and group B), a morning blood sample was obtained at admission to the ICU to determine baseline plasma cortisol. Subsequently, 1 microg of corticotropin (adrenocorticotropic hormone, Synacthen) was administered intravenously, and a blood sample was taken 30 mins after the injection. In group B patients who became brain dead while being treated in the ICU (n = 10), the same procedure was repeated the morning after the confirmation of brain death. Patients having a cortisol level of at least 18 microg/dL after the administration of adrenocorticotropic hormone were defined as responders., MEASUREMENTS AND MAIN RESULTS: After the occurrence of brain death, group B patients had significantly lower values for baseline (8.5 +/- 6.2 vs. 17.0 +/- 6.6 microg/dL, p <.001) and stimulated (16.9 +/- 6.3 vs. 23.9 +/- 5.7 microg/dL, p =.001) plasma cortisol compared with group A patients. Thirteen group B patients (76%) and two group A patients (10%) were nonresponders to adrenocorticotropic hormone (p <.001). In group B patients, baseline and stimulated cortisol concentrations were significantly related (r =.71, p =.001), whereas there was no correlation between baseline cortisol and the increment in cortisol (r = -.37, p =.15). Mean hormonal data of the ten brain-dead patients studied at admission in the ICU and after the occurrence of brain death were the following: baseline plasma cortisol (23.5 +/- 11.4 vs. 6.8 +/- 4.2 microg/dL, p =.003) and stimulated serum cortisol (28.8 +/- 9.9 vs. 16.3 +/- 4.3 microg/dL, p =.008)., CONCLUSIONS: Adrenal cortisol secretion after dynamic stimulation is deficient in a substantial proportion of brain-dead potential organ donors.

1402. Dinakaran, S. and P. J. Noble (1998). "Silent orbitocranial penetration by a pencil." Journal of accident & emergency medicine 15(4): 274-275.

OBJECTIVE: To emphasise the value of computed tomography even in the absence of symptoms in a case of penetrating injury of the upper eyelid., METHODS: Case report., RESULTS: Although clinically asymptomatic, penetration of upper eyelid was associated with intracranial penetration that left a track in the brain parenchyma., CONCLUSIONS: Computed tomography of orbit and brain is an important investigation, even in seemingly trivial eyelid injury, to reveal the full extent of the damage.

1403. Ding, K., et al. (2008). "Cerebral atrophy after traumatic white matter injury: correlation with acute neuroimaging and outcome." Journal of neurotrauma 25(12): 1433-1440.

Traumatic brain injury (TBI) is a pathologically heterogeneous disease, including injury to both neuronal cell bodies and axonal processes. Global atrophy of both gray and white matter is common after TBI. This study was designed to determine the relationship between neuroimaging markers of acute diffuse axonal injury (DAI) and cerebral atrophy months later. We performed high-resolution magnetic resonance imaging (MRI) at 3 Tesla (T) in 20 patients who suffered non-penetrating TBI, during the acute (within 1 month after the injury) and chronic stage (at least 6 months after the injury). Volume of abnormal fluid-attenuated inversion-recovery (FLAIR) signal seen in white matter in both acute and follow-up scans was quantified. White and gray matter volumes were also quantified. Functional outcome was measured using the Functional Status Examination (FSE) at the time of the chronic scan. Change in brain volumes, including whole brain volume (WBV), white matter volume (WMV), and gray matter volume (GMV), correlates significantly with acute DAI volume ($r = -0.69$, -0.59, -0.58, respectively; $p < 0.01$ for all). Volume of acute FLAIR hyperintensities correlates with volume of decreased FLAIR signal in the follow-up scans ($r = -0.86$, $p < 0.001$). FSE performance correlates with acute hyperintensity volume and chronic cerebral atrophy ($r = 0.53$, $p = 0.02$; $r = -0.45$, $p = 0.03$, respectively). Acute axonal lesions measured by FLAIR imaging are strongly predictive of post-traumatic cerebral atrophy. Our findings suggest that axonal pathology measured as white matter lesions following TBI can be identified using MRI, and may be a useful measure for DAI-directed therapies.

1404. Dinocourt, C., et al. (2006). "Injury-induced axonal sprouting in the hippocampus is initiated by activation of trkB receptors." The European journal of neuroscience 24(7): 1857-1866.

Penetrating head injuries are often accompanied by the delayed development of post-traumatic epilepsy. Schaffer collateral transection leads to axonal sprouting and hyperexcitability in area CA3 of hippocampal slice cultures. We used this model to test the hypothesis that the injury-induced axonal sprouting results from increased neurotrophin signaling via trkB receptors near the lesion. Using rats and mice, we established that sprouting CA3 pyramidal cell axons are labeled with an antibody to the growth-associated protein GAP-43. We observed two- to threefold increases in the level of brain-derived neurotrophic factor and trkB protein in area CA3 by 24-48 h after Schaffer collateral transection, preceding the onset of axonal sprouting. Finally, we demonstrated that injury-induced axonal sprouting of GAP-43-immunoreactive axons is impaired in hippocampal slice cultures from mice expressing low levels of trkB receptors. We conclude that injury-induced axonal sprouting is initiated by brain-derived neurotrophic factor-trkB signaling and suggest that this process may be critical for the genesis of post-traumatic epilepsy.

1405. Diop, A. and M. Faye (2021). "Penetrating brain trauma through a metal bar extracted at home: An unusual case." Neuro-Chirurgie 67(6): 636-638.

1406. Distelmaier, P. and I. Vlajic (1977). "Position of a projectile in a cerebral ventricle." Lage eines Geschosses in einem Hirnventrikel 126(1): 71-72.

1407. Ditmore, Q. M., et al. (1980). "Traumatic middle cerebral artery aneurysm: case report." Neurosurgery 6(3): 293-296.

A case of traumatic middle cerebral artery aneurysm is presented. The case demonstrates some of the difficulties encountered when dealing with this type of aneurysm. The unusual surgical approach required for obliteration is described.

1408. Dittmann, W. (1986). "[Gunshot injuries of the brain caused by air pressure guns]." Gehirnschussverletzungen durch Luftdruckwaffen. 96(2): 119-131.

The article describes the historical and legal basis, as well as the ballistic criteria of injuries caused by air-rifle shots to the head. Six of our own cases of craniocerebral air-gun pellet injuries are discussed and critically assessed, using the results communicated in other papers as the basis of the discussion. The different post-traumatic complications, including the histopathological reaction of the brain to lead-pellets, are considered. The literature is reviewed and the indications for stereotactic removal or craniotomy of intracranial air-gun pellets are discussed. Air rifles, while occasionally the cause of serious head injuries, are rarely thought of as lethal weapons. However, this article illustrates the potential penetrating power of the air-gun pellet, a fact not always appreciated by physicians.

1409. Dixon, C. E., et al. (2016). "Cyclosporine Treatment in Traumatic Brain Injury: Operation Brain Trauma Therapy." Journal of neurotrauma 33(6): 553-566.

Operation Brain Trauma Therapy (OBTT) is a consortium of investigators using multiple pre-clinical models of traumatic brain injury (TBI) to bring acute therapies to clinical trials. To screen therapies, we used three rat models (parasagittal fluid percussion injury [FPI], controlled cortical impact [CCI], and penetrating ballistic-like brain injury [PBBI]). We report results of the third therapy (cyclosporin-A; cyclosporine; [CsA]) tested by OBTT. At each site, rats were randomized to treatment with an identical regimen (TBI + vehicle, TBI + CsA [10 mg/kg], or TBI + CsA [20 mg/kg] given intravenously at 15 min and 24 h after injury, and sham). We assessed motor and Morris water maze (MWM) tasks over 3 weeks after TBI and lesion volume and hemispheric tissue loss at 21 days. In FPI, CsA (10 mg/kg) produced histological protection, but 20 mg/kg worsened working memory. In CCI, CsA (20 mg/kg) impaired MWM performance; surprisingly, neither dose showed benefit on any outcome. After PBBI, neither dose produced benefit on any outcome, and mortality was increased (20 mg/kg) partly caused by the solvent vehicle. In OBTT, CsA produced complex effects with histological protection at the lowest dose in the least severe model (FPI), but only deleterious effects as model severity increased (CCI and PBBI). Biomarker assessments included measurements of glial fibrillary acidic protein (GFAP) and ubiquitin C-terminal hydrolase-L1 (UCH-L1) in blood at 4 or 24 h after injury. No positive treatment effects were seen on biomarker levels in any of the models, whereas significant increases in 24 h UCH-L1 levels were seen with CsA (20 mg/kg) after CCI and 24 h GFAP levels in both CsA treated groups in the PBBI model. Lack of behavioral protection in any model, indicators of toxicity, and a narrow therapeutic index reduce enthusiasm for clinical translation.

1410. Dixon, C. E., et al. (2014). "Dose-response evaluation of simvastatin in the controlled cortical impact model: Operation brain trauma therapy consortium." Journal of neurotrauma 31(12): A107.

The 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor simvastatin reduces serum cholesterol but also has potent inhibitory effects on neuro-inflammation and possible effects on brain edema, Akt, CBF and trophic factor production. Simvastatin was screened in the Operation Brain

Trauma Therapy (OBTT) consortium for efficacy as a sustained therapy to improve neurobehavioral and neuropathological outcomes in the controlled cortical impact (CCI) model. Forty male Sprague-Dawley rats were anesthetized and surgically prepared for CCI injury (4 m/sec, 2.5-mm deformation) or sham surgery. Rats were randomized into four groups: CCI + vehicle (3% methylcellulose in distilled water), CCI + simvastatin (1mg/kg), CCI + simvstatin (5 mg/kg), and sham. Simvastatin was given PO with the first dose at 3 h after injury and subsequent doses daily for 14 d. Motor function (beam balance and walking) were evaluated on d1-5 and Morris water maze (MWM) (acquisition and probe trial) on d14-20. Rats were sacrificed on d21 to assess lesion and hemispheric volumes. In the beam balance test, the CCI + vehicle and CCI + simvastatin (1mg/kg) performed significantly worse than sham while the CCI + simvastatin (5 mg/kg) did not differ from sham. In the beam walking test and MWM acquistion, all of the CCI groups performed significantly worse than sham and neither simvastatin-treated group differed vs. vehicle. In the MWM probe trial (% time in target quadrant), there were no differences between CCI groups. Neither lesion volume nor hemispheric volume loss were reduced by treatment. Surprisingly, our study did not replicate the benefit of simvastatin shown in previous work. Similar to the fluid percussion and penetrating ballistic-like brain injury models also used in OBTT, modest benefit was limited to motor performance after CCI. Support: US Army, W81XWH-10-1-0623.

1411. Dixon, C. E., et al. (2013). "Operation brain trauma therapy consortium: Dose-response evaluation of cyclosporine a in the pittsburgh controlled cortical impact model of traumatic brain injury." Journal of neurotrauma 30(15): A159.

Introduction Cyclosporine A (CsA) is a clinically-used immunosuppressant that has shown beneficial effects in several animal models of TBI. CsA was screened in the Operation Brain Trauma Therapy consortium. We assessed the therapeutic efficacy of post-injury administration of CsA on neurobehavioral and neuropathological outcomes in the controlled cortical impact (CCI) model. Methods Thirty-nine male Sprague-Daley rats were anesthetized and surgically prepared for CCI injury (4 m/sec, 2.5mm deformation) or sham surgery. Rats were randomized into four groups: CCI + vehicle (Cremophor), CCI + CsA (10mg/kg), CCI + CsA (20mg/kg), and sham. CsA was given IV at 15 min and 24 h after injury. Blood sampling (0.7mL whole blood) via the tail artery was obtained at 4 h, 24 h, and at sacrifice from each rat to measure the neuronal biomarker UCH-L1 and the glial biomarker GFAP levels. Motor function (beam balance and beam walking) were evaluated on days 1-5 and Morris water maze (MWM) (acquisition and probe trial) on days 14-20. The rats were sacrificed on day 21 to assess lesion and hemispheric tissue volumes. Results In the beam balance test, there was no treatment effect vs. vehicle, although both CCI + CsA groups performed significantly worse than sham. In the beam walking test, all of the CCI groups performed significantly worse than sham, but none of the CCI + CsA groups differed vs. vehicle. For MWM acquisition, only the CCI + CsA 20mg/ kg group performed significantly worse ($P > 0.01$) than sham. In the probe trial (% time in target quadrant), there were no statistical differences between groups. Neither lesion volume nor hemispheric volume loss were significantly affected by treatment. Injury significantly increased serum GFAP levels in vehicle ($P < 0.01$ vs. sham), but high dose CsA exhibited the highest GFAP levels at 24 h ($P < 0.001$ vs. sham). However, the three CCI groups did not significantly differ from each other for GFAP levels at 24 h. Conclusions Our study did not replicate the benefit of CsA shown in previous work. In fact, the higher dose (20 mg/kg) actually impaired performance on MWM and showed the highest 24 h serum GFAP levels. Our findings in CCI are also consistent with failure of CsA in the penetrating ballistic-like brain injury model in OBTT and do not support utility of CsA in severe insults.

1412. Diyora, B., et al. (2021). "Meat Hook Injury Leading to Brain Abscess: A Rare Occurrence." Indian Journal of Neurotrauma.

Transorbital orbitofrontal penetrating injury by a nonmissile object is uncommon. The presentation of this injury varies. This injury can be easily missed during the initial clinical presentation, because the foreign body is sometimes not visible on local examination, the wound on the orbital skin is

small, and very subtle signs are present. The patient can present with delayed complications of the primary injury. Our patient was a 33-year-old male who presented with an orbitofrontal injury with a meat hook. He had minor symptoms at the time of presentation, which were overlooked. Three weeks later, he developed signs and symptoms of raised intracranial pressure (ICP). Brain imaging revealed a peripheral rim of contrast-enhancing mass lesion in the right frontal lobe, extending into the right orbit with perilesional edema suggestive of posttraumatic brain abscess. Via right frontal craniotomy, pus was drained out and abscess wall was excised. The patient made good clinical recovery. A higher index of suspicion and sound knowledge of occult penetrating injury patterns is required in the cases of orbital injuries. Appropriate radiological imaging can lead to an earlier and accurate diagnosis, and can prevent its delayed sequela like brain abscess.

1413. Diyora, B., et al. (2021). "Iron Rod Penetrating Head Injury in a Child." Indian Journal of Neurotrauma 18(2): 148-149.

1414. Diyora, B., et al. (2018). "Perforating head injury with iron rod and its miraculous escape: Case report and review of literature." Trauma case reports 14: 11-19.

Civilian perforating head injury is rare. Because rarity of this injury, there is no standard management protocol. We report a case of perforating head injury with iron rod, review the literature on the subject and discuss the challenges in the management of such case. We have not found similar case in the literature. Civilian perforating head injury is rare. A 25-year-male brought to the emergency department with approximately two feet perforating iron rod in the head, entering via frontal region, left side of midline and coming out of the occipital region. He developed right sided hemiplegia and global aphasia. He underwent series of imaging for the evaluation of the course of the iron rod and injury sustained because of it. Under strict aseptic precaution, iron rod removed in the operation theater. His clinical condition improved over a period of three weeks. At one year follow up- he had almost normal speech and language functions and was able to walk without support. This case illustrates the possibility of bizarre type of such injury in the presence of protective helmet and challenges in the management. Preoperative planning on the basis of images, prophylactic antibiotics and anticonvulsant medications, cleaning of the objects with antiseptic solutions, anterograde extraction after adequate exposure around entry and exit points resulted in good clinical outcome after successful removal of the rod.

1415. Diyora, B., et al. (2022). "Life-threatening perforating brain injury by a rusty iron rod – A case report." Surgical neurology international 13.

Background: When an object traverses through the cranium leaving behind both an entry and exit wound, it is called perforating brain injury. Perforating open brain injury is rare. A paucity of published literature on such cases and a lack of a standard management protocol pose significant challenges in managing such cases. Case Description: We present a case of a 24-year-old man who worked as a carpenter at the construction site. He slipped while working and fell from a height of 13 feet onto a rusty, vertically placed 3 feet iron rod located on the ground. Iron rod entered his body from the right upper chest, came out from the neck, and again re-entered through the right upper neck medial to the angle of the mandible and finally came out from the posterosuperior surface of the right side of the head. He presented to the emergency department in a conscious state, but his voice was heavy and slow-paced, and he showed signs of lower cranial nerve palsy on the right side. He underwent numerous radiological investigations. The iron rod was removed in the operation theater under strict aseptic precautions. On day 7 after surgery, he developed right lobar pneumonia, and on day 21, he developed an altered sensorium, followed by a loss of consciousness. He did not regain consciousness and, unfortunately, succumbed after 30 days of sustaining the injuries. Conclusion: Perforating open brain injuries are rare, especially in civilian society, and are usually associated with significant morbidity and mortality. Due to a lack of standard guidelines for managing such severe injuries and limited knowledge, many patients

with these injuries do not survive. Although each case presents differently, certain management principles must be followed.

1416. Dizdarevic, K., et al. (2011). "War head injuries: Experience from sieged Sarajevo." Acta neurochirurgica 153(9): 1881.

Objectives. We aimed to analyze the war head injuries in sieged Sarajevo during the first part of Bosnian war and to present our operative strategies. Patients and methods. We conducted a retrospective study of injured patients using review of the hospital data. Results. 1,728 neurosurgical injured patients were admitted to our department. Majority of patients (84%) were admitted within 3 hours of injury and operated without any delay. The neurosurgical injuries were head injuries (80%), spine injuries (6%) and peripheral nerve injuries (14%). Over 80% of headinjured patients had penetrating injury. The patients with head injury were operated on in 70% of cases.Mortality of operated patients was 13.3%. The number patients with GCS 3 and GCS 4 who died were 143 (35%) and 122 (30 %). The GCS 4 patients were operated on only in the case of compressive intracranial haematomas. A total mortality of the patients with head injury was 30%. Over 60% of injured patients who died were under 50 years old. The most common cause of death were excessive penetrating brain injury (85%) caused by shell shrapnels and sniper bullets. Shrapnels were the cause of injury in 73% of cases. Good outcome without any focal neurological deficit was found in 42.6% of all patients with head injury. Conclusion: Our less invasive early neurosurgical operative approach in the form of intracranial haematomas evacuation, reduced brain debridment without searching for in-driven fragments and meticulous dural closure resulted in acceptable treatment outcome during the Bosnian war.

1417. Djabali, E. J. and P. T. Dziegielewski (2020). "A lucky bullet in the neck: Incidental carcinoma of unknown primary found during a gunshot wound repair." Otolaryngology Case Reports 16.

Background: The incidental finding of squamous cell carcinoma (SCC) in cervical lymph nodes during neck exploration for non-oncologic surgery is not reported in the literature. This study presents the first-ever reported incidentally found SCC in the neck during a penetrating neck trauma repair. The approach, clinical implications, and treatment are discussed. Case presentation: A 58-year-old otherwise healthy male was taken to an outside emergency department following a near-fatal gunshot wound to his neck with a large pharyngeal defect. During the neck exploration, several firm enlarged upper cervical lymph nodes were sent for frozen section pathology, which came back suspicious for SCC. A comprehensive neck dissection was completed and the remaining lymph nodes were excised. The patient underwent a pharyngoplasty and neck skin reconstruction with a bi-lobed anterolateral thigh (ALT) free flap. Final pathology identified the neck nodes to be positive for moderately differentiated human papillomavirus negative SCC. The patient underwent treatment for cancer of unknown primary with chemoradiation therapy. PET-CT imaging 1-year postoperatively was negative for persistent or recurrent disease. The patient was without signs of recurrence at his 18-month follow-up with a viable ALT flap at the site of reconstruction. Discussion: Incidental cancer diagnosis during surgery following trauma is rare. These circumstances make a case for routine examination of lymph nodes during surgery.

1418. Djalilian, H. R., et al. (2002). "Reconstruction of complicated skull base defects utilizing free tissue transfer." Skull Base 12(4): 209-213.

We managed five patients with large skull base defects complicated by complex infections with microvascular free tissue transfer. The first patient developed an infection, cerebrospinal fluid (CSF) leak, and meningitis after undergoing a translabyrinthine resection of an acoustic neuroma. The second patient had a history of a gunshot wound to the temporal bone, with a large defect and an infected cholesteatoma that caused several episodes of meningitis. The third through the fifth patients had persistent CSF leakage and infection refractory to conventional therapy. In all cases prior attempts of closure with fat grafts or regional flaps had failed. Rectus abdominis myofascial free flap, radial forearm

free flap or a gracilis muscle free flap was used after debridement of the infected cavities. The CSF leaks, local infections, and meningitis were controlled within a week. In our experience, microvascular free tissue provides the necessary bulk of viable, well-vascularized tissue, which not only assures a mechanical seal but also helps clear the local infection.

1419. Djilvesi, D., et al. (2010). "[Association of post-traumatic communication of endocranium and nasal cavity with recurrent meningoencephalitis without rhinorrhea]." Vojnosanitetski pregled **67**(11): 945-948.

INTRODUCTION: A gunshot head injury, characterized by a huge intensity of mechanical force, in addition to the direct tissue damage at the location of direct impact, may cause a skull and skull base fracture, distant from the the point of direct impact, which could be further complicated by creating a communication between endocranium and nasal/paranasal cavities. Such cases pose a great diagnostic and therapeutic challenge for every clinician., CASE REPORT: The patient is presented with the history of a perforating gunshot head injury six years ago, with recurrent attacks of meningoencephalitis subsequently, without rhinorrhea. By using high resolution CT scans, previous traumatic skull injury was verified and a fissure in the frontoethmoidal region, far from the point of direct impact, was detected. The patient underwent transnasal endoscopic surgery, in order to seal the communication on skull basis. The patient did not suffer from meningoencephalitis during the next two years., CONCLUSION: In the cases with late occurrence of posttraumatic meningoencephalitis with no signs of rhinorrhea, a possibility of an existing communication between intracranial and nasal cavities should be considered, as well. By applying modern diagnostic and therapeutic procedures such communication should be precisely located and sealed.

1420. Doctor, V. S. and D. G. Farwell (2007). "Gunshot wounds to the head and neck." Current opinion in otolaryngology & head and neck surgery **15**(4): 213-218.

PURPOSE OF REVIEW: Gunshot wounds to the head and neck result in significant bone and soft tissue loss. These defects pose a challenge to the facial reconstructive surgeon. This paper reviews the current literature on the management of ballistic injuries to the head and neck and outlines a treatment algorithm., RECENT FINDINGS: With recent advances in free tissue transfer, early definitive reconstruction of bone and soft tissue deficits with vascularized flaps has become the treatment of choice. Computed tomography angiography of the neck has been shown to be a sensitive, specific, and safe technique in screening for vascular injuries., SUMMARY: Management of ballistic injuries to the head and neck begins with advanced trauma life support protocols. Computed tomography angiography is now widely available and provides an accurate and rapid evaluation of head and neck vasculature. The initial operation aims to establish occlusion, stabilize bone and close soft tissue defects. Serial debridement of wounds with delayed reconstruction has given way to early definitive repair with vascularized tissue. This has led to improved function, fewer operations, and shorter hospital stays.

1421. Doddamreddy, P., et al. (2016). "Critical illness associated with methamphetamine exposure in the central valley of California (crime)." Chest **150**(4): 333A.

PURPOSE: The Stimulant Associated Disease Database (SADD) was established to document the health related consequences of methamphetamine exposure (ME) from a single tertiary care center in the Central Valley of California. This interim analysis focuses on critical illness associated with ME. METHODS: Data was derived from SADD, an ongoing retrospective observational registry study at our institution including all patients with a positive urine drug screen (UDS) for amphetamines, which is used as a surrogate for methamphetamine positive. Of 16,232 UDS ordered from Jan to Dec 2013, 2714 were positive (16.72%). We retrospectively reviewed 688 of these medical charts with a focus on patients with critical illness. RESULTS: Among 688 patients, 56 (8.14%) were admitted to the Intensive Care Unit (ICU). The average age was 45.28 years, and predominantly male (62.5%). 46.45% of the patients were brought to the Emergency Department (ED) for altered mental state (AMS), while 37.5% were brought for trauma. Other chief complaints included “found down” (19.64%), shortness of breath (14.29%), suicidal ideations (7.14%) and seizure (3.57%). Of note, 42.85% of the patients were hypertensive (SBP >140) upon arrival to the ED with an average blood pressure of 183/104 mmHg. Admission locations were: medical ICU (60.71%), trauma ICU (32.14%), burn ICU (5.36%), and surgical ICU (1.78%). The admitting diagnoses included AMS (16.07%), septic shock (12.5%), gunshot wound (10.7%), blunt trauma (7.14%), seizure (7.14%), cerebrovascular hemorrhage (7.14%), stab wounds (5.3%), and motor vehicle collision (5.3%). A few other included auto vs pedestrian, hypertensive emergency, acute kidney injury (AKI), train vs pedestrian, and

respiratory failure. The mean ICU length of stay (LOS) of 7.84 ± 10.78 days. 67.85% required mechanical ventilatory support with an average of 6.18 ± 10.379 ventilator days (VD). 12.5% required vasopressors and coincidentally 12.5% also were bacteremic. 16.07% of the patients had AKI while 5.35% were found to have rhabdomyolysis. However, only one patient (1.78%) required dialysis. Of the 56 ICU admissions, 6 (10.71%) expired in the ICU. Majority of these patients were male (66.67%) with an average age of 47.5 years. All these patients presented with AMS and they had an average ICU LOS of 5.17 days & 4.67 VD. The causes of death included multi-organ failure, multiple cerebral infarcts, cerebral edema, brain herniation, bacterial endocarditis and septic shock. CONCLUSIONS: 1. Amongst all UDS requested over a one year period,16.72% were positive for ME, 8% requiring ICU care. 2. ME was more predominant in young men 3. Hypertension was prevalent (>40%) upon arrival to the ED with an average SBP > 180 mmHg 4. Altered Mental State, Septic shock and Trauma accounted for > 80% of the ICU admissions with an average ICU LOS > 7 days.

1422. Dodge, G. G., et al. (1994). "Gunshot wounds: 10-year experience of a rural, referral trauma center." The American surgeon **60**(6): 401-404.

The 10-year experience of a Level II trauma center with 122 gunshot wounds referred from a large rural area was analyzed to illustrate differences from the experience of urban centers. Most frequent causes of injury were attempted suicide in 38 (31%) patients, hunting mishaps in 32 (26%), unintentional accidents in 29 (24%), and intentional assault in 18 (15%). Of weapons specified, rifles were documented in 48 (39%) instances, shotguns in 25 (21%), and handguns in 24 (20%). Body regions injured were the trunk in 47 (39%) patients, head in 35 (29%), lower extremity in 31 (25%), and upper extremity in 29 (24%). Twenty-five patients (20%) died as a result of their injuries. The cause of death was brain injury in 18 (72%), exsanguination from truncal wounds in 5 (20%), myocardial infarction in 1 (4%), and multiple organ failure in 1 (4%). We conclude that the distributions of cause and type of gunshot wounds are unique in a rural setting. These differences have profound consequences in designing effective prevention programs for our area and support the design of more efficient trauma systems for rural North America.

1423. Dodson, R. F., et al. (1978). "Cerebral tissue response to electrode implantation." The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques **5**(4): 443-446.

Tissue response to platinum electrodes was assessed after an eight-day implantation period. The regions of study included the cortical areas at the opercular gyri and at the sulcus parieto-occipitalis externus, as well as the sub-cortical white matter in these cases. Perivascular and intraparenchymal hemorrhagic lesions as well as edematous changes characterized both by extensive intra and extracellular swelling were noted. Numerous phagocytic elements and degenerative strucutres were present at the electrode/parenchymal interface. Tissue alterations were asymmetrical as observed both around and at the tip of the implanted electrode. The parenchymal alterations extended from 0.2mm to 3.5mm distance from the electrode path/parenchymal interface. Greater tissue involvement was found in the subcortical white matter as compared to the adjacent cortical gray matter.

1424. Doherty, P. F. and R. P. Rabinowitz (2004). "Gunshot wounds to the head: The role of antibiotics." Infections in Medicine **21**(6): 297-300.

Penetrating craniocerebral injuries are the leading cause of death from head trauma in the civilian population aged 35 to 75 years. In a retrospective review, we identified 19 infectious complications in 59 patients with gunshot wounds to the head who were seen at a trauma center during a period of 3.5 years. The majority of CNS infections identified were related to placement of invasive monitoring devices, specifically ventriculostomies (4 cases of ventriculitis). Most patients received antibiotics at the time of presentation, but few received CNS-specific coverage or extended-duration antibiotic therapy. No relationship could be identified between use of prophylactic antibiotics and risk of infection.

1425. Dohlman, C. H., et al. (1974). "Prosthokeratoplasty." American journal of ophthalmology **77**(5): 694-670.

1426. Dohrmann, G. J. and J. M. Rubin (1997). "Neurotraumatology: ultrasonic evaluation of the central nervous system." Neurological research **19**(3): 317-322.

In this study we describe the technique of intraoperative ultrasound imaging of brain and spinal cord in trauma patients. The images are shown and their interpretation is discussed. This intraoperative imaging allows for localization of hematomas, bone fragments and indriven foreign bodies (i.e., pieces of plastic, glass, metal, etc.). Disc material and bone fragments deep to the spinal cord can be localized with this technique. Real-time ultrasound can be used to guide instruments within the brain and, thereby, provide dynamic guidance for removal of bone fragments and foreign bodies dynamically. In summary, intraoperative real-time ultrasonic imaging is of use to the neurosurgeon in the treatment of the neurotrauma patient.

1427. Dojcinovic, I., et al. (2007). "Unusual ballistic trauma of the face with a less-lethal launcher." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **65**(10): 2105-2107.

1428. Dolachee, A. A., et al. (2019). "Factors affecting the outcome in surgically treated civilian penetrating head injury: Case series." International Journal of Research in Pharmaceutical Sciences **10**(3): 2120-2126.

Penetrating brain injury (PBI) is any injury that causes penetration of the scalp, skull, meninges, and brain. It is a traumatic brain injury caused by either low-velocity sharp objects (e.g. a knife), high-velocity projectiles (shell fragment or bullets) or blast injury is the consequence of the detonation of complex explosives with or without PBI and closed head injury. Aim of the study: To evaluate the factors (pre-operative and operative) that affect the surgical outcome of civilian PBI. This study was done from February 2017 to October 2018 prospectively & retrospectively. The study involved only the civilian patients that got a penetrating head injury and surgically treated in Neurosurgical Teaching Hospital/Baghdad/Iraq. The data include thirty-nine (39) operated patients with PBI. Data information includes the Glasgow Coma Scale (GCS), radiological investigations (computerized tomov graphy (CT-scan) and plain X-ray) the outcome determined by Glasgow Outcome Score (GOS). The patients were followed up during the time of hospitalization. The surgical outcome of the penetrating head injury in this study was assessed by GOS and was as follow, good recovery 10 patients (25.6%), moderately disabled 11 patients (28.2%), severely disabled 5 patients (12.8%), vegetative 6 patients (15.4%), Dead 7 patients (18.0%). Good outcome 21 patients 53.8% while poor outcome 18 patients 46.2%. GCS is significant factor (p-value = 0.002), time not affecting, CT-finding is significant factor (p-value = 0.000), blood pressure >= 90 mm Hg is a good predictor factor (p-value =0.001), speech difficulty is poor predictor factor (p-value = 0.004), outcome of inlet alone better than inlet and outlet. There are many factors affecting the surgical outcome in civilian penetrating head injury, and the significant factor is pre-operative GCS, CT-scan which is the best radiological investigation for pre-operative and postoperative assessment and show the details of the injury, blood pressure > = 90 mm Hg which is a good prognostic factor.

1429. Dolezalova, J., et al. (2001). "[Penetrating intraocular injuries caused by foreign bodies of organic origin]]." Penetrujici poraneni cizim nitroocnim teliskem organickeho puvodu. **57**(6): 381-386.

OBJECTIVE: To demonstrate two eyes of two patients with a penetrating injury by an organic intraocular foreign body (CNT), to outline the course of treatment and to evaluate anatomical and functional results., MATERIAL AND METHODS: During the period between May and July 1999 the authors treated at their department an 11-year-old girl and a 17-year old boy with a penetrating CNT injury of organic origin. In the girl they extracted a CNT which pierced the sclera and protruded into the vitreous body. The foreign body was extracted by means of a forceps, the site of perforation was treated by a cryosurgical procedure with a radial Silastic filling. The man was shot into the OL by a grain of pepper from an air-gun. The organic body in the vitreous body caused a violent inflammatory reaction in the vitreous body and retina. Early extraction of the CNT could not be made because of an adverse corneal finding which made surgery impossible. The progressing proliferative vitreoretinopathy (PVR) led to repeated formation of epiretinal, subretinal and cyclitic membranes which caused relapsing detachment of the retina (OS). The foreign body was extracted during pars plana vitrectomy (PPV) by the transvitreal route using a forceps. Definite adherence of the retina was achieved during the third PPV, membranectomy and implantation of silicone oil (SO). Final functional success was achieved by eliminating SO and by partial perforating keratoplasty., RESULTS: The CNT in the girl was histologically and parasitologically identified as a fibre of animal origin (animal hair or human eyelash). The follow up period is six months, VOP-5/5 nat., NOT 17 torr, bulbus undisturbed. In the second patient the cultivation finding from the vitreous body was negative. Extensive PVR developed as a result of breakdown products of the organic CNT and led to relapsing OS. Three months after the last operation the bulbus is at rest, the corneal disc clear, the retina attached, VOL-3/60 s + 8.0 D

steop., NOT 12 torr., CONCLUSIONS: The final results of treatment of severe devastating penetrating injuries by a CNT is determined by the preoperative condition of the ocular tissues. CNT of organic origin damage intraocular tissues by their breakdown products as well as by more frequent contamination with pathological microorganisms. Our experience provided evidence that penetrating injuries by non-infected CNT of organic origin have a favourable prognosis. But even relapsing and prolonged OS after extraction of the CNT of organic origin and endophthalmitis need not lead to loss of the eye or its function.

1430. Dolinak, D., et al. (2008). "Microscopic and spectroscopic features of gunpowder and its documentation in gunshot wounds in charred bodies." The American journal of forensic medicine and pathology **29**(4): 312-319.

Determining the direction and range of fire of gunshot wounds in charred bodies can be difficult because soot resulting from thermal injury can grossly be identical to soot arising from a contact or close-range firearm discharge. Two charred bodies had gunshot wounds of the head and neck region that were distorted by thermal effect, precluding determination of the direction and range of fire by gross findings alone. By microscopy, deep wound tissue from each charred body had foreign material suggestive of gunpowder. Samples of the foreign material were examined by Fourier transform infrared (FT-IR) microscopy and determined to be cellulose nitrate (nitrocellulose), a main component of gunpowder. In addition, 12 cases of suicide in well-preserved bodies with contact gunshot wounds were examined with FT-IR microscopy, confirming the presence of cellulose nitrate in 6 (50%) of the cases. Identification of cellulose nitrate in the tracks of gunshot wounds can assist in the determination of direction and range of fire when the surface features are charred.

1431. Dolinin, V. A. (1991). "[Irreversibility of the conditions in injuries and gunshot wounds at different sites]." Neobratimost' sostoianii pri travmakh i ognestrel'nykh raneniiakh razlichnoi lokalizatsii. **146**(2): 47-51.

1432. Domanskaia, I. A., et al. (1993). "[The regional use of antibiotics in treating craniocerebral trauma and suppurative complications]." Regionarnoe primenenie antibiotikov pri lechenii cherepno-mozgovoi travmy i gnoinykh oslozhnenii. **150**(3-4): 53-56.

The authors used the intracarotid and subarachnoid methods of infusion of antibiotics for treatment of purulent meningitis, brain abscesses. The methods are considered to be fairly effective.

1433. Domenicucci, M., et al. (1999). "Surgical treatment of penetrating orbito-cranial injuries. Case report." Journal of neurosurgical sciences **43**(3): 229-234.

Penetrating orbital injuries are not frequent but neither are they rare. The various diagnostic and therapeutic problems are related to the nature of the penetrating object, its velocity, shape and size as well as the possibility that it may be partially or wholly retained within the orbit. The authors present another case with unusual characteristics and discuss the strategies available for the best possible treatment of this traumatic pathology in the light of the published data. The patient in this case was a young man involved in a road accident who presented orbito-cerebral penetration caused by a metal rod with a protective plastic cap. Following the accident, the plastic cap (2.5x2 cm) was partially retained in the orbit. At initial clinical examination, damage appeared to be exclusively ophthalmological. Subsequent CT scan demonstrated the degree of intracerebral involvement. The damaged cerebral tissue was removed together with bone fragments via a bifrontal craniotomy, the foreign body was extracted and the dura repaired. Postoperative recovery was normal and there were no neuro-ophthalmological deficits at long-term clinical assessment. Orbito-cranial penetration, which is generally associated with violent injuries caused by high-velocity missiles, may not be suspected in traumas produced by low-velocity objects. Diagnostic orientation largely depends on precise knowledge of the traumatic event and the object responsible. When penetration is suspected and/or the object responsible is inadequately identified, a CT scan is indicated. The type of procedure to adopt for extraction, depends on the size and nature of the retained object. Although the possibility of non-surgical extraction has been described, surgical removal is the safest form of treatment in cases with extensive laceration and brain contusion.

1434. Domenicucci, M., et al. (1995). "Delayed post-traumatic epidural hematoma. A review." Neurosurgical review **18**(2): 109-122.

Post-traumatic acute epidural hematoma (EDH) is generally visible on the CT scan done immediately after admission: occasionally, it only comes to light at a later scan and is then termed delayed (DEDH). Since the introduction of CT, the frequency of this occurrence has gone up from 6-13% to 30%. The mechanisms responsible for the delayed appearance of the epidural hematoma a "tamponade" effect are usually increased endocranial pressure and post-traumatic arterial hypotension as well as, in a limited number of cases, coagulopathy, CSF drainage, and arterio-venous shunt. The authors report 5 of their own cases and 45 published cases and discuss the characteristics of this particular form of hematoma and its outcome.

1435. Domingo, Z., et al. (1994). "Low-velocity penetrating craniocerebral injury in childhood." Pediatric neurosurgery **21**(1): 45-49.

Fifty-four children with low-velocity penetrating injury of the skull and brain are described. The incidence of septic complications was 43%, which is significantly higher than that seen in adults. Nine percent of children developed vascular complications. Due to the high septic complication rate, a more aggressive management protocol consisting of craniectomy and dural repair under antibiotic cover is suggested.

1436. Dominguez-Gil, B., et al. (2017). "End-of-life practices in patients with devastating brain injury in Spain: implications for organ donation." Practicas clinicas al final de la vida en pacientes con dano cerebral catastrofico en Espana: implicaciones para la donacion de organos. **41**(3): 162-173.

OBJECTIVE: To describe end-of-life care practices relevant to organ donation in patients with devastating brain injury in Spain., DESIGN: A multicenter prospective study of a retrospective cohort., PERIOD: 1 November 2014 to 30 April 2015., SETTING: Sixty-eight hospitals authorized for organ procurement., PATIENTS: Patients dying from devastating brain injury (possible donors). Age: 1 month-85 years., PRIMARY ENDPOINTS: Type of care, donation after brain death, donation after circulatory death, intubation/ventilation, referral to the donor coordinator., RESULTS: A total of 1,970 possible donors were identified, of which half received active treatment in an Intensive Care Unit (ICU) until brain death (27%), cardiac arrest (5%) or the withdrawal of life-sustaining therapy (19%). Of the rest, 10% were admitted to the ICU to facilitate organ donation, while 39% were not admitted to the ICU. Of those patients who evolved to a brain death condition (n=695), most transitioned to actual donation (n=446; 64%). Of those who died following the withdrawal of life-sustaining therapy (n=537), 45 (8%) were converted into actual donation after circulatory death donors. The lack of a dedicated donation after circulatory death program was the main reason for non-donation. Thirty-seven percent of the possible donors were not intubated/ventilated at death, mainly because the professional in charge did not consider donation alter discarding therapeutic intubation. Thirty-six percent of the possible donors were never referred to the donor coordinator., CONCLUSIONS: Although deceased donation is optimized in Spain, there are still opportunities for improvement in the identification of possible donors outside the ICU and in the consideration of donation after circulatory death in patients who die following the withdrawal of life-sustaining therapy.

1437. Dominguez-Roldan, J. M., et al. (1992). "Is intracranial hypertension useful in the diagnosis of brain death?" Transplantation proceedings **24**(1): 31-32.

1438. Dominguez-Roldan, J. M., et al. (1992). "High-risk cerebral injuries leading to cerebral death: early detection of potential organ donors." Transplantation proceedings **24**(1): 29-30.

1439. Don Lehmkuhl, L., et al. (1993). "Factors that influence costs and length of stay of persons with traumatic brain injury in acute care and inpatient rehabilitation." Journal of Head Trauma Rehabilitation **8**(2): 88-100.

This study investigated factors that influence the costs (hospital charges) and length of stay (LOS) in acute care and in rehabilitation of 301 persons with traumatic brain injury (TBI). Factors examined included initial severity of brain injury, external cause of injury, blood alcohol level, intracranial operations, and designated payor. As expected, more

severely injured persons had longer LOS and higher charges for both acute care and rehabilitation. Overall mean LOS in acute care was 27 days (standard deviation [SD] = 24) and charges (not including physicians' fees) were $66,368. Overall mean LOS in rehabilitation was 48 days (SD = 47) and charges were $51,416. The external causes of injury resulting in the largest average overall charges (acute care and rehabilitation combined) were motorcycle accidents ($165,294 per case) and gunshot wounds to the head ($164,250 per case). Ninety-five percent of persons included in the study were living in private residences just prior to the onset of their injuries, and 81% were discharged from inpatient rehabilitation to a private residence. No trends were evident regarding the LOS and type of designated payor for rehabilitation services. The results support the premise that the TBI model systems are effective in minimizing the average LOS and in achieving functional benefits that reduce the disability of persons with severe TBI.

1440. Donmez-Demir, B., et al. (2018). "Microembolism of single cortical arterioles can induce spreading depression and ischemic injury; a potential trigger for migraine and related MRI lesions." Brain research **1679**: 84-90.

Increasing epidemiological evidence suggests an association between migraine with aura (MA) and cardiovascular events. There is experimental as well as clinical evidence implying cerebral microembolism as a potential trigger for MA attacks. Microembolism may also account for some of the ischemic MRI lesions more commonly observed in MA than in general population. Limited size of clinically-silent MRI lesions suggests isolated occlusion of a small vessel. However, it is not known whether selective thrombosis of a small arteriole (e.g. single mouse penetrating arteriole - PA), can induce cortical spreading depression (CSD), the putative cause of migraine aura and, hence, trigger an MA attack. For this, we mimiced thrombosis of a small vessel caused by microembolism by selectively occluding a PA just before diving into the cortex (radius; 10-25microm) in the mouse. Clotting was induced with FeCl3 applied focally over the PA by a glass micropipette for 3 min. DC potential changes were recorded and the alterations in cortical blood flow were monitored by laser speckle contrast imaging. Mice were kept alive for 1-4 weeks and brain sections were stained with H&E or luxol-fast blue to evaluate changes induced by PA occlusion. We found that single PA occlusion consistently triggered a CSD originating from the tissue around the PA soon after occlusion and induced delayed, small ischemic lesions within territory of the affected vessel a few weeks later. These findings suggest that cerebral microembolism can lead to MA attacks and may account for some of the silent brain lesions.

1441. Dookie, S., et al. (2016). "Survivors of self-inflicted gunshot head injuries managed at a single neurosurgical unit: A 12-year review." African Journal of Neurological Sciences **35**(2).

Background and objective: Self-inflicted gunshot head injuries (SIGHIs) following suicidal intent (SI) have a high pre-hospital mortality; with survivors representing an exceptional entity. We investigated the prevalence, demographics, and characteristics of these injuries with regards to clinical presentation, computerised tomography (CT) findings, management, and outcomes at discharge. Methods This was a retrospective study of patients admitted to the Department of Neurosurgery at Inkosi Albert Luthuli Central Hospital during January 2003 to September 2014. Patients with craniocerebral gunshot injuries (CGIs) were identified and only those with a history of a SIGHI following SI were included in the study. Results A total of 499 cases of CGI were treated during this period; of which 31(6%) were SIGHI following SI. There were 28 (90%) males (M: F ratio = 9:1). The median age was 32 years, interquartile range (IQR) of 27 - 39 years, and median admission Glasgow Coma Scale (GCS) was 11 (IQR = 8 - 14). The frontal region formed the predominant entry site [12; 39%]. CT brain scan revealed intracerebral haematomas in the majority of patients [29; 93%] and eighteen patients (58%) sustained transaxial injuries. All patients were managed surgically. The median hospital stay was 10 days (IQR = 3 - 19). The median discharge GCS was 13 (IQR = 7 - 14). Seven (23%) patients demised during their stay; having a post resuscitation GCS ≤ 8 (P = 0.018) and age ≥ 39 (P = 0.026). Conclusion This single-centre review highlights the devastating clinical impact of SIGHIs following SI. The post-resuscitation GCS remains an important prognosticating factor.

1442. Dooling, J. A., et al. (1967). "Penetrating skull wound from a pair of scissors. Case report." Journal of neurosurgery **26**(6): 636-638.

1443. Dorado, E., et al. (2019). "Suicide by gunshot at the back of the head with a muzzle-loading shooting revolver and homemade ammunition." Legal medicine (Tokyo, Japan) **37**: 60-63.

The present case concerns a 29years-old male with a history of mental disorder, who committed suicide by gunshot at the posterior midline of the head. This location is very rare in suicide cases. The weapon used is the replica of a muzzle-loading Remington Revolver with homemade ammunition prepared with easily available materials such as lead fishing weights, percussion primers, and black powder from firecrackers.

1444. Dorafshar, A. H., et al. (2013). "Total face, double jaw, and tongue transplantation: an evolutionary concept." Plastic and reconstructive surgery **131**(2): 241-251.

BACKGROUND: The central face high-energy avulsive injury has been frequently encountered and predictably managed at the R Adams Cowley Shock Trauma Center. However, despite significant surgical advances and multiple surgical procedures, the ultimate outcome continues to reveal an inanimate, insensate, and suboptimal aesthetic result., METHODS: To effectively address this challenging deformity, a comprehensive multidisciplinary approach was devised. The strategy involved the foundation of a basic science laboratory, the cultivation of a supportive institutional clinical environment, the innovative application of technologies, cadaveric simulations, a real-time clinical rehearsal, and an informed and willing recipient who had the characteristic deformity., RESULTS: After institutional review board and organ procurement organization approval, a total face, double jaw, and tongue transplantation was performed on a 37-year-old man with a central face high-energy avulsive ballistic injury., CONCLUSIONS: This facial transplant represents the most comprehensive transplant performed to date. Through a systematic approach and clinical adherence to fundamental principles of aesthetic surgery, craniofacial surgery, and microsurgery and the innovative application of technologies, restoration of human appearance and function for individuals with a devastating composite disfigurement is now a reality., CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, V.

1445. Doron, Y., et al. (1982). "Penetrating cranio-cerebral injuries due to unusual foreign bodies." Neurosurgical review **5**(2): 35-40.

Seven cases of penetrating cranio-cerebral injury by peculiar foreign bodies are described. The clinical-pathological picture is reported wherever possible. Lack of adequate safety measures and untrained careless handling of instruments were at the root of these tragic accidents. Greater awareness of such dangers in industry and in school might help to promote the adoption of adequate safety measures.

1446. Doroshow, R. W., et al. (1995). "Availability and selection of donors for pediatric heart transplantation." The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation **14**(1 Pt 1): 52-58.

METHODS: Applying generally accepted criteria for selection of adult heart donors, we conducted a retrospective study of brain-dead infants and children for assessment of suitability as donors for heart transplantation. Cardiac histopathologic studies were evaluated in all subjects undergoing autopsy., RESULTS: In 5 years there were 58 such patients, the majority of whom had head injury, near-drowning, near-miss sudden infant death syndrome, infection, or asphyxia. Of these, only five met the proposed clinical criteria. Most prospective donors were eliminated on the basis of prolonged cardiac arrest (n = 33), pressor dependency (n = 25), and/or infection (n = 10). Forty-two subjects underwent autopsy, of whom 36 would not have been excluded as donors except on the basis of ischemic cardiac insult. Of these, 18 subjects were found to have essentially normal myocardium, nine had abnormal but potentially reversible microscopic changes, and nine had myocardial infarction. The pathologic findings were not predicted by the selection criteria, but severe chest trauma was not associated with infarction, eight of the nine patients with infarction had had cardiac arrest, and most of those with infarction had drowned or had had sudden infant death syndrome., CONCLUSIONS: The supply of donor organs for pediatric heart transplantation is very limited if selection criteria used for adult donors are applied. These criteria, however, do not correlate well with myocardial pathologic findings in infants and children. More accurate predictors of donor suitability are needed.

1447. Dorsemans, A.-C., et al. (2017). "Impaired constitutive and regenerative neurogenesis in adult hyperglycemic zebrafish." The Journal of comparative neurology **525**(3): 442-458.

A growing body of evidence supports hyperglycemia as a putative contributor to several brain dysfunctions observed in diabetes patients, such as impaired memory capacity, neural plasticity, and neurogenic processes. Thanks to the persistence of radial glial cells acting as neural stem cells, the brain of the adult zebrafish constitutes a relevant model to investigate constitutive and injury-induced neurogenesis in adult vertebrates. However, there is limited understanding of the impact of hyperglycemia on brain dysfunction in the zebrafish model. This work aimed at exploring the impact of acute and chronic hyperglycemia on brain homeostasis and neurogenesis. Acute hyperglycemia was shown to promote gene expression of proinflammatory cytokines (il1beta, il6, il8, and tnfalpha) in the brain and chronic hyperglycemia to impair expression of genes involved in the establishment of the blood-brain barrier (claudin 5a, zona occludens 1a and b). Chronic hyperglycemia also decreased brain cell proliferation in most neurogenic niches throughout the forebrain and the midbrain. By using a stab wound telencephalic injury model, the impact of hyperglycemia on brain repair mechanisms was investigated. Whereas the initial step of parenchymal cell proliferation was not affected by acute hyperglycemia, later proliferation of neural progenitors was significantly decreased by chronic hyperglycemia in the injured brain of fish. Taken together, these data offer new evidence highlighting the evolutionary conserved adverse effects of hyperglycemia on neurogenesis and brain healing in zebrafish. In addition, our study reinforces the utility of zebrafish as a robust model for studying the effects of metabolic disorders on the central nervous system. J. Comp. Neurol. 525:442-458, 2017.

1448. Dos Santos, J. H. Z., et al. (2014). "Firearm injury in face: A case report." International Archives of Otorhinolaryngology **18**.

Introduction: Firearms injuries (FI) on the face usually cause great inconvenience to patients and physicians for the noble structures present; the difficulty in managing bleeding nasal, oral, facial, and airway maintenance; besides the possible esthetic and functional sequelae, corroborating high mortality and morbidity. Objectives: This article describes a case of FI occurred in polytrauma unit of the Hospital de Base do Distrito Federal (HBDF), Brazil. Case report: A 19yearold male patient, victim of FI in the face 2 hours ago, hemodynamically stable, admitted to the ENT unit of HBDF. He presented orifice of entry into branch of the right mandible, no exit hole, trismus, moderate bleeding in the right tonsil, and swelling of the retromolar trigone and cheek. He also presented neck pinjury or pain. Result: Tomography showed bone fragments in the lingual region and masticatory space right next to tooth 48 and comminuted fracture of mandible transfixation projectile fragments before the C2 region. The team of oral and maxillofacial surgery removed bone fragments and tooth 48. Cervical Doppler showed carotid and jugular without injury. The patient kept bleeding, developed somnolence, and initiated shock protocol. He opted for surgical intervention. There was extensive laceration of the soft palate, anterior, and posterior pillar, and amygdala lacerated with moderate bleeding. The resection of the amygdala was preceded with cauterizing and suturing the pharyngeal muscles with the removal of prevertebral projectile. The patient evolved with oropharyngeal pain and odynophagia without oral bleeding. Conclusion: Thirty days followup showed good healing without dysphagia or food to reflux nose, mild speech impairment with dysarthria, and referred for speech rehabilitation.

1449. dos Santos Pereira, R., et al. (2014). "Internal maxillary artery pseudoaneurysm subsequent gunshot wound in a teenager." The Journal of craniofacial surgery **25**(3): 1125-1126.

1450. Doskova, H. (2006). "[Evaluation of results of the penetrating injuries with intraocular foreign body with the Ocular Trauma Score (OTS)]." Hodnoceni vysledkiu penetrujicich poraneni s kovovym nitroocnim telesem dle Ocular Trauma Score. **62**(1): 48-52.

UNLABELLED: The goal of the study was to correlate the final functional status with the initial prediction of the OTS in the eyes following the penetrating injury with metallic intraocular body. The group consisted of 20 men (20 eyes), the average age was 35.4 +/- 10.8 years. The average follow up period was 21.0 +/- 10.7 months. In all cases, the penetrating injury with the metallic intraocular foreign body was present. To evaluate the prediction of the final functional status of the organ, the OTS tables were used, and according to their criteria, the initial clinical findings in all 20 eyes were scored. A half of the year after the injury the achieved visual acuity was compared with proportional

prediction in given group according to the final OTS table., RESULTS: In the original prediction according to the score, 6 patients were classified in group 2, 8 patients in the group 3, 4 patients in the group 4, and 2 patients in the group 5. In the final evaluating of the functional status, in the group 2, we achieved in 3 cases 13% of probability of the presumed final visual acuity, in 2 cases 26% of probability, and in one case 18% of probability. In the group 3, we achieved in 7 cases 28% of probability and in 2 cases 44% of probability of the achieved visual acuity. In the group 4, in 3 cases we achieved 21% of probability and in one case 1% of probability. In the group 5, in one case we achieved 92% of the probability and in one case 5% of probability of the final functional status. Introducing the Ocular Trauma Score evaluating system into the practice offers the possibility of simple approximation of the final functional result after six months after the injury.

1451. Dosoglu, M., et al. (1999). "Civilian gunshot wounds to the head." Neuro-Chirurgie **45**(3): 201-207.

BACKGROUND AND PURPOSE: Civilian Gunshot Wounds (GSWs) to the head are important causes of mortality. The severity of GSWs is related to several factors. Patients with GSWs tend to do very well or very poor depending on these factors., METHODS: We retrospectively reviewed 47 patients with GSWs to the head during the last 5 years. Clinical and radiological findings of cases are described. Statistical analysis was used to find the effects of all independent variables with mortality and the prognostic factors., RESULTS: Glasgow Outcome Scale results showed that 38% of patients died, 13% were moderately disabled and 49% had good recovery at discharge. Patients with respiratory depression, hypovolemia, bilateral pupil dilatation, Glasgow Coma Scale (GCS) scores of 3 to 5, central bihemispheric and transventricular injury experienced 100% mortality. The mortality rate was 58% in patients with intracerebral or subdural hematoma, 78% in multilobar injury, 14% in unilobar injury and 57% in self-inflicted wounds. The postoperative mortality was 27%., CONCLUSION: The manuscript describes the clinical experience of penetrating missile injuries in a Turkish civilian practice. Mortality and/or poor outcome are relatively high in spite of the cases wounded by low-velocity weapons. We should emphasize that following stabilization of vital signs, all patients with GCS scores of 3 to 5 should be evaluated immediately with CT and treated conservatively. If it is appropriate the patients with a GCS score higher than 8 should undergo surgery. Patients with GCS scores of 6 to 8 should be followed closely and treated with surgery when necessary even if they have poor prognosis.

1452. Dougall, D., et al. "Pharmacotherapy for chronic cognitive impairment in traumatic brain injury." (12).

Background, Traumatic brain injury (TBI) is a major cause of chronic disability. Worldwide, it is the leading cause of disability in the under 40s, resulting in severe disability in some 150 to 200 million people per annum. In addition to mood and behavioural problems, cognition-particularly memory, attention and executive function-are commonly impaired by TBI. Cognitive problems following TBI are one of the most important factors in determining people's subjective well-being and their quality of life. Drugs are widely used in an attempt to improve cognitive functions. Whilst cholinergic agents in TBI have been reviewed, there has not yet been a systematic review or meta-analysis of the effect on chronic cognitive problems of all centrally acting pharmacological agents., Objectives, To assess the effects of centrally acting pharmacological agents for treatment of chronic cognitive impairment subsequent to traumatic brain injury in adults., Search methods, We searched ALOIS-the Cochrane Dementia and Cognitive Improvement Group's Specialised Register-on 16 November 2013, 23 February 2013, 20 January 2014, and 30 December 2014 using the terms: traumatic OR TBI OR 'brain injury' OR 'brain injuries' OR TBIs OR 'axonal injury' OR 'axonal injuries'. ALOIS contains records of clinical trials identified from monthly searches of a number of major healthcare databases, numerous trial registries and grey literature sources. Supplementary searches were also performed in MEDLINE, EMBASE, PsycINFO, The Cochrane LibraryCINAHL, LILACs, ClinicalTrials.gov, the World Health Organization (WHO) Portal (ICTRP) and Web of Science with conference proceedings., Selection criteria, We included randomised controlled trials (RCTs) assessing the effectiveness of any one centrally acting pharmacological agent that affects one or more of the main neurotransmitter systems in people with chronic traumatic brain injury; and there had to be a minimum of 12 months between the injury and entry into the trial., Data collection and analysis, Two review authors examined titles and abstracts of citations obtained from the search. Relevant articles were retrieved for further assessment. A bibliographic search of relevant papers was conducted. We extracted data using a standardised tool, which included data on the incidence of adverse effects. Where necessary we requested additional unpublished data from study authors. Risk of bias was assessed by a single author., Main results, Only four studies met the criteria for inclusion, with a total of 274 participants. Four pharmacological agents were investigated: modafinil (51 participants); (-)-OSU6162, a monoamine stabiliser (12 participants of which six had a TBI); atomoxetine (60 participants); and rivastigmine (157 participants). A meta-analysis

could not be performed due to the small number and heterogeneity of the studies., Authors' conclusions, There is insufficient evidence to determine whether pharmacological treatment is effective in chronic cognitive impairment in TBI. Whilst there is a positive finding for rivastigmine on one primary measure, all other primary measures were not better than placebo. The positive findings for (-)-OSU6162 are interpreted cautiously as the study was small (n = 6). For modafinil and atomoxetine no positive effects were found. All four drugs appear to be relatively well tolerated, although evidence is sparse.

1453. Doughty, K., et al. (2005). "An unusual case of impalement of the cranium in a child." The Journal of trauma **58**(6): 1290-1293.

1454. Douis, N., et al. (2020). "Metal artifact reduction for intracranial projectiles on post mortem computed tomography." Diagnostic and interventional imaging **101**(3): 177-185.

PURPOSE: To compare the image quality of cranial post-mortem computed tomography (CT) obtained with and without projection-based single-energy metal artifact reduction (SEMAR) in cadavers with intracranial metallic ballistic projectiles., MATERIALS AND METHODS: From January 2017 to January 2018, cadavers with ballistic projectile head wounds with metal fragments and without massive head destruction were investigated using post-mortem CT. All subjects underwent CT using a conventional iterative reconstruction (IR) and SEMAR. To evaluate the impact of metallic artifacts, the total intracranial area (TA), non-interpretable zone (NIZ), disturbed interpretation zone (DZ), and artifact total surface (ATS) were delineated. Two independent readers identified extra-axial hemorrhage (EAH) and subarachnoid hemorrhage (SAH). Autopsy reports were used as the standard of reference., RESULTS: Eleven corpses (10 males, 1 female; mean age, 62.8+/-17.9 [SD] years) were evaluated. SEMAR showed a significant decrease in the ATS ratio with respect to conventional IR (72.1+/-26.1 [SD] % [range: 26.8-99.1] vs. 86.4+/-17.8 [SD] % [range: 37.2-100]; P<0.001) and NIZ/TA ratios (11.6+/-8.26% [range: 0.95-33.4] versus 42.5+/-30.5% [range: 3.86-100]; P<0.001). The interobserver reproducibility in diagnosing EAH and SAH was excellent with conventional IR (0.82) and good with SEMAR (0.75). SEMAR reduced uncertain diagnoses of EAH in 7 subjects for Reader 1 and in 6 for Reader 2, but did not influence the diagnosis of SAH for either reader., CONCLUSION: SEMAR reduces the influence of metallic artifacts and increases the confidence with which the diagnosis of EAH can be made on post-mortem CT.

1455. Dovlatian, A. A. and I. V. Cherkasov (2003). "[Injuries of the urogenital system]." Travmy organov mochepolovoi sistemy.(4): 52-57.

To analyse the results of treatment of isolated and concomitant urogenital injuries, a retrospective analysis was made of 608 case histories for patients treated in 1986-2000. Of them, 530 patients were males, 78 were females, the age ranged from 16 to 70 years, most of the patients were 20 to 50 (71.2%) years of age. Most frequently the injury was inflicted by beating. Fall from the height, transport accidents ranked second among the causes of injury (17 and 14.3%, respectively). Stab and gunshot injuries occurred in 4.4 and 8% cases, respectively. Ultrasound and x-ray methods were employed for examination. An isolated injury was found in 481 patients, the rest had urogenital injury and skeletal (53%), craniocerebral (25%), abdominal (20%) lesions. 29 patients had a severe concomitant wound: urogenital injury combined with abdominal, skeletal, cranial lesions. Surgery was performed in 267 patients. The rest patients received conservative treatment. Most of the operations were made on the kidney and urinary bladder because of rupture. In some patients these interventions were conducted during laparotomy and were combined with abdominal intervention (44 cases). 25 patients with the compound injury underwent 2-stage operations. 552 patients were cured. 56 (9.2%) lethal outcomes were due to progression of traumatic shock. This low percent of lethality may be explained by an optimal choice of treatment policy in the above patients.

1456. Dovlatian, A. A. and I. V. Cherkasov (2003). "[Results of treatment of isolated and combined trauma of urogenital system]." Rezul'taty lecheniia izolirovannoi i sochetannoi travmy organov mochepolovoi systemy.(5): 53-58.

Retrospective analysis of treatment results of 608 patients with trauma of organs of urogenital system (UGS) was carried out. Beating was the cause of trauma in 55% cases, fall from height--in 17%, transport trauma--in 14.3%, knife wound--in 4.4%, gunshort wound--in 1.3%. Isolated trauma of UGS was in 481 (79.1%) patients. In other patients

combined injury of UGS with injury of skeleton's bones (53), cranium and brain (25), abdominal organs (20) was diagnosed. In 29 patients severe combined trauma of UGS, abdominal organs, skeleton bones and cranium was seen. Surgeries were performed in 267 patients. Surgeries on kidney and urinary bladder due to their disruption predominated. In 44 patients these surgeries were combined with ones on abdominal organs. Surgery was performed in two stages in 25 patients with combined trauma of UGS and other organs. From 608 patients 552 (90.2%) cured. Lethal outcome was in 56 (9.2%) patients due to progressive traumatic shock.

1457. Dow, R., et al. (2018). "Interventional Removal of Traumatic Nail from Skull Base After Endovascular Coiling of Internal Carotid Artery and Jugular Vein." World neurosurgery **115**: 138-142.

BACKGROUND: Cases of nail gun injuries to the head and neck are rare, and treatment approach varies with each case based on location and extent of injury., CASE DESCRIPTION: We present a case of a 52-year-old male who fell off a roof holding a pneumatic nail gun and accidentally shot himself with a nail through the right frontal neck region. The nail penetrated the right sternocleidomastoid muscle and extended intracranially through the right occipital condyle with its tip embedded in the right cerebellar hemisphere. The nail coursed between the right distal cervical internal jugular vein and right internal carotid artery. There was no evidence of vascular injury on initial imaging. The barbs of the nail abutted the right sigmoid sinus, making for high risk of tear and intracranial hemorrhage on manual nail extraction. Therefore preemptive coil embolization of the right dural venous sigmoid and occipital sinuses and internal jugular bulb was performed before attempted nail removal. Using biplane fluoroscopy, orthopedic screw removal plyers were successful in snaring the head of the nail. On initial removal attempt, the head of the nail injured the distal right cervical internal carotid artery, requiring endovascular coil embolization. The nail was then successfully extracted from the neck without further immediate complications., CONCLUSION: Use of biplane fluoroscopy and preemptive endovascular embolization makes a nonsurgical approach to penetrating skull base injuries feasible. Despite improving right visual loss related to the right internal carotid artery embolization, the patient had no new focal neurologic deficits on 1-month outpatient follow-up.

1458. Dowlati, E., et al. (2020). "The Retro-Auricular Incision as a Safe and Effective Alternative for Decompressive Hemicraniectomy." Clinical neurosurgery **67**(SUPPL 1): 148-149.

INTRODUCTION: The decompressive hemicraniectomy (DHC) is used to relieve refractory intracranial hypertension to prevent fatal brainstem compression. Traditionally, the reverse question mark (RQM) incision is utilized, placing the scalp blood supply at risk of injury. METHODS: We performed a retrospective review of all DHCs over a span of 30 months (July 2017-Dec 2019) at our institution and stratified them based on incision: RQM vs. RA. Exclusion criteria included: other incisions, bilateral DHC, penetrating injury to the head, and lack of postoperative imaging. The surface areas of the cranial defect were measured. To normalize measurements and account for difference in cranium size, defect to skull diameter ratios were also measured. Additionally, a review of clinical outcomes, including complications were collected from both cohorts and analyzed. RESULTS: A total of 47 patients in the RQM group and 35 in the RA group. The average surface area for the RA and RQM incisions were 116.9cm2 and 109.2cm2 (P = .017), respectively. Average defect: skull ratio for RA incision was 0.813 compared to 0.784 for the RQM group (P = .019). Of those who survived beyond one-week, the absolute risk for wound and surgical site complications were 7.14% and 17.78% for RA and RQM group, respectively. CONCLUSION: We present a safe and effective alternative incision to the traditional RQM incision used for DHC. The RA incision provides exposure for a larger hemicranium defect and also may lead to less wound complications by preserving major arterial blood supply to the scalp.

1459. Downey, R., et al. (2010). "MDCT evaluation of acute eye pain in the ED." Emergency radiology **17**(6): 545.

Purpose: The objectives of this exhibit are to review normal orbital anatomy and to discuss the various causes of acute eye pain in the emergency department (ED) setting and their radiologic appearance on multidetector CT (MDCT), with an emphasis on the most relevant clinical findings. Materials and Methods: For patients presenting to the ED with acute eye pain, the potential for serious adverse outcome, such as loss of vision or even death, necessitates an accurate and timely diagnosis so that appropriate treatment can be initiated. MDCT is the preferred initial imaging test for the evaluation of acute eye pain in the ED setting. The radiologist must be familiar with the complex anatomy of the orbit and the MDCT findings of the different causes of acute eye pain. Results: The normal orbital anatomy by MDCT will be illustrated and reviewed, with special attention to definitions of orbital compartments. The MDCT appearance of the

orbit acutely involved by blunt or penetrating trauma, infection, inflammation and vascular disease will be discussed and representative cases provided with accompanying surgical and pathological correlation where available. Conclusion: In patients with acute eye pain in the ED, it is imperative that an accurate and timely diagnosis is rendered due to the potential for poor clinical outcome. MDCT plays an essential role in the initial evaluation and diagnosis of acute eye pain in the ED setting. Familiarity with the various pathological entities that result in acute eye pain and their imaging appearance is important to facilitate treatment and optimize clinical outcome.

1460. Downs, C., et al. (2021). "Injuries in Netball-A Systematic Review." Sports Medicine - Open **7**(1).

Background: Netball is estimated to be played by more than 20 million people worldwide, but there is evidence of high injury incidence. A thorough understanding of the types and rates of netball injuries is essential for effective injury management and prevention strategies to be developed and implemented. This systematic review summarises the published findings with respect to injury types, participant characteristics and any identified risk factors for netball injuries. Methods: A librarian-assisted computer search of seven scientific databases was conducted for studies reporting on netball injuries. Inclusion criteria were studies published in English, in peer-reviewed journals, which reported data on injuries and variables (e.g. age and competition level) that have been proposed as possibly associated with netball injury risk. Results: Forty-six studies (43.5% prospective, 37% hospital/insurance records, 19.5% retrospective) from 45 articles were included after screening. The majority of studies (74%) were conducted in Australia or New Zealand. There was little consistency in the definition of 'injury'. Elite or sub-elite level players were included in 69% of studies where the level of competition was reported. The duration of injury surveillance was generally related to the format of competition from which data were collected. Self-report questionnaires were used in 48% of studies and only 26% of studies used qualified health professionals to collect data courtside. Injuries to the ankle and knee were the most common (in 19 studies) although the incidence varied considerably across the studies (ankle 13–84% and knee 8–50% of injuries). Prevention of ankle and knee injuries should be a priority. Children sustained more upper limb injuries (e.g. fractures) compared with adults who sustained more lower limb injuries (e.g. ankle and knee sprains/strains). A large number of potential risk factors for injury in netball have been investigated in small numbers of studies. The main circumstances of injury are landings, collisions and falls. Conclusion: Further studies should be directed towards recreational netball, reporting on injury incidence in players by age and utilising high-quality, standardised methods and criteria. Specific injury diagnosis and a better understanding of the circumstances and mechanisms of injury would provide more meaningful data for developing prevention strategies.

1461. Doyon, D., et al. (1979). "[Facial artery injury from a bullet wound discovered after arteriography (author's transl)]." Decouverte arteriographique d'une plaie balistique de l'artere faciale. **80**(1): 23-25.

Signs of a fracture of the mandible and a submaxillary hematoma were present in a patient wounded by a bullet. Selective carotid arteriography by femoral catheterization revealed the presence of sectioning of the facial artery at its origin and underlying external carotid stenosis. Hemorrhagic complications or aneurysm formation could have occurred if the lesion had not been demonstrated. Though arteriography is not without risks, it is irreplaceable for investigating cervicofacial injuries when a vascular lesion is suspected.

1462. Dragojlovic, N. and S. Pandit (2014). "Bilateral bell-s palsy in the setting of traumatic brain injury: A case report." PM and R **6**(9): S334.

Case Description: Patient: A 30-year-old man undergoing inpatient rehabilitation for a traumatic brain injury. The patient sustained a gunshot wound to the right parieto-occipital region and underwent emergent surgery. Eight days later, he was transferred to inpatient rehabilitation due to left hemiparesis and spasticity. On day ten of rehabilitation, he reported numbness and tingling on the left side of his face, and the next day he developed left facial paralysis. Over the next week, his symptoms worsened and progressed to bilateral facial paralysis with dysphagia. An initial modified barium swallow study demonstrated oral but no pharyngeal weakness. Extensive work up including computed tomography (CT) scans, laboratory testing, and electrodiagnostics were unremarkable. Magnetic resonance imaging (MRI) could not be completed due to retained bullet fragments. Setting: Community rehabilitation hospital. Results or Clinical Course: Despite the progression of his facial symptoms, his left hemiparesis and spasticity continued to improve with therapy. At the time of discharge, his symptoms had improved enough to safely resume a regular diet. In outpatient follow-up, the patient-s facial weakness was slowly resolving at two months, and completely resolved by

four months. He was diagnosed with bilateral Bell-s palsy as a diagnosis of exclusion. Discussion: Delayed facial palsy in traumatic brain injury has an estimated incidence of 0.6-2.2% and is associated with basilar skull fractures. Other causes include Lyme disease, Guillain-Barre syndrome, sarcoidosis, and viral infection. Bell-s palsy can impair function by negatively affecting hygiene, feeding, and self-perception. Those with concomitant traumatic brain injury are at increased risk for functional impairment due to pre-existing limitations in self-care and activities of daily living. Conclusions: Bilateral Bell-s palsy should be considered in the setting of new bilateral facial weakness when evaluation for other diseases is negative. Diagnosis in polytrauma is made difficult by co-existing neurologic, musculoskeletal, and medical comorbidities.

1463. Dricken, J., et al. (2013). "Ventilator associated pneumonia rates in a trauma ICU: The impact of traumatic brain injury." Critical care medicine **41**(12): A275.

Introduction: Ventilator -associated pneumonia (VAP) is a common occurrence in critically-ill trauma patients. The National Healthcare Safety Network has established national benchmarks for VAP rates in trauma intensive care units (ICU). The purpose of this study is to assess the effect of traumatic brain injury on VAP rates in a trauma ICU. Methods: Retrospective data were collected from the 5-year period (1/08-12/12) through chart review on all patients ventilated greater than 48 hours in a trauma ICU. All VAPs were diagnosed with bronchoalveolar lavage with greater than 10 to the 4th CFU/ml as diagnostic criteria. Patients were divided into two cohorts: Those patients intubated for altered mental status with traumatic brain injury (TBI) diagnosed by CT scan and those without evidence of TBI. Results: During the study period, 729 patients were ventilated greater than 48 hours. 616 (84%) were blunt trauma patients and 113 (16%) were injured secondary to penetrating trauma. 407(56%) patients were diagnosed with TBI, of which 124 (30%) developed VAP. 322 (44%) patients without TBI were intubated greater than 48 hours, 75 (23%) of which developed VAP ($P<0.05$). Average vent days for TBI patients was 10.7 days and 10.3 days for non-TBI patients ($P>0.05$). VAP rate for all patients was 23.1 VAPs/1000 vent days. VAP rate for TBI patients was 28.2 VAPs/1000 vent days and 22.5 for non-TBI patients ($P<0.05$). Conclusions: The TBI population has higher VAP rates than non-TBI patients. Trauma ICUs that admit a disproportionate number of TBI patients should be expected to have higher VAP rates than current national benchmarks.

1464. Driscoll, D. M., et al. (2012). "Empathic deficits in combat veterans with traumatic brain injury: a voxel-based lesion-symptom mapping study." Cognitive and behavioral neurology : official journal of the Society for Behavioral and Cognitive Neurology **25**(4): 160-166.

OBJECTIVE: To understand better which brain regions support emotional empathy., BACKGROUND: Emotional empathy, the ability to interpret and share the affective states of others, is a key component in human social interaction. Previous research has suggested that emotional empathy relies on several distinct brain regions, although further evidence from human lesion studies is needed to determine which regions are critical., METHODS: We studied 192 male Vietnam combat veterans who had sustained focal penetrating traumatic brain injuries, and 54 non-brain-injured veterans. We used voxel-based lesion-symptom mapping on computed tomographic scans to elucidate the neural bases of self-reported emotional empathy as measured by the Balanced Emotional Empathy Scale., RESULTS: Damage in several brain regions, particularly the ventrolateral prefrontal cortex, left and right posterior temporal lobes, and insula, was associated with diminished emotional empathy., CONCLUSIONS: These findings provide further insight into the neural substrates of emotional empathy, and are consistent with the notion that emotional empathy is supported by a distributed network of brain regions. Additional work may advance our understanding of the empathic deficits commonly observed in patients with neurologic and psychiatric disorders.

1465. Drosos, E., et al. (2018). "Pediatric Nonmissile Penetrating Head Injury: Case Series and Literature Review." World neurosurgery **110**: 193-205.

BACKGROUND: Pediatric nonmissile penetrating head injury (NMPHI) is usually accidental attributed mainly to the softer skulls of growing children. However, it is a rare entity, and therefore no consensus exists regarding treatment to effectively prevent immediate and long-term complications. Throughout the literature, these injuries are mostly discussed in case reviews and case series in the general population. No data originating from randomized studies are available because of ethical and practical limitations., METHODS: We retrospectively studied and present 5 cases of children with NMPHI treated in the last 6 years in the Neurosurgery Department of Children's Hospital "Aghia Sofia". We

performed a review of the literature in PubMed, using the key words "non-missile," "penetrating head injury," and "pediatric." We included case reports and case series involving pediatric cases since 2008 and selected older reports as well as certain literature reviews focusing on analysis of complications and treatment suggestions. We compared reported practice in various institutions with suggestions from the literature., RESULTS: In the last year, 4 literature reviews were published suggesting treatment algorithms of NMPHIs. Surgery timing and method as well as anticonvulsant and antibiotic therapy still remain debatable. The only review concentrating on pediatric populations dates back to 1994, based on patient outcome studies from the 1980s. In our review, treatment steps were similar among various institutions and resembled recently suggested algorithms, with better treatment outcomes than originally reported 30 years ago.

1466. Drubach, D. A., et al. (1994). "Brain SPECT in a case of cortical blindness." Stroke **25**(5): 1061-1064.

BACKGROUND: Published reports on patients with cortical blindness describe bilateral brain hemispheric lesions visualized in radiological and functional imaging studies., CASE DESCRIPTION: We present a case with a unilateral lesion on radiological studies and bilateral abnormalities on single-photon emission-computed tomographic (SPECT) scanning., CONCLUSIONS: SPECT images correlated much more closely than radiological studies with the patient's clinical status. We suggest that SPECT scanning can be a useful indicator of focal brain dysfunction in brain injury in spite of normal radiological studies. We also hypothesize that our patient's clinical and functional imaging findings could be attributed in part to the process of diaschisis.

1467. du Toit, D. F., et al. (2003). "Neurologic outcome after penetrating extracranial arterial trauma." Journal of vascular surgery **38**(2): 257-262.

PURPOSE: We undertook this study to determine factors that adversely affect outcome in patients with penetrating injury to the extracranial cerebral vasculature. Patients and methods Medical records were reviewed for all patients who had undergone surgical intervention to treat penetrating injury to the extracranial cerebral arteries between January 1989 and December 1999. Forensic autopsy findings were also reviewed for all patients who died as a result of their injury., RESULTS: One hundred fifty-one patients with injury to the brachiocephalic artery (n = 21), common carotid artery (n = 98), or internal carotid artery (n = 32) were identified. Overall mortality was 21.2%, and stroke rate in surviving patients was 15.1%. Twenty-five of 32 deaths (78.1%) were stroke-related. Brachiocephalic artery injury was associated with the highest mortality (38.1%), and survivor stroke rate was highest in patients with internal carotid injuries (22.7%). Hemodynamic instability at presentation led to both higher mortality (30.7%) and stroke rate (19.2%). Preoperative angiography did not influence mortality or stroke rate in hemodynamically stable patients. Procedural mortality associated with arterial ligation was 45% (9 of 20 patients), and no surviving patient experienced a change in pre-ligation neurologic state. Nine patients remained neurologically intact after ligation, and 2 patients with preoperative localized neurologic deficit were unchanged postoperatively. In 131 patients, mortality after arterial repair was 17.6%, and in 5 surviving patients (5.4%) an ischemic neurologic deficit developed. Twelve of 15 surviving patients (80%) with preoperative neurologic deficit who underwent arterial repair had improved neurologic status. Cerebral infarcts were confirmed at autopsy in 23 patients; 18 infarcts were ischemic (10, repair; 8, ligation), and 5 infarcts were hemorrhagic (all, repair). No factor was identified that was predictive of ischemic versus hemorrhagic infarction in patients undergoing repair., CONCLUSIONS: The presence of hypovolemic shock, internal carotid artery injury, complete vessel transection, and arterial ligation are associated with unfavorable outcome. Penetrating injury to the brachiocephalic, common carotid, or internal carotid artery should be repaired rather than ligated when technically possible. Subsequent ischemic or hemorrhagic cerebral infarction is unpredictable, but overall outcome is superior to that with ligation of the injured artery.

1468. du Trevou, M. D. and J. R. van Dellen (1992). "Penetrating stab wounds to the brain: the timing of angiography in patients presenting with the weapon already removed." Neurosurgery **31**(5): 905-902.

Angiography is always necessary in patients with penetrating stab wounds to the head, to exclude unexpected vascular lesions. The most important, since they are seldom clinically evident, are traumatic aneurysms and arteriovenous fistulae. It has previously been proposed that carotid angiography should be delayed until the start of the second week, to allow for better visualization of these complications. However, traumatic aneurysms can rupture at any time after the injury, and the mortality resulting from a second hemorrhage is unacceptably high. A prospective study

was undertaken in which 330 patients with penetrating stab wounds to the head underwent angiography as soon as possible after admission. In 250 of these patients (76%), the weapon had already been removed by the assailant, and there was radiological evidence of penetration of the dura. Of these 250, 130 patients underwent angiography within 7 days of the injury. Another 51 patients, who presented late, underwent angiography more than 7 days after the injury. The timing of angiography did not affect the identification of traumatic aneurysms, the incidence of which was 12% in both groups. Of the patients with cranial stabs and who required urgent evacuation of intracerebral hematomas, 10% had traumatic aneurysms that could be dealt with simultaneously. No patient in this series suffered a secondary hemorrhage. We conclude that it is neither necessary nor safe to delay angiography. In some patients, either because of vasospasm or "cut-off" of a vessel, a second angiogram may be necessary to further elucidate a vascular abnormality that might not have been evident originally.

1469. Duan, R., et al. (2018). "A Penetrating Facial Wound With Burn Injury." The Journal of craniofacial surgery **29**(7): 1900-1902.

A patient presented with a complex penetrating facial wound by high temperature steel. The hot steel penetrated right temple, ethmoid bone, and maxillary sinus, and then exited from his left cheek. He kept his right eye but lost his sight. For functional and esthetic considerations, treatments were provided in a staged procedure. First, the debridement was performed under the endoscope. The dead bone was removed, broken teeth were extracted, and necrotic tissue was cleaned. The exposed wounds were cleaned, and dressing was changed daily until the exudation was widely reduced. Then, a 50-mL expander was placed in the left cheek, and an 80-mL expander was put in the scalp just before the defect in the temple area. Five months later, expander inflation was accomplished. Expanders were taken out and expanded flaps were transposed to cover the defect. At the same time, an anterolateral thigh flap was harvested to repair the inner lining of the cheek and the gingiva. Thereafter, several operations were performed to revise the wound scar and the remaining deformity. Both defects in the temple and left cheek were restored with a satisfactory functional and aesthetic outcome. The temporal area was repaired with haired expanded scalp, whereas the face was repaired with an expanded facial flap with similar texture and color. The oral commissure regained balance and integrity. The defect of the gingiva was repaired. A severe penetrating wound in the cranium and face can be nicely repaired using tissue expander and microvascular reconstruction.

1470. Duane, T. M., et al. (2002). "Endovascular carotid stenting after trauma." The Journal of trauma **52**(1): 149-153.

1471. Duarte, J. N. and J. Cavaleiro (2015). "Traumatismo crânio-encefálico penetrante múltiplo por pistola de pregos: Descrição de um caso e revisão da literatura." Sinapse **15**(1): 27-30.

Introduction: Penetrating brain trauma by pneumatic nail gun is rare and is frequently associated with suicide attempts. Case report: We report a case of a 46 year old male with a self inflicted injury by 13 nails in the head caused by a pneumatic nail gun. At the admission the patient had a Glasgow Coma Scale score of 15 and didn’t have any neurological deficit. The brain CT show 13 nails in the head, 11 of which penetrating the brain. The angio-CT didn’t show any vascular damage. After these studies the patient was submitted to a surgical procedure to remove the nail, followed by a period of antibiotics and anti-epileptic drugs and was discharged without any neurological deficits. Because it was a probable suicide attempt, he was directed to psychiatric care. Discussion: Although the diagnosis is based in clinical history and physical examination, the brain CT is essential because besides the diagnosis it allows planning the treatment. Even though the occurrence of vascular lesions is rare, the angiographic studies are recommended in most cases. Conservative treatment can be an option in some patients, although in the majority the main goal is the removal of the nails. The prognosis is based in several factors, namely the neurological condition in the admission, the type of nail gun, the intentionality of the incident, the multiplicity and the local of the trauma, the presence of vascular damage and/or haemorrhages and the period between the incident and the treatment.

1472. Dubernard, X., et al. (2020). "Attempted suicide with a crossbow." European annals of otorhinolaryngology, head and neck diseases **137**(6): 493-495.

INTRODUCTION: Airway management and control of bleeding are essential aspects of the management of attempted suicide involving the head and neck. Attempted suicide using a crossbow is exceptional. The patient's

respiratory status, the position of the crossbow bolt in the head and neck, the type of bolt and its exit wound required airway management that has not been previously reported in the literature., CASE REPORT: This conscious patient had attempted suicide by shooting a crossbow bolt to the head. The radiological assessment (contrast-enhanced CT scan) did not reveal any vascular, ophthalmological or neurological lesions. The submental entry wound of the bolt avoided any damage to the lingual and ethmoidal arteries, lamina papyracea, or frontal lobe. The bolt induced mechanical trismus and its position limited access to the base of the neck, preventing orotracheal intubation. Nasotracheal intubation and primary tracheotomy were also difficult in this situation. It was therefore decided to remove the bolt while the patient was still conscious, rapidly followed by intubation, with no complications., CONCLUSION: In attempted suicide by crossbow involving the head and neck, airway management depends on the possibility of exposure of the glottis, the bolt exit wound and safe access to the anterior neck.

1473. Dubey, A., et al. (2008). "Traumatic intracranial aneurysm: a brief review." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **15**(6): 609-612.

Traumatic intracranial aneurysms are uncommon and represent fewer than 1% of all cerebral aneurysms. They may develop after blunt or penetrating head injuries and can present both diagnostic challenges and surgical difficulties. Because traumatic aneurysms are fragile and prone to rupture, early diagnosis with cerebral angiography and prompt treatment are essential. We present two patients with traumatic aneurysms and discuss their aetiology, classification, clinical presentations, diagnosis, and treatment options.

1474. Dubiel, R., et al. (2020). "Baseline Characteristics For Differences Between Men And Women With Violence-Related Etiology Using National Traumatic Brain Injury Model Systems Database: 1989-2019." Archives of physical medicine and rehabilitation **101**(12): e131.

Research Objectives: To identify differences between men and women with violence-related etiology (VRE) traumatic brain injury (TBI). Design: Cross-sectional. Setting: Inpatient rehabilitation. Participants: Individuals >16 years old with TBI VRE and enrolled in the TBI Model Systems. Interventions: None. Main Outcome Measures: TBI VRE measured by ICD-9/10 and cause of injury category. Results: Of 4,729 women, 267 (5.6%) had VRE. Of 13,049 males, 1696 (13%) had VRE. Compared to men, women with VRE were older and more educated, more often had a history of prior mental health problems, psychiatric hospitalization, and special education, but not prior TBI, were less likely to be abusing alcohol, be using illicit drugs, or to have a prior felony conviction, were less frequently employed, married, and covered by private insurance, and were less likely to have past military service ($p < .05$). Women with VRE were more often injured via gunshot wound or other violence (e.g., assault), whereas men with VRE were more likely to have been assaulted with a blunt instrument ($p < .001$). Men with VRE took longer to follow commands post-injury ($p = .027$), had poorer functional cognition at discharge ($p = .023$), and were more likely to live with a spouse/significant other vs other relatives ($p < .001$) compared to women. Conclusions: Men with VRE had more indicators of being perpetrators of violence (e.g. alcohol abuse, prior felony), whereas women with VRE had more indicators of being victims of violence (e.g. mental health history, unemployed). VRE may be missed due to participants' consciousness state upon hospital presentation post TBI or due to inability/unwillingness to divulge sensitive intimate partner violence information at intake. Standard and routine screening for VRE upon admission to the emergency setting is recommended. Author(s) Disclosures: No disclosures. Keywords: Violence, Traumatic Brain Injury, Predictors

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1475. Dubose, J., et al. (2011). "Combat-related traumatic brain injury: A prospective study of demographics and risk for early mortality." Critical care medicine **39**: 48.

Introduction: Combat-related TBI (CRTBI) is known to be associated with significant mortality. The purpose of our present examination was to examine the demographics of CRTBI and determine the early factors associated with in-theater death after these injuries. Methods: A prospective sample of 99 consecutive CRTBI patients (GCS < 14 on admission or penetrating TBI) was collected from both Coalition casualties and injured Host Nationals presenting to level II or III facilities. Admission variables (demographics, exam, labs, imaging) were documented and correlated with theater mortality. Results: Patients were mostly male (96.0%) and had sustained injury due to explosive mechanisms (78.6%). Penetrating brain injuries occurred in 42.9%. On arrival at a hospital facility, GCS was < or = 8 in 47.7%, with abnormal admission pupillary exams in 31.6%, and abnormal motor exams in 41.7%. Hypercarbia ($paCO_2$ >45; 50%) and hypocarbia ($paCO_2$ <36; 20.3%) were common on admission. Head CT results were documented for 74 patients. The

most common findings were skull fracture (68.9%), subdural hematoma (54.1%) and cerebral contusion (51.4%). Hypertonic saline (3%) was administered to 69.7%, and Factor VIIa to 11.1%. Overall in-theater mortality was 19.4%. On univariate evaluation, significant increases of in-theater mortality after CRTBI were associated with penetrating brain injury (p = 0.003), GCS < = 8 on admission (p<0.001), hypoxia (spO2 <90%) within the first 24 hours of admission (p = 0.002), massive transfusion (p = 0.025), GCS < = 8 and an abnormal head CT (p = 0.018), GCS < = 8 and any hypotension in the first 72 hours of admission (p = 0.007), abnormal admission pupillary exam (p<0.001), and abnormal admission motor exam (p = 0.001). Conclusions: CRTBI is associated with significant mortality. Opportunities exist for the potential improvement in the pre-hospital care of CRTBI, particularly optimization of pCO2 levels and avoidance of hypoxia.

1476. DuBose, J. J., et al. (2011). "Isolated severe traumatic brain injuries sustained during combat operations: demographics, mortality outcomes, and lessons to be learned from contrasts to civilian counterparts." The Journal of trauma **70**(1): 11-18.

BACKGROUND: Severe traumatic brain injuries occurring in the context of modern military conflict are entities about which little has been reported. We reviewed the epidemiology of these injuries from the Joint Trauma Theater Registry (JTTR), contrasting these results with civilian counterparts from the National Trauma Databank (NTDB)., METHODS: Isolated severe brain injuries (defined as head abbreviated injury scale [AIS] >=3 and no other body region AIS>2) were queried from the JTTR over a period from 2003 to 2007. The demographics and outcomes of these injuries were reviewed. These results were then contrasted to findings of similar patients, age 18 years to 55 years, over the same period from the NTDB using propensity score matching derived from age, gender, systolic blood pressure, Glasgow Coma Scale, and AIS., RESULTS: JTTR review identified 604 patients meeting study criteria, with a mean age of 25.7 years. Glasgow Coma Scale was <=8 in 27.8%, and 98.0% were men. Hypotension at presentation was noted in 5.5%. Blast (61.9%) and gunshot wound (19.5%) mechanisms accounted for the majority of combat injuries. Intracranial pressure monitoring was used in 15.2%, and 27.0% underwent some form of operative cranial decompression, lobectomy, or debridement. When compared with matched civilian NTDB counterparts, JTTR patients were significantly more likely to undergo intracranial pressure monitoring (13.8% vs. 1.7%; p<0.001) and operative neurosurgical intervention (21.5% vs. 7.2%; p<0.001). Mortality was also significantly better among military casualties overall (7.7% vs. 21.0%; p<0.001; odds ratio, 0.32 [0.16-0.61]) and particularly after penetrating mechanisms of injury (5.6% vs. 47.9%; p<0.001; odds ratio, 0.07 [0.02-0.20]) compared with propensity score-matched NTDB counterparts., CONCLUSION: Patients sustaining severe traumatic brain injury during military operations represent a unique population. Comparison with civilian counterparts has inherent limitations but reveals higher rates of neurosurgical intervention performed after penetrating injuries and a corresponding improvement in survival. Many factors likely contribute to these findings, which highlight the need for additional research on the optimal management of penetrating brain injury.

1477. Duch-Samper, A. M., et al. (1998). "Endophthalmitis following open-globe injuries." Current opinion in ophthalmology **9**(3): 59-65.

Endophthalmitis following open-globe injuries is caused by a specific range of microorganisms, of which Bacillus sp. and coagulase-negative Staphylococcus are the most frequent. Risk factors include the presence of an intraocular foreign body, injury inflicted by organic material, delay in surgery, and the type of wound involved. Despite important advances in medical and surgical management, this type of endophthalmitis continues to pose a poor prognosis. In this sense, we consider prevention to be the best approach. We report our protocols for the prevention and treatment of endophthalmitis following open-globe injuries, based on recent experimental studies on the ocular pharmacokinetics of antibiotics and on multicenter studies of the treatment of endophthalmitis.

1478. Duckworth, J. L. (2012). "23.4% Hypertonic saline in the management of increased intracranial pressure associated with combat related traumatic brain injury." Neurocritical care **17**: S102.

Introduction: 23.4% hypertonic saline is used for the treatment of increased intracranial pressure (ICP) and in the prevention and reversal of brain herniation syndromes. The use of hypertonic saline in the management of combat related penetrating and severe traumatic brain injury is described. 23.4 % hypertonic saline effectively managed ICP with decreased risk of hypovolemia and secondary hypotension compared with Mannitol. 23.4% hypertonic saline also preserved cerebral blood flow, decreasing the risk for secondary cerebral ischemia in acute neurotrauma patients, where hyperventilation is contraindicated. Methods: The NATO hospital, Kandahar Afghanistan treated eleven (11)

patients with twenty-seven (27) doses of 23.4% saline from 3-March 2012 to 25-April 2012. Hypertonic saline was used to treat acute elevation in ICP, as well as to maintain an elevated serum sodium concentration during periods of cerebral edema. All patients were treated with initial conservative ICP management. External ventricular drains were placed and drainage of 5-10cc of CSF was performed in an attempt to maintain ICP before using hypertonic saline. Patients with life-threatening clinical signs of elevated ICP secondary to brain edema or acute neurologic deterioration were potential candidates for 23.4% hypertonic saline therapy. 30-60mL of 23.4% sodium chloride was administered via a central line infusion. Results: 23.4% hypertonic saline was successful in acutely reducing ICP. A 30ml bolus of 23.4% saline predictably increased the serum sodium levels allowing reliable titration and maintenance of serum sodium levels and efficient management of the patient's volume status (30cc of 23.4% = 250cc of 3%). Conclusions: Penetrating and severe closed head injuries have the potential to lead to neurologic emergency as a result of brain edema associated with primary TBI or following neurosurgical intervention. In a combat TBI population, 23.4% hypertonic saline demonstrates a clinical benefit over alternative treatments by decreasing the risk of secondary cerebral injury during the management of elevated ICP and was well tolerated.

1479. Duda, T., et al. (2020). "Outcomes of civilian pediatric craniocerebral gunshot wounds: A systematic review." The journal of trauma and acute care surgery **89**(6): 1239-1247.

BACKGROUND: Pediatric craniocerebral gunshot injuries (CGIs) occur both in the context of accidental and intentional trauma. The incidence and physiology of pediatric CGIs merit reexamination of prognostic factors and treatment priorities. This study characterizes the current understanding of mortality and prognostic factors in this patient population., METHODS: A systematic search was conducted. Selection criteria included all studies published since 2000, which described civilian isolated CGIs in pediatric patients. Data were analyzed qualitatively and quantitatively to identify factors prognostic for the primary outcome of mortality. Secondary outcomes included functional outcome status, requirement for surgery, and injury complications. Study quality was assessed with the Newcastle-Ottawa Scale. This study was registered with PROSPERO (CRD42019134231)., RESULTS: Initial search revealed 349 unique studies. Forty underwent full text screening, and eight studies were included in the final synthesis. The overall mortality rate was 44.8%. Most CGIs occurred in older teenagers. Aggressive surgical treatment was recommended by one author, while remaining studies emphasized clinical judgment. Reported prognostic factors include initial Glasgow Coma Scale, pupil reactivity, involvement of multiple lobes or deep nuclei, and bihemispheric injuries. Reported complications from CGIs included seizure, meningitis, abscess, cerebrospinal fluid leak, bullet migration, focal neurological deficits, endocrine abnormalities, cognitive deficits, and neuropsychological deficits. The Glasgow Outcome Scale was the predominant measure of function and demonstrated a moderate recovery in 17.4% and a good recovery in 27.3% of patients., CONCLUSION: This systematic review analyzed the existing evidence for prognostic factors in the context of pediatric CGIs. Significant long-term clinical improvement is possible with interventions including urgent surgical therapy. Fixed bilateral pupils and low initial Glasgow Coma Scale correlate with mortality but do not predict all patient outcomes. Patients younger than 15 years are underreported and may have differences in outcome. The literature on pediatric CGIs is limited and requires further characterization., LEVEL OF EVIDENCE: Systematic Review, level IV.

1480. Duda, T., et al. (2019). "Systematic review of civilian pediatric intracranial gunshot wounds." Canadian Journal of Neurological Sciences **46**: S42.

Background: Pediatric craniocerebral gunshot wounds occur in the context of both accidental and intentional trauma. Unique physiologic factors merited research into prognostic factors and treatment priorities in the pediatric population. Methods: A systematic search of MEDLINE, EMBASE, Web of Science, LILACS, Cochrane Registered Trials and Systematic Reviews, ISRCTN, and ClinicalTrials.gov was conducted. Selection criteria included all studies published in any language since 2000 which described intracranial isolated gunshot wounds in a civilian individual or population of pediatric age. Post-mortem and epidemiological studies were excluded. Screening was conducted through Covidence. Results: Initial database search revealed 349 unique studies for abstract and title screening. Fifty studies were selected for full text screening. Nine studies were included in the final review. Study quality was assessed with the Newcastle-Ottawa Scale. Case series noted bullet migration, pituitary deficiency, neurovascular and neuropsychological concerns. Three single-center retrospective studies of 71, 30, and 48 pediatric patients suggested multiple negative prognostic signs on initial presentation. Early aggressive surgical treatment was recommended by some authors. Conclusions: This systematic review analyzed the best current understanding of evidence for prognostic factors and treatment

considerations of intracranial gunshot wounds in the pediatric neurotrauma context. Areas for future research with larger multi-center studies were highlighted.

1481. Duda, T., et al. (2021). "Craniocerebral gunshot injury bullet migration to the cardiac right ventricle." Surgical neurology international **12**.

Background: Missile embolism is the process of slow velocity projectiles penetrating into vascular spaces followed by arterial, venous, or paradoxical embolism of the fragments. This is a rare complication in craniocerebral gunshot injuries (CGI), with only five other cases previously published demonstrating pulmonary or arterial emboli from these injuries. There is a high rate of mortality from these injuries. Case Description: A patient presented with a CGI from an occipital trajectory, causing penetrating fragments into the venous sinus system. The weapon was a Glock Model 17M 9 mm with a hollow-point bullet, fired close range. Initial chest X-ray demonstrated only atelectasis. After stabilization, 18 min from the initial chest X-ray, subsequent computed tomography (CT) imaging demonstrated extensive intracranial injuries and fragmentation of the bullet with the expected devastating intracranial injuries. Unexpectedly, chest CT revealed metallic fragments in the right cardiac ventricle which was redemonstrated on follow-up chest X-ray. Unfortunately, his extensive intracranial injuries and poor clinical status were nonsurvivable, and thus the family elected to discontinue supportive measures. Conclusion: This case demonstrates radiographic imaging of a metallic intravascular fragment from CGI through presumed transvenous mechanisms. The imaging provides a consistent timeline demonstrating migration can occur in the acute phase. This study additionally supports the presumed mechanism for pulmonary of migration through the right heart. Fragment embolization should be considered in cases of acute deterioration in this patient population.

1482. Dudley, H. A., et al. (1968). "Civilian battle casualties in South Vietnam." The British journal of surgery **55**(5): 332-340.

1483. Duerr, S. and T. Cocco (1977). "Gunshot wound of the abdomen with cerebral embolization." The Journal of trauma **17**(2): 155-157.

A distinctly rare case of a bullet embolus to the internal carotid artery following an abdominal gunshot wound is reported. Unusual aspects of the case are discussed with references to the literature. Pathways the bullet may have traversed to reach its final location are proposed.

1484. Duffy, F. J., Jr., et al. (1998). "Use of bilateral folded radial forearm free flaps for reconstruction of a midface gunshot wound." Journal of reconstructive microsurgery **14**(2): 89-96.

Optimal treatment of midfacial gunshot wounds includes early definitive reconstruction of the bony scaffold to prevent soft tissue contraction. When this is not possible, secondary reconstruction is more difficult. The authors present a case of delayed reconstruction of a midface gunshot wound. Two months following a self-inflicted, submental gunshot wound and eventual rigid fixation of the remaining midfacial bony anatomy, two simultaneous radial forearm free flaps were utilized in the reconstruction. The first flap was folded onto itself to recreate the hard palate in conjunction with a split rib graft; the second flap filled the remaining soft-tissue defect and simultaneously provided lining for an eventual staged nasal reconstruction. The second stage of the nasal reconstruction was completed 5 weeks later with a calvarial bone graft and forehead flap. This dual microsurgical approach allowed for one-step reconstruction of both surfaces of the hard palate, resulting in separate oral and nasal cavities, and optimizing the patient's ability to speak and eat. Extensive soft-tissue contraction encountered in late reconstructions underscores the importance of an early, definitive, surgical approach in these difficult wounds.

1485. Duffy, G. P. and Y. S. Bhandari (1969). "Intracranial complications following transorbital penetrating injuries." The British journal of surgery **56**(9): 685-688.

1486. Dujardin, K. S., et al. (2001). "Myocardial dysfunction associated with brain death: clinical, echocardiographic, and pathologic features." The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation **20**(3): 350-357.

BACKGROUND: The sequelae of severe brain injury include myocardial dysfunction. We sought to describe the prevalence and characteristics of myocardial dysfunction seen in the context of brain-injury-related brain death and to compare these abnormalities with myocardial pathologic changes., METHODS: We examined the clinical course, electrocardiograms, head computed tomography scans, and echocardiographic data of 66 consecutive patients with brain death who were evaluated as heart donors. In a sub-group of patients, we compared echocardiographic findings with pathologic findings., RESULTS: Echocardiographic systolic myocardial dysfunction was present in 28 (42%) of 66 patients and was not predicted by clinical, electrocardiographic, or head computed tomographic scan characteristics. Ventricular arrhythmias were more common in the patients with, compared to those without, myocardial dysfunction (32% vs 0%; $p < 0.001$). Myocardial dysfunction was segmental in all 8 patients with spontaneous subarachnoid or intracerebral hemorrhage. In these patients, the left ventricular apex was often spared. Myocardial dysfunction was either segmental or global in 17 patients who suffered head trauma and in 3 patients who died of other central nervous system illnesses. In 11 autopsied hearts, we found poor correlation between echocardiographic dysfunction and pathologic findings., CONCLUSIONS: Systolic myocardial dysfunction is common after brain-injury-related brain death. After spontaneous subarachnoid or intracerebral hemorrhage, the pattern of dysfunction is segmental, whereas after head trauma, it may be either segmental or global. We found poor correlation between the echocardiographic distribution of dysfunction and light microscopic pathologic findings.

1487. Dujardin, R., et al. (2021). "Effect of female sex on endothelial activation and fibrinolysis in trauma patients." Intensive Care Medicine Experimental **9**(SUPPL 1).

Introduction. Premenopausal female sex is suggested to provide a survival advantage in response to traumatic injury that is attributed to protective effects of estrogen on endothelial and coagulation disturbances[1]. However, previous studies report contradictory results. Objectives. To compare markers of endothelial activation and fibrinolysis between male and female trauma patients of different age groups. Methods. This study is performed as part of the prospective, multicenter, Activation of Coagulation and Inflammation in Trauma (ACIT) trial. All trauma patients ≥ 18 years with full trauma team activation were included between January 2008 and April 2015. Exclusion criteria were penetrating trauma, traumatic brain injury (TBI) defined as an abbreviated injury score (AIS) of head and neck ≥ 3 and total other AIS < 3, administration of > 2L i.v. fluids before hospital admission, hospital arrival > 2 h after injury or burns covering > 5% of the body. Trauma patients were divided in the following three categories: male patients < 45, female patients < 45, and female patients ≥ 45 years of age. At hospital admission, blood was drawn for analysis of von Willebrand factor antigen (vWF:ag) and thrombomodulin (TM) as markers for endothelial activation and D-dimer, plasmin antiplasmin complexes (PAP) and tissue plasminogen activator (tPA) as markers for fibrinolysis. Groups were compared using a Kruskal Wallis test, followed by a Dunn's post hoc test. Results. In total, 743 patients were enrolled. Groups did not differ in injury severity or shock indices (Table 1). Compared to males, early mortality was significantly higher in the female ≥ 45 group, but not in female < 45 patients. Levels of vWF:ag and TM were lower in both the female < 45 and female ≥ 45 group when compared to men, but not different between the female age groups. Female ≥ 45 patients showed increased PAP and tPA levels compared to female < 45 patients, and increased PAP levels compared to male < 45 patients. Although D-dimer levels were also higher in female ≥ 45 patients, this increase was not statistically significant. Conclusion. This study shows that female patients ≥ 45 years of age have an increased risk of mortality compared to female and male patients < 45 years of age, associated with an increase in markers of fibrinolysis. Reduced endothelial activation as observed in women did not provide a survival benefit. Whether suppletion of estrogen in women ≥ 45 confers protection by decreasing fibrinolysis warrants further research.

1488. Dujovny, M., et al. (1995). "Transcranial cerebral oximetry and carotid cavernous fistula occlusion. Technical note." Acta neurochirurgica **133**(1-2): 83-86.

Different methods have been used in the evaluation and monitoring of the cerebral oxygen supply during neuro-interventional therapies. Attenuation of near-infrared light by the chromophores oxyhemoglobin and deoxyhemoglobin have shown to be useful in the study of the cellular oxygen metabolism and oxygen delivery to the brain. Transcranial cerebral oximetry (TCCO) has the advantage of providing real-time information regarding regional brain oxygen saturation (rSO2) by using wavelengths in the near-infrared range. We present a patient with a carotid cavernous fistula

who underwent balloon occlusion and concurrent continuous TCCO monitoring. TCCO was found to be a useful tool providing immediate rSO2 values during the angiographic and interventional procedures. Initial balloon occlusion of a carotid cavernous fistula resulted in partial occlusion of the internal carotid artery lumen causing an immediate decrease in rSO2 which correlated with angiographic findings. Subsequent reocclusion of the fistula produced a slower and smaller degree of decrease in rSO2 with clinical improvement in the patient. Changes in rSO2 were detected before any adverse clinical event was observed. TCCO was reliable, safe, sensitive, and provided a real-time assessment tool for the monitoring of brain oxygen supply in a patient undergoing a neuroendovascular procedure.

1489. Duke, J., et al. (2018). "Another case of pleural based malignancy or perhaps not: An unusual presentation of gunshot injury." American Journal of Respiratory and Critical Care Medicine **197**(MeetingAbstracts).

INTRODUCTION: This is a case of a 46 year old with high risk of malignancy with multiple pleural-based nodules found to have thoracic splenosis. DESCRIPTION: A 46 year old man with past medical history of hypertension and tobacco use (20 pack years) was referred to our institution for evaluation of multiple pleura-based nodules along the left diaphragmatic pleura which were found incidentally on a CT scan of the chest. He reported significant asbestos exposure having worked for one year in a shipyard as well as a history of a gunshot wound to the abdomen requiring an exploratory laparotomy ten years prior. Due to concern for possible neoplasm, the patient underwent video-assisted thoracoscopic surgery converted to open thoracotomy due to significant bleeding for biopsy. His post-operative course was complicated by bilateral cerebellar stroke without long-term limitations. Pathology showed lymphoid follicles lined by endothelium cells consistent with splenic tissue. DISCUSSION:: Splenosis is a term that describes the heterotopic autotransplantation of splenic tissue to another area of the body. Typically, this occurs through trauma that results in scattering of the tissue, most often in the abdominal cavity. Often the condition is found incidentally on imaging, and the history of incidents with possible splenic injury to is the key to the diagnosis. Splenosis is a benign condition but often can be mistaken for metastatic disease resulting in an invasive workup. The diagnostic imaging modality of choice for splenosis is technetium-99m heat-damaged erythrocyte nuclear scintigraphy. The damaged red blood cells are taken up by the reticuloendothelial system, helping to localize splenic tissue. Once the diagnosis is made for splenosis, no further evaluation or treatment is necessary. Therefore, in patients with prior history of splenic rupture presenting with left-sided pleural nodules, a high index of suspicion with emphasis on a detailed history is needed to adequately assess the patient for this rare mediastinal condition. Image 1: (a) (b) CT findings of pleural-based nodules initially concerning for malignancy. (c) histology consistent with lymphoid follicles lined by endothelium cells consistent with splenic tissue.

1490. Duker, J. S., et al. (1991). "Inadvertent globe perforation during retrobulbar and peribulbar anesthesia. Patient characteristics, surgical management, and visual outcome." Ophthalmology **98**(4): 519-526.

The authors report a series of 20 eyes from 20 patients in whom inadvertent perforation of the globe occurred during local anesthesia for ocular surgery. Perforation resulted from retrobulbar anesthesia in 18 eyes and from peribulbar anesthesia in 2 eyes. Nine (45%) of 20 eyes had an axial length greater than or equal to 26.00 mm. Combining this figure with axial length data for the general population and estimates for the risk of globe perforation during local anesthesia yields an approximate incidence of perforation in eyes with axial length greater than or equal to 26.00 mm of 1 in 140 injections. Proliferative vitreoretinopathy (PVR) developed in 8 of the 20 eyes (40%) in this series. Overall, 15 (75%) of the 20 eyes were successfully repaired, and, in five eyes (25%), the final visual acuity was 20/70 or better.

1491. Dulger, H. E. and M. Tokdemir (2001). "An accidental death caused by an unexploded 40-mm grenade." Military medicine **166**(6): 557-559.

Unexploded grenades are potentially dangerous materials. Numerous grenades have been found to be unexploded after wars have ended. We present an interesting case of an unexploded grenade that was found accidentally in a soldier's skull. On physical examination, the entrance wound of an unusual penetrating object was noted. This unusual physical finding led us to undertake radiographic examination. A 40-mm unexploded grenade was noticed on the radiograph of the soldier's skull.

1492. Duman, H., et al. (1999). "Reconstruction of contour and anterior wall defects of frontal bone with a porous polyethylene implant." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **27**(5): 298-301.

Frontal bone contour defects cause marked facial deformity, which is instantly obvious to the observer. The aetiology is usually post-traumatic either following a traffic accident or a gunshot injury. The contour deformity of the frontal bone was reconstructed using Medpor porous polyethylene in 12 consecutive patients during a period of 2 years. In four of the patients, we used a coronal approach, whilst using the old incision scar and laceration for access in the remainder. In two of the patients it was not necessary to fix the implant at all, but the remainder were fixed with lag screws because of implant mobility. The aetiology, the technique used, and the results obtained are presented.

1493. Duman, H., et al. (2002). "Spontaneous subfalcial transcallosal migration of a missile to the contralateral hemisphere causing deterioration in neurological status--case report." Neurologia medico-chirurgica **42**(8): 332-333.

A 26-year-old man sustained a gunshot injury. Computed tomography (CT) demonstrated the missile in the right parietal region. Twenty-four hours later, the missile had moved towards the midline. Following slight deterioration in his neurological condition one week later, follow-up CT revealed that the missile had crossed the midline through the corpus callosum and was located in the left parietal region. CT during the second week demonstrated that the missile had stopped close to the left parietal bone. Spontaneous migration of a missile to the contralateral side via a subfalcial-transcallosal route with deterioration in neurological status is unusual. The missile may have moved under the influence of the intracranial pressure and pulsatile effect of the cerebrospinal fluid.

1494. Dumbach, J., et al. (1994). "[Limits of osseous reconstruction of the mandible with autologous spongiosa, hydroxyapatite granules and titanium mesh, especially after radiotherapy]." Grenzen der knochernen Rekonstruktion des Unterkiefers mit autogener Spongiosa, Hydroxylapatitgranulat und Titangitter, insbesondere nach Strahlentherapie. **39**: 93-95.

Over the past twenty years the titanium mesh combined with autologous iliac crest spongiosa and hydroxylapatite has performed well in the restoration of mandibular discontinuity defects in 79 patients. In 14 irradiated patients with a transplant bed of inferior quality, however, complications and failures occurred more often than in the 65 not irradiated patients. The results of our investigation clearly show, that the success of mandibular reconstruction mainly depends on a well vascularized transplant bed.

1495. Duncan, K. A., et al. (2013). "Injury-induced expression of glial androgen receptor in the zebra finch brain." Journal of neurotrauma **30**(22): 1919-1924.

Astrogliosis occurs following injury to the zebra finch brain. To date, only estrogen synthase (aromatase) has been identified in injury-induced astrocytes. The expression of other steroidogenic enzymes or their receptors remains unknown in the avian brain. However, in mammals, an upregulation of androgen receptors has been identified in glial cells. The aim of this study was to determine if the androgen receptor is upregulated following injury in adult zebra finches. Finches were given a single penetrating injury and brain tissue was collected 24 or 72 h later. Expression of androgen receptor was examined using immunohistochemistry and quantified using quantitative polymerase chain reaction (qPCR) analysis. Androgen receptors were localized to astrocytes versus neurons, further solidifying the role for astrocytes in neural recovery.

1496. Duncan, N. O., 3rd, et al. (1986). "Gunshot injuries of the temporal bone." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **94**(1): 47-55.

Concurrent with the increase in handgun crime in the United States is a rising incidence of gunshot wounds to the temporal bone. These injuries present challenging diagnostic and management problems to the otolaryngologist. A timely multicenter review of this entity revealed 22 cases evaluated and treated by the authors between 1975 and 1984. A wide variety of injuries were encountered, involving anatomic structures within or contiguous with the temporal bone. These included: eight intracranial injuries; 11 traumatized facial nerves; seven vascular wounds; 19 mastoid, middle, or inner ear injuries; and 11 cases of damage to the external auditory canals. A rational scheme for immediate and long-

term management of each type of injury is outlined. Illustrative cases representing vascular, neural, temporal bone, and central nervous system injury are presented.

1497. Dunmade, A. D. and B. S. Alabi (2007). "Penetrating injury of head and neck by the spoke of a cycle." West African journal of medicine **26**(1): 55.

1498. Dunn, I. F., et al. (2009). "Orbitocranial wooden foreign body: a pre-, intra-, and postoperative chronicle: case report." Neurosurgery **65**(2): E383-E384.

OBJECTIVE: Intraorbital wooden foreign bodies--usually from a low-velocity puncture--are elusive and demand a low threshold for further imaging. In patients with traumatic injuries, orbital and intracranial air from fractures may be present, and it is particularly easy to overlook a wooden fragment, CLINICAL PRESENTATION: A 53-year-old equestrian was kicked in the face by the rear hoof of a horse. The event was captured on video by her husband. Although no obvious entry point in and around the eye was observed, her ocular examination was notable for superior orbital fissure syndrome and increasing intraocular pressure in the left eye. Closer inspection revealed a 5-mm laceration above her superior lid margin; imaging revealed a foreign body at the orbital apex with apparent communication with the cranial vault., INTERVENTION: We proceeded with cranio-orbital exploration because of the risk of continued ocular damage in the setting of increasing intraocular pressure and the potential for infection of both the eye and the intracranial space from a suspected foreign body. A 3.0 cm x 0.5 cm fragment was found lodged in the orbital apex and removed., CONCLUSION: The patient recovered well after surgery and a course of antibiotics and has returned to riding. This case report presents an algorithm for approaching cranio-orbital foreign objects of unclear identity and the favorable outcomes that may be achieved.

1499. Dunn, I. F., et al. (2007). "Traumatic pericallosal artery aneurysm: a rare complication of transcallosal surgery. Case report." Journal of neurosurgery **106**(2 Suppl): 153-157.

Traumatic intracranial aneurysms are rare in adults but account for up to 33% of all aneurysms encountered in a pediatric population. The most common location of such lesions in children is the pericallosal or adjacent branch of the anterior cerebral artery, where a head impact exerts sudden decelerating shearing forces on the arteries tethered on the brain surface against an immobile falx cerebri, weakening the arterial wall. This action can lead to dissection of the damaged vascular layers, with resultant expansion of the affected site into a fusiform aneurysm. Pericallosal aneurysms following a penetrating intracranial injury have also been described, and the resultant lesion in some cases can be a pseudoaneurysm. The incidence of iatrogenic pericallosal artery aneurysms, however, is extremely rare. The authors describe the first reported case of a traumatic pericallosal artery aneurysm following transcallosal surgery. This 6-year-old boy underwent resection of a hypothalamic pilocytic astrocytoma, which was approached via the transcallosal corridor. A follow-up magnetic resonance image obtained within 1 year of surgery disclosed a small flow void off the right pericallosal artery, which was initially interpreted as residual tumor. Serial investigations showed the lesion enlarging over time, and subsequent angiography revealed a round 7-mm pericallosal artery aneurysm with an irregularly shaped 2- to 3-mm lumen. The aneurysm was difficult to treat with clip reconstruction or suturing of the affected segment, and an excellent outcome was ultimately achieved with resection of the lesion and autogenous arterial graft interposition. The authors also discuss the likely pathophysiology of the aneurysm and the surgical procedures undertaken to treat it.

1500. Dunn, L. T. and P. M. Foy (1994). "Anticonvulsant and antibiotic prophylaxis in head injury." Annals of the Royal College of Surgeons of England **76**(3): 147-149.

The evidence for and against the prophylactic use of anticonvulsants and antibiotics in head injury is reviewed. There is a lack of blinded placebo-controlled trials in this area. On balance there is no compelling evidence to support the use of either anticonvulsant or antibiotic prophylaxis in head injury, with the possible exception of antibiotic prophylaxis in compound depressed skull fractures and penetrating brain injuries.

1501. Duntze, J., et al. (2009). "[Clostridial brain abscess after glioblastoma resection: case report and critical review of the literature]." Abces cerebral aClostridium perfringens apres chirurgie d'exerese d'un glioblastome: a propos d'un cas et revue de la litterature. **55**(6): 569-572.

Clostridium perfringens is rare in neurosurgery. The source of clostridial brain abscess is usually a penetrating head injury. We report the case of a 57-year-old man who had parietal glioblastoma resection with local carmustine chemotherapy and who presented a clostridial brain abscess three weeks later. Progression was especially brutal, leading to patient's death in few hours. We discuss the etiology and progression of this case compared to the data reported in the literature.

1502. Dunya, I. M., et al. (1995). "Penetrating orbital trauma." International ophthalmology clinics **35**(1): 25-36.

1503. Duong Dinh, T. A., et al. (2011). "[Uncommon knife injury of the neck]." Ungewohnliche Messerstichverletzung des Halses. **90**(12): 760-761.

1504. Dupoirieux, L., et al. (1994). "The role of microsurgery in salvage operations for cranio-cerebral gunshot wounds: a case report." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **22**(2): 81-85.

A case of gunshot wound of the brain associated with a scalp defect is presented. Repair of the scalp defect was primarily achieved by multiple rotation flaps. Successive complications occurred in the postoperative course related to wound breakdown and infection. The patient underwent a secondary reconstruction by a free forearm flap. Despite an infected recipient bed and poor general condition, the postoperative course was uneventful and the healing was complete within 1 month.

1505. Durand, M. L. and C. H. Dohlman (2009). "Successful prevention of bacterial endophthalmitis in eyes with the Boston keratoprosthesis." Cornea **28**(8): 896-901.

PURPOSE: To determine the influence of topical vancomycin prophylaxis on the incidence of bacterial endophthalmitis in eyes with a Boston Keratoprosthesis (KPro)., METHODS: A retrospective chart review was performed for 255 eyes of 231 patients who received a KPro between March 1990 and December 2006. Preoperative diagnoses were burn, ocular cicatricial pemphigoid (OCP), Stevens-Johnson Syndrome (SJS), and graft failure/other. Patients used topical antibiotic prophylaxis for the duration of the KPro: polymyxin-trimethoprim or a quinolone in the 1990s, or a quinolone with or without vancomycin beginning in late 1999. For each KPro eye, the follow-up interval was divided into months on or off vancomycin (vancomycin versus no-vancomycin group). The incidence of endophthalmitis was calculated with Kaplan-Meier survival curves., RESULTS: The 255 eyes were followed for 673.6 patient-years (mean, 2.64 years; range, 1 week to 13 years). There were 18 cases of bacterial endophthalmitis; 17 occurred at least 6 weeks postoperatively (range, 1.5 to 46 months). Gram-positive cocci caused over 80% of cases. Only 1 case, due to an atypical mycobacterium, occurred in a patient using vancomycin. The incidence of bacterial endophthalmitis was lower in the vancomycin group than in the no-vancomycin group: 0.35% versus 4.13% per patient-year (P = 0.001). It was also lower in SJS eyes using vancomycin versus no vancomycin: 1.76% versus 18.39% per patient-year (P = 0.009). In eyes with preoperative diagnoses of burn, OCP, or graft failure/other, the incidence in the vancomycin group was zero., CONCLUSION: Topical vancomycin plus a quinolone is effective in preventing bacterial endophthalmitis in KPro eyes.

1506. Durfort, C., et al. (2020). "Committing Suicide With Handgun Wounds in the Head Using a Defective Firearm: About 2 Unusual Autopsy Cases." The American journal of forensic medicine and pathology **41**(2): 124-127.

We report 2 unusual autopsy cases with head handgun wounds using defective firearms in a suicidal context. In the first case, a 78-year-old man was found hanged from a tree, with a Lefaucheux revolver lying on the tree. In the right temporal region, there was an entrance wound with a bullet still in place, responsible for a mild cerebral contusion, without bone defect. The main cause of death was hanging. In the second case, a 60-year-old man died at home after shooting himself in the head several times with a 22-long rifle revolver. The autopsy showed 13 entrance wounds on the scalp. Most of the bullets remained along the skull vault. In each of 2 cases, the manner of death, the feasibility of

suicidal gesture, and the consequences of a brain injury on the time to the occurrence of incapacity were questioned. These unusual autopsy cases underline how important it is to take into account the defective nature of firearms.

1507. Durmaz, O., et al. (2017). "A Rare History: an Intracranial Nail Present for Over a Half-Century." Acta medica (Hradec Kralove) **60**(3): 124-126.

We present a rare case of a patient with a persistent headache for many years found to have an intracranial nail present for nearly 65 years. The nail was found entering approximately 1 cm from the midline on the left side, passing below the superior sagittal sinus, with the tip 1.5 mm right of the frontal horn of the lateral ventricle. Treatment strategies designed to optimize outcome for intracranial foreign bodies and possible complications are discussed in this report. We also discuss the decision for surgical intervention for foreign bodies and the relevance of position of the foreign body.

1508. Durmaz, R., et al. (2003). "Lazaroid attenuates edema by stabilizing ATPase in the traumatized rat brain." The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques **30**(2): 143-149.

OBJECTIVE: The aim of the present study was to determine the potential therapeutic value of the lazaroid U-83836E on blood brain barrier (BBB) breakdown and edema with respect to the changes in the synaptosomal Na+/K+ and Mg(2+)/Ca(2+)-adenosinetriphosphatase (ATPase) activities, tissue malondialdehyde levels and the neuronal viability in the rat brain subjected to cerebral trauma., METHODS: Traumatic brain injury (TBI) was introduced by applying a 75 gm. cm force to the right parietal cortex using the weight-drop method. The first set of animals was used for determining time course changes of the synaptosomal Na+/K+ and Mg(2+)/Ca(2+)-ATPase and the malondialdehyde levels and were sacrificed 2, 6 and 24h after lesion production. A group of the animals was treated with U-83836E proir to TBI and sacrificed 24h after cerebral injury. A second set of animals was used for evaluating the alterations in BBB disruption and tissue water content and were sacrificed 2, 6 and 24h after lesion production. Two groups of animals were treated with U-83836E and sacrificed after 2 and 24h following TBI. U-83836E was given intraperitoneally thirty minutes before trauma at a dose of 10 mg/kg. Neuronal necrosis was also evaluated in the groups of U-83836E and physiological saline-treated animals., RESULTS: Extravasation of Evans blue into the traumatized hemisphere was maximum at 2h ($p<0.001$) and returned close to the control levels at 24h after TBI ($p>0.05$). Edema had developed progressively over time and reached the maximum degree of 2.1% ($p<0.001$) at 24h. U-83836E showed no effect on the BBB breakdown and the tissue water content at 2h and still had no effect on the BBB breakdown after 24h following the trauma ($p>0.05$), although it reduced edema after 24h ($p<0.01$). The losses of Na+/K+ and Mg(2+)/Ca(2+)-ATPase activities were found as 39.5% ($p<0.001$) and 29.4% ($p<0.01$) of the control value, respectively, and remained at the decreased levels throughout the experiment. Malondialdehyde level continued to increase over time reaching up to 209% ($p<0.001$) of the control value 24h after TBI. Both ATPase activities were improved to near control values ($p>.05$) by the effect of U-83836E. U-83836E inhibited the increase of lipid peroxidation ($p<0.001$) and also salvaged neuronal necrosis ($p<0.05$)., CONCLUSION: U-83836E given prophylactically after cerebral trauma appears to reduce edema, possibly by inhibiting increases in lipid peroxidation and by stabilizing ATPase. Further studies are recommended to verify the similar effects of the brain penetrating lazaroids when they are given after trauma.

1509. Durmic, T., et al. (2017). "Death related to nasal surgery: Case report and review of literature." Rechtsmedizin **27**(4): 351-352.

Background. The investigation of deaths that are suspected to be related to medical therapy present several challenges for the forensic pathologist. Material and methods. We present a case of a 55-year-old woman who underwent this elective surgical procedure and never recovered from general anesthesia. Results. An otherwise healthy 55-year-old female with a multiple nasal polyps underwent nasal polypectomy. The operation was initially considered successful; however, the patient never recovered from general anesthesia and was declared deceased within 24 hours of her surgery. At autopsy, there was evidence of basilar subarachnoid hemorrhage. Examination of the basilar skull showed an approximately 15 by 7 mm perforation of the right cribriform plate. Above the bone perforation, there was a disruption of the dura, as well as a 20 mm long penetrating wound within the right frontal lobe parenchyma of the brain, with associated interventricular haemorrhage. Subsequent sectioning of the formalin fixed brain revealed extensive parenchymal destruction. The cause of death was certified as complications of nasal/sinus surgery, with perforation of base of skull with hemorrhagic tissue destruction of brain, while the manner of death was considered accidental.

Discussion and conclusions. Nasal polypectomy represents one common, minimally invasive nasal functional endoscopic sinus surgery technique that has been used for over 20 years in its surgical removal. All complications of this surgery are divided into major and minor complications. Major intracranial complications, although rare, are of greater interest to forensic pathologists, since many of these are potentially fatal. Complications that have resulted in death include cerebral spinal fluid (CSF) leakage, meningitis, brain abscess, damage to major blood vessels in the region, subarachnoid hemorrhage, and parenchymal damage. Following the presentation of this case, the authors discuss common nasal surgical procedures and their known complications. In addition, the authors address and review the topic of deaths related to medical therapy as an extremely challenging process with an enormous potential for almost limitless clinicopathological and medicolegal exploration.

1510. Durmic, T., et al. (2019). "Two cases of firearm-related murder-suicide: Forensic implications of the ability to act." Medicine, science, and the law **59**(2): 78-82.

One of the most important tasks in forensic medicine is differentiating between a homicide and a suicide, especially in cases where more than one self-inflicted gunshot wound is present. The significance is even greater when the victim's ability to act after the first gunshot is questionable. In these cases, the only way to determine the sequence of the shots is to consider the severity of the injuries and their disabling effect. Therefore, the importance of previously mentioned facts is even greater, not only in everyday forensic practice but also in court. The questions dealing with the crime scene and interpretation of the wounds' trajectories are of the utmost importance.

1511. Dusoir, H., et al. (1990). "The role of diencephalic pathology in human memory disorder. Evidence from a penetrating paranasal brain injury." Brain : a journal of neurology **113 (Pt 6)**: 1695-1706.

A patient (B.J.) is reported who developed severe memory impairment following a penetrating brain injury caused by a snooker cue which entered through his left nostril into the basal regions of the brain. Initially, his memory disorder had the clinical features of a dense amnesic syndrome, with both anterograde and retrograde amnesia, but B.J. subsequently showed significant recovery of memory function. Formal memory testing was carried out 21 months after injury. This demonstrated marked verbal memory impairment, as severe as that seen in patients with the amnesic syndrome. On nonverbal memory tests, his impairment was relatively mild and patchy. His retrograde amnesia had regressed mainly to affect a 6 month period before the injury. On other cognitive tasks, he performed at an average or above average level, and there was no neuropsychological evidence of frontal lobe dysfunction. Neuroradiological investigations at various stages after his injury failed to demonstrate a lesion in any of the thalamic nuclei. Magnetic resonance imaging showed a lesion in the hypothalamus in the region of the mamillary bodies. Our study demonstrates that marked, relatively focal, memory disorder after diencephalic injury can occur without direct pathology to the body of the thalamus. It also indicates that structures in or adjacent to the hypothalamus, such as the mamillary bodies, may play a more important role in human memory functioning than has hitherto been considered.

1512. Dutcher, S. A., et al. (1998). "Heat-shock protein 72 expression in excitotoxic versus penetrating injuries of the rodent cerebral cortex." Journal of neurotrauma **15**(6): 421-432.

The induction of heat shock protein 72 (hsp72) has been described in various experimental models of brain injury. The present study examined hsp72 expression patterns within the rodent cerebral cortex in experimental paradigms designed to mimic two mechanisms of damage produced by penetration of the cerebral cortex: (1) tissue tearing from the missile track and (2) diffuse excitotoxicity during temporary cavitation and shock wave formation. Adult male Spaque-Dawley rats received controlled penetration (stab) or injection of the NMDA receptor excitotoxin, quinolinic acid (QA), into the frontal cortex and were killed 1-24 h later. Tissue from the lesioned, sham-operated, or contralateral uninjected cortex was processed for Western and immunocytochemical analyses of hsp72 protein expression. By 12 h, both controlled penetration and excitotoxic brain injuries produced significant increases in hsp72 immunoreactivity, which decreased toward control levels at 24 h. However, the severity and regional distribution of hsp72 expression varied between the two models. Specifically, the controlled penetration injury produced many hsp72-expressing cells near the needle track, while immunoreactive cells within the QA-injected cortex were found in the periphery of the lesion site. Morphological assessment of brain sections subjected to dual-labeling procedures demonstrated that cells expressing hsp72 were primarily neuronal in both models of injury. These results suggest that

although controlled penetration and diffuse excitotoxicity may induce similar temporal and cellular patterns of hsp72 expression, the spatial location of hsp72-immunoreactive cells may differ between the two models.

1513. Dutton, R. P., et al. (2010). "Trauma mortality in mature trauma systems: are we doing better? An analysis of trauma mortality patterns, 1997-2008." The Journal of trauma **69**(3): 620-626.

BACKGROUND: Advances in care such as damage control surgery, hemostatic resuscitation, protocol-driven cerebral perfusion management, and lung-protective ventilation have promised to improve survival after major trauma. We examined injury severity, mortality, and preventability in a mature trauma system during a 12-year period to assess the overall benefits of these and other improvements., METHODS: Using the institutional trauma registry and the quality management database, we analyzed the outcome and the cause of death for all primary trauma admissions from July 1, 1996, to June 30, 2008, and linked these data with patient demographics, hospital length of stay, time to death, predicted probability of survival, and peer review of in-hospital deaths., RESULTS: Through fiscal year (FY) 2007, primary trauma admissions increased in number, injury severity, and age. Performance benchmarked against predicted probability of survival improved. Mortality through this era ranged from 3% to 3.7% and worsened slightly overall (p = 0.04). However, among those patients admitted with Injury Severity Score 17-25, survival improved significantly (p = 0.0003). Traumatic brain injury (TBI) accounted for 51.6% of deaths; acute hemorrhage, 30%; and multiple organ failure, 10.5%. Median time to death for uncontrollable hemorrhage, TBI, multiple organ failure was 2 hours, 24 hours, and 15 days, respectively. These patterns did not change significantly over time., CONCLUSION: Survival after severe trauma and survival benchmarked against predicted risk improved significantly at our center during the past 12 years despite generally increasing age and worsening injuries. Advances in trauma care have kept pace with an aging population and greater severity of injury, but overall survival has not improved.

1514. Dworzack, D. L., et al. (1989). "Pseudallescheria boydii brain abscess: association with near-drowning and efficacy of high-dose, prolonged miconazole therapy in patients with multiple abscesses." Medicine **68**(4): 218-224.

Brain abscess caused by Pseudallescheria boydii is a highly lethal infection, usually seen in immunosuppressed patients. Five patients with P. boydii brain abscesses are described. Four of these patients acquired their infection after near-drowning; 1 patient developed an abscess after penetrating head trauma. Two patients survived their infections, which included involvement of other body sites (lung, eye, bone) as well as multiple undrained brain abscesses, after prolonged courses of high-dose parenteral miconazole (80-90 mg/kg/d). Progressive increases in miconazole dosage during the treatment periods were required to produce serum levels above the minimum inhibitory concentrations of the fungal isolates.

1515. Dwyer, B. E., et al. (1996). "Transient induction of heme oxygenase after cortical stab wound injury." Brain research. Molecular brain research **38**(2): 251-259.

Heme oxygenase (HO) exists as two isoenzymes designated heme oxygenase-1 (HO-1) and heme oxygenase-2 (HO-2). HO-1 has been identified as a heat shock or stress protein and is inducible whereas HO-2 is largely refractory to induction. HO-2 is the predominant isoenzyme in normal brain and appears to have a predominantly neuronal distribution in cerebral cortex. Cortical stab wound injury resulted in HO-1 induction as determined by Western blot analysis. Immunohistochemical analysis suggested that induced HO-1 was largely restricted to reactive astrocytes and macrophage-like cells. Enhanced HO-1 immunoreactivity was observed in hypertrophied, GFAP+ reactive astrocytes near the wound margin as early as 12 h after injury. Very rarely were HO-1+ neurons observed and then only up to 6 h after stabbing. Maximal numbers of HO-1+ astrocytes were found 3 days after stabbing. Their numbers declined thereafter. By 5 days after stab injury few HO-1+ reactive astrocytes were observed although GFAP+ reactive astrocytes were still prominent near the wound margin. HO-1+ macrophage-like cells were initially observed between 1 and 3 days after injury and they persisted in the margin of the wound for at least 14 days. The proximity of HO-1+ cells to the wound margin suggests that factors associated with injury contribute to the regulation of HO-1 in injured cortex.

1516. Dzenitis, A. J. and J. E. Kalsbeck (1965). "CHRONIC BRAIN ABSCESS DISCOVERED 31 YEARS AFTER INTRACEREBRAL INJURY BY MISSILE: REPORT OF A CASE." Journal of neurosurgery **22**: 169-171.

1517. Eachempati, S. R., et al. (1999). "The image of trauma: nail gun injury to the right ear and base of skull." The Journal of trauma **47**(5): 985.

1518. Ebner, Y., et al. (2009). "Penetrating injury of the maxilla by needlefish jaws." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **37**(4): 235-238.

INTRODUCTION: Needlefish penetrating injuries have become a worldwide problem, inflicting critical morbidities and even mortalities. This is the first published case of needlefish injury in the Mediterranean basin., CASE REPORT: A 29 year old man was admitted to Meir Medical Centre in Israel with a penetrating facial wound caused by elongated needlefish jaws. The severity of the wound contrasted greatly with the expected injury from collision with a fish inflicting a small penetration lesion. The rigid jaws penetrated the maxilla transversely and obliquely from the left canine-fossae, through the nasal cavity, and to the right maxillary sinus, with its tip reaching the right medial-inferior orbital wall. The needlefish jaws were completely removed using a combined endoscopic and external approach. The course of surgery and hospitalization was uneventful and the patient was discharged with no complications., CONCLUSIONS: Fish inflicted critical facial injuries might be dangerously underestimated prima facie. The impact might be energetic enough to penetrate deep facial and vital cranial structures, hence thorough examination and imaging are recommended. Needlefish species are now common in the tropical and subtropical regions of all oceans and therefore this phenomenon is of interest to worldwide trauma medical providers, fishermen, divers, and also to marine-biologists.

1519. Ebraheim, N. A., et al. (2009). "An evaluation of halo pin insertion torque on outer table penetration in elderly patients." Journal of spinal disorders & techniques **22**(3): 177-181.

STUDY DESIGN: An experimental anatomic study performed on elderly cadaveric skulls., OBJECTIVES: (1) To determine the pin penetration depths in outer table of skull at different torques in the elderly population during halo pin insertion and (2) to validate a safe range of torque for use in this population., SUMMARY OF BACKGROUND DATA: The elderly are at an increased risk of falls, which can lead to cervical fractures. The halo pins used to stabilize these injuries present unique problems in this population owing to osteoporosis, and intracranial pin penetration should always be avoided., METHODS: A halo ring was used to insert pins in 4 standard positions on 10 elderly cadaveric skulls. Incremental torques were used to drive the pin into the outer table, and the penetration of each pin was measured using computed tomography imaging at each stage., RESULTS: Eight to Twelve in-lb of torque was not sufficient to fully penetrate the outer table of the skull. Only at 16 in-lb of torque was the outer table penetrated, and only anterolaterally, hence the posterolateral outer table is more resistant to penetration than the anterolateral outer table., CONCLUSIONS: Despite age-related bone changes in the elderly, it is still safe to use 8 in-lb of torque when inserting pins for a halo vest. However, as the anterolateral outer table is weaker than the posterolateral outer table, a new pin design with broader shoulders should be used anterolaterally to ensure maximal patient safety.

1520. Ebrahimi, A., et al. (2021). "Epidemiologic patterns of maxillofacial fractures: A 5-year study in one of the referral hospitals of Iran." Trauma Monthly **26**(5): 258-264.

Introduction: Maxillofacial trauma resulting in fractures are among the most common reasons for referral to the ER. Epidemiological fracture patterns are widely dependent on cultural, environmental, and socio-economic parameters. This study aimed to assess the epidemiology and prominent patterns of maxillofacial injuries and fractures in Iran. Methods: This cross-sectional study was conducted at a trauma research center. In this study, medical records of patients with maxillofacial fractures from 2010 to 2015 were reviewed. Factors such as age, gender, GCS at admission, hospital stay, fracture cause, site of fractured bones, ocular injuries, brain injuries, trigeminal involvement, facial nerve involvement, soft tissue injuries, and upper face fractures were evaluated. Treatments rendered were also reviewed. Data analysis was performed using SPSS version 22. Results: 283 patients with a mean age of 32.48 years and a male-to-female ratio of 4:1 was seen. The most common age group was the third decade of life (38.2%). The most common causes of fracture were MVA (66.4%), falls (13.1%), and assault (9.2%). The most common fractured bones were: mandible (42.04%), orbit (39.57%), and maxilla (37.1%). The most common treatment was open reduction (94%) and internal fixation with miniplates (49.5%). The hospital stay duration was 3.4 days (average). Conclusion: In this study males in the third decade of life were the most prone to facial fractures. Associated injuries were common and must not

be neglected on physical examination. The profession, culture, and social differences in the society are influential in facial fractures and thus the pattern will differ in different nations.

1521. Eckardt, A. and A. Al-Jawadi (2011). "Cranio-maxillo-facial injuries in civilians from Iraq caused by bomb attacks and gunshots: Experience of a humanitarian project in Jordan." International journal of oral and maxillofacial surgery **40**(10): 1034.

Objectives: Combat injuries in worldwide military conflicts have been reported frequently, however publications on injuries of unprotected civilians caused by bomb attacks and bullets are rare. The present report gives an overview of the range of complex cranio-maxillofacial injuries in victims of violence inside Iraq who were treated within a humanitarian project initiated in Amman/Jordan since 2006 from the NGO-Group “Doctors without Borders” in collaboration with “Iraqi Medical Association” and “Jordan Red Crescent Society”. Due to the critical and unsafe situation in Iraq, reconstructive surgery for the large number of residual deformities secondary to the cranio-maxillo-facial war injuries is presently inadequate. Material and method: All patients who entered this project and were treated during the period from August 2006 until December 2007 were reviewed retrospectively with regard to type of injury, previous treatment, surgical treatment, complications, and postoperative outcome. A descriptive statistical analysis was performed. Results: A total number of 144 different complex cranio-maxillo-facial reconstructive procedures were done during the period August 2006 to December 2007. All cases are residual deformities that either had received inadequate treatment at the time of injury, or got a complication of the primary treatment, or had inadequate access to proper reconstructive surgery unit inside Iraq. Summary: Unprotected civilians are vulnerable to receive and express the maximum wounding capacity during armed conflicts. However, this paper is showing that there is a considerably significant chance of patients with such severe residual deformities to re-gain adequate function, that can help heal their physical and psychological trauma.

1522. Ecker, R. D., et al. (2011). "Outcomes of 33 patients from the wars in Iraq and Afghanistan undergoing bilateral or bicompartmental craniectomy." Journal of neurosurgery **115**(1): 124-129.

OBJECT: There are no published long-term data for patients with penetrating head injury treated with bilateral supratentorial craniectomy, or supra- and infratentorial craniectomy. The authors report their experience with 33 patients treated with bilateral or bicompartmental craniectomy from the ongoing conflicts in Iraq and Afghanistan., METHODS: An exploratory analysis of Glasgow Outcome Scale (GOS) scores at 6 months in 33 patients was performed. Follow-up lasting a median of more than 2 years was performed in 30 (91%) of these patients. The association of GOS score with categorical variables was explored using the Wilcoxon rank-sum test or Kruskal-Wallis analysis of variance. The Spearman correlation coefficient was used for ordinal/continuous data. To provide a clinically meaningful format to present GOS scores with categorical variables, patients with GOS scores of 1-3 were categorized as having a poor outcome and those with scores of 4 and 5 as having a good outcome. This analysis does not include the patients who died in theater or in Germany who underwent bilateral decompressive craniectomy because those figures have not been released due to security concerns., RESULTS: All patients were men with a median age of 24 years (range 19-46 years) and a median initial Glasgow Coma Scale (GCS) score of 5 (range 3-14). At 6 months, 9 characteristics were statistically significant: focus of the initial injury, systemic infection, initial GCS score, initial GCS score excluding patients with a GCS score of 3, GCS score on arrival to the US, GCS score on dismissal from the medical center, Injury Severity Score, and patients with cerebrovascular injury. Six factors were significant at long-term follow-up: focus of initial injury, systemic infection, initial GCS score excluding patients with a GCS score of 3, GCS score on arrival to the US, and GCS score on dismissal from the medical center. At long-term follow-up, 7 (23%) of 30 patients had died, 5 (17%) of 30 had a GOS score of 2 or 3, and 18 (60%) of 30 had a GOS score of 4 or 5., CONCLUSIONS: In this selected group of patients who underwent bilateral or bicompartmental craniectomy, 60% are independent at long-term follow-up. Patients with bifrontal injury fared best. Systemic infection and cerebrovascular injury corresponded with a worse outcome.

1523. Ecker, R. D., et al. (2012). "Response." Journal of neurosurgery **116**(1): 258-259.

1524. Ecklund, J. M., et al. (1999). "Cerebral abscess after presumed superficial periorbital wound." Military medicine **164**(6): 444-445.

Penetrating wounds in the periorbital region may appear superficial and minor at first glance. The unique shape and thin bony roof of the orbit give these injuries a significant risk of associated intracranial penetration. This can initially be asymptomatic, and a high index of suspicion is essential to properly diagnose and treat these injuries. We report a case of an 8-year-old female who presented with delayed seizures from a frontal abscess resulting from such an injury. This article reviews the literature and discusses the appropriate management that should be used by emergency room and military physicians.

1525. Ecklund, J. M. and P. Sioutos (2014). "Prognosis for gunshot wounds to the head." World neurosurgery **82**(1-2): 27-29.

1526. Eckstein, M. (1995). "The prehospital and emergency department management of penetrating head injuries." Neurosurgery clinics of North America **6**(4): 741-751.

The prehospital and emergency department management of the patient with a penetrating cranial injury can be summarized by the following tenets: 1. Assume any alteration in level of consciousness to be a result of the brain injury and not from alcohol or illicit drug intoxication. 2. Have a low threshold to protect the patient's airway with endotracheal intubation and chemical paralysis if a surgical lesion is suspected, there is seizure activity, or the patient is too combative to obtain the necessary studies. 3. Always protect the cervical spine and do not remove the hard collar and spine board until adequate radiographs have been obtained and the patient is lucid enough to complain of any neck pain. 4. Do not delay CT scanning to obtain other studies in the presence of lateralizing neurologic findings. 5. Do not delay in obtaining neurosurgical consultation or in arranging transfer to a facility where definitive care can be provided. 6. Remember, first do no harm. The primary brain injury has already been done. The clinician maximizes preservation of viable brain tissue by preventing secondary injury.

1527. Edem, B. E., et al. (2017). "Anaesthetic and surgical management of airway penetrating injuries in children in resource-poor setting: Case reports." International journal of surgery case reports **39**: 119-122.

INTRODUCTION: Impacted penetrating foreign body (FB) in the airway especially the postnasal space presents with management challenges. The challenges are worsened by lack of modern equipment in resource-poor settings. Two suchlike cases were managed in this report., PRESENTATION OF CASES: Case 1: A 4-year-old girl who fell on a metal rod in her mouth while playing alone. Examination revealed an agitated child in open mouth posture, with a silvery straight metallic object impacted on the hard palate and projecting from the mouth. X-ray of the post nasal space showed a radiopaque object through the hard palate impinging on the skull base. Case 2: A 5-year-old male presented with swollen neck and difficulty in breathing following a fall on a sharp pencil while at play in school. The object which pierced through the neck was immediately removed by an attendant. Examination revealed a child in obvious respiratory distress with swollen neck, face and eyes with a slit measuring 2cm over the crico-thyroid membrane (subcutaneous emphysema)., DISCUSSION: With no available fibre-optic laryngoscope, classical Macintosh laryngoscopy was infeasible. With refusal of tracheostomy, the authors employed three-man intubation technique to successfully secure the airway for excision of the FB in first patient. The second was induced with IV ketamine since he could not tolerate the supine position and facemask. Due to falling oxygen saturation, an orotracheal intubation was done before a successful mid-level emergency tracheostomy was sited., CONCLUSION: Penetrating airway injuries in children pose serious management challenges. Careful anticipation and quick intervention are helpful.

1528. Edetanlen, B. E. and B. D. Saheeb (2016). "Blood lead concentrations as a result of retained lead pellets in the craniomaxillofacial region in Benin City, Nigeria." The British journal of oral & maxillofacial surgery **54**(5): 551-555.

Patients who survive gunshot wounds often retain pellets in their bodies, which cause delayed morbidity from lead poisoning, and even death. Our aim was to find out whether there is a high concentration of lead in the blood of patients who have asymptomatic retention of lead pellets in the craniomaxillofacial region. We prospectively studied 28 patients who were admitted to our hospital with gunshot injuries to the region, and 28 control subjects. Each was originally recruited three days after injury. The control subjects were chosen from people who lived in the same household or worked in the same place as the patients. Any previous exposure to lead was excluded. Blood samples

were collected three days and three months after injury and analysed for the presence of lead by atomic absorption spectrophotometry. The mean (SD) age for both patients and control subjects was 33 (12) years. The mean (SD) and range of concentrations of lead in patients three days after injury was 0.11 (0.07), range 0.01-0.32mumol/L, while those of the control subjects were 0.03 (0.02) and 0-0.06, respectively. Three months after injury, the mean (SD) and range of concentrations of the patients were 0.30 (0.11) and 0.12-0.59mumol/L, while those of the control subjects were 0-1.25 and 0.12 (0.006) mumol/L, respectively (p= 0.000). The study showed a higher mean blood lead concentration in patients with gunshot injuries than in control subjects, but lower than the threshold values published by the Centers for Disease Control/Occupational Health and Safety Administration in the United States.

1529. Edetanlen, B. E. and B. D. Saheeb (2019). "Effect of bone fracture(s) on blood lead levels from retained lead pellets in craniomaxillofacial region." Human & experimental toxicology **38**(12): 1378-1383.

BACKGROUND: Missile-related blood lead elevations and toxicity are well documented in the literature but reports on its associated risk factor(s) are few., OBJECTIVE: To determine if bone fracture(s) contribute to an elevated lead blood level., METHOD: This is a prospective study of subjects with retained pellets in the craniomaxillofacial region following gunshot injuries who met the inclusion criteria. Blood samples were collected from the test subjects and their corresponding control subjects via venipuncture. Collected blood samples were used for blood lead measurement by the wet method of the atomic absorption spectrophotometry. Using appropriate statistical tests, $p < 0.05$ was considered significant., RESULTS: A total number of 48 subjects were studied. The mean blood lead levels (BLLs) of the study population were 6.88 +/- 1.17 microg/dl while that of the control group was 1.52 +/- 0.87 microg/dl and the mean difference was statistically significant ($p = 0.03$). The mean and standard deviation of BLL of subjects with fractures were 4.77 +/- 0.9, 5.08 +/- 1.0, and 5.22 +/- 1.0 microg/dl at days 3, 21, and 42 postinjury, respectively, while for those without bone fractures were 3.07 +/- 1.4, 3.70 +/- 0.8, and 4.33 +/- 1.7 microg/dl. The difference was statistically significant ($p = 0.04$)., CONCLUSION: Subjects with bone fractures were found to have higher BLLs than those without bone fractures, where pellets were retained in their bodies.

1530. Edetanlen, E. B. and B. D. Saheeb (2018). "A study on shotgun injuries to the craniomaxillofacial Region in a Nigerian Tertiary Health Center." Nigerian journal of clinical practice **21**(3): 356-361.

CONTEXT: Short-range shotgun wounds of the craniomaxillofacial region are life-threatening and are as devastating as military rifle wounds., AIMS: This study aimed to evaluate the pattern of presentation of craniomaxillofacial shotgun injuries, types of shotgun injuries, and the outcome of treatments in our environment., SETTING AND DESIGN: This is a prospective observational study. Materials and Methods: This is a prospective observational study conducted from February 2006 to March 2012. All patients with shotgun wounds to the craniomaxillofacial region were included in the study by convenient sampling method. Glezer's shotgun classification scheme was used to categorize the patients into short-, intermediate-, and long-range shotgun wounds. Data collected were analyzed using SPSS version 16., STATISTICAL ANALYSIS USED: Descriptive statistics were used to calculate the data. Mean and standard deviation (SD) were calculated for all quantitative variables such as age. Frequency and percentages were presented for qualitative variables., RESULTS: A total number of 28 patients were seen. Ages ranged from 19 to 64 years with a mean (+/-SD) of 32.7 (+/-11.4) years. The two most commonly used shotguns were locally made pistol (25, 42.9%) and the cut-size gun (10, 35.7%) and the least commonly used was Dane gun (1, 3.6%). Close-range injury to the face was 17 (60.7%) while that of intermediate- and long-range injuries were 6 (21.1%) and 5 (17.9%), respectively., CONCLUSION: Wounds sustained from close-range shotguns to the face were the most common in this environment. The outcome of treatment was satisfactory when treated with conservative debridement and early reconstruction.

1531. Edge, R. and S. Navon (1999). "Scleral perforation during retrobulbar and peribulbar anesthesia: risk factors and outcome in 50,000 consecutive injections." Journal of cataract and refractive surgery **25**(9): 1237-1244.

PURPOSE: To measure the frequency of scleral perforation and identify related risk factors during local anesthetic injection for intraocular surgery., SETTING: Multispecialty eye hospital., METHODS: All patients (n = 50,000) having retrobulbar (26,857) or peribulbar (23,143) injections at the King Khaled Eye Specialist Hospital were reviewed. Cases of scleral perforation were analyzed for potential technical and ophthalmic risk factors, management of injuries,

and visual and anatomic outcomes. Mean follow-up was 14.4 months (range 8 to 24 months)., RESULTS: Seven (0.014%) needlestick injuries were identified, all of which had posterior staphyloma as the only identifiable risk factor. Applying a previously measured prevalence of 10.7% for posterior staphyloma in our surgery patients gave a scleral perforation rate of 0.13% (7 of 5350) for staphylomatous eyes. All perforated globes had originally planned cataract extraction within 8 weeks of injury. Additional management consisted of observation (2 cases), cryotherapy (2 cases), and vitreoretinal procedures for retinal detachment (3 cases) and subretinal hemorrhage (1 case). At last follow-up, all retinas were attached and 3 cases (42.8%) had a visual acuity of worse than 20/160. Both cases requiring multiple retinal detachment surgeries developed proliferative vitreoretinopathy and poor visual acuity., CONCLUSIONS: Eyes with posterior staphyloma sustained needlestick injuries at a rate of 1 in 760 compared with 0 injection perforations in more than 44,000 nonstaphylomatous eyes.

1532. Edgington, B. D., et al. (2008). "Intraorbital organic foreign body in a tree surgeon." Ophthalmic plastic and reconstructive surgery **24**(3): 237-238.

A tree surgeon suffered a traumatic floor fracture complicated by multiple organic foreign bodies. CT confirmed a left floor fracture and medial wall fracture and decreased attenuation in the inferior orbit and maxillary sinus. Exploration of the orbital floor led to the removal of multiple wooden fragments up to 2.5 cm in length. Additional surgeries led to the removal of additional wooden fragments. Detection of organic intraorbital foreign bodies requires a high degree of clinical suspicion and close consultation with a radiologist.

1533. Edrich, C. L. and C. F. Kranemann (1998). "Air gun injury presenting as axial proptosis." Canadian journal of ophthalmology. Journal canadien d'ophtalmologie **33**(4): 219-220.

1534. Edwards, F. H. and R. S. Davies (1982). "Late post-traumatic obstructive jaundice secondary to a biliary tract foreign body." The Journal of trauma **22**(4): 336-338.

Post-traumatic biliary obstruction caused by a penetrating foreign body is rare. Our patient appears to be the first case in which the diagnosis was established by endoscopic retrograde cholangiopancreatography. Even though this entity is uncommon, it should be considered in patients presenting with jaundice and abdominal pain years after penetrating abdominal trauma.

1535. Efe, J. O. J., et al. (2021). "Investigating antemortem, perimortem and postmortem injuries: Forensic implication." Bangladesh Journal of Medical Science **20**(1): 50-57.

Context:Skeletal injuries discovered from human remains are classified into antemortem, perimortem and postmortem. Studies that documents injuries of various skeletal elements is of vital importance to forensic anthropologist. Aim: This study investigated antemortem, perimortem, postmortem and other injuries caused by various instruments among skeletal elements. Methodology: A total of 200 bones of unknown age and gender were studied. Injuries were interpreted based on basic features specific to them and each was described and photographed. Chisquare test was used to show association between skeletal elements and time of injuries. Statistical evaluation was done using SPSS 20 Software Version. Significance was accepted at $p<0.05$. Result: The bones from this study showed 17.50% antemortem, 24% perimortemand 57% postmortem. Findings showed that 49.50% of the bones had blunt force injury, 30.50% had sharp force while 20.00% had ballistic injuries. Basic features of antemortem injuries were smooth and round fractured edges within bones. Sharp, smooth fractured edges were observed among perimortem bones in contrast to irregular, blunt fractured edges and uneven discoloration in postmortem bones.Straight line incisions were seen in bones with sharp force injuries,presence of an entrance wound in ballistic injuries while an impact area was discovered in most bones with blunt force injury.Findings showed that there exist a significant association between ante, peri and postmortem injuries in the ulnar,radius and femur bones ($X2=25.32;13.35;10.11$. $p=0.000;0.001,0.006$) Conclusion: Bones from this study showed more post mortem blunt force injury.

1536. Eftekhar, B., et al. (2009). "Prognostic factors in the persistence of posttraumatic epilepsy after penetrating head injuries sustained in war." Journal of neurosurgery **110**(2): 319-326.

OBJECT: The goal of this paper was to investigate the long-term outcome and the possible prognostic factors that might have influenced the persistence of posttraumatic epilepsy after penetrating head injuries sustained during the Iraq-Iran war (1980-1988)., METHODS: In this retrospective study, the authors evaluated 189 patients who sustained penetrating head injury and suffered posttraumatic epilepsy during the Iraq-Iran war (mean 18.6 +/- 4.7 years after injury). The probabilities of persistent seizures (seizure occurrence in the past 2 years) in different periods after injury were estimated using the Kaplan-Meier method. The possible prognostic factors (patients and injury characteristics, clinical findings, and seizure characteristics) were studied using log-rank and Cox regression analysis., RESULTS: The probability of persistent seizures was 86.4% after 16 years and 74.7% after 21 years. In patients with < 3 pieces of shrapnel or no sphincter disturbances during seizure attacks, the probability of being seizure free after these 16 and 21 years was significantly higher., CONCLUSIONS: Early seizures, prophylactic antiepileptics drugs, and surgical intervention did not significantly affect long-term outcome in regard to persistence of seizures.

1537. Eftekhari, K., et al. (2015). "The last ride of Henry II of France: orbital injury and a king's demise." Survey of ophthalmology **60**(3): 274-278.

Jousting was a popular pastime for royalty in the Renaissance era. Injuries were common, and the eye was particularly at risk from the splinters of the wooden lance. On June 30, 1559, Henry II of France participated in a jousting tournament to celebrate two royal weddings. In the third match, Gabriel de Montgomery struck Henry on the right shoulder and the lance splintered, sending wooden shards into his face and right orbit. Despite being cared for by the prominent physicians Ambroise Pare and Andreas Vesalius, the king died 10 days later and was found to have a cerebral abscess. The wound was not explored immediately after the injury; nevertheless, wooden foreign bodies were discovered in the orbit at the time of autopsy. The dura had not been violated, suggesting that an infection may have traveled from the orbit into the brain. Nostradamus and Luca Guarico, the astrologer to the Medici family, had prophesied the death of Henry II of France, but he ignored their warnings and thus changed the course of history in Renaissance Europe.

1538. Egan, R. A. and V. K. Vijayan (1991). "Fibronectin immunoreactivity in neural trauma." Brain research **568**(1-2): 330-334.

The presence of extracellular matrix protein fibronectin (FN) at the site of neural trauma was examined using immunohistochemical methods. At 2, 4 and 7 days following a penetrating wound through the rat cerebral cortex, FN staining was detected in the neuropil and in non-neuronal cells adjacent to the wound. FN-stained cells were GFAP-negative and were identified as brain macrophages based on cell surface staining for CR3 complement receptor. Our findings suggest a role for FN in the repair of neural trauma.

1539. Egbohou, P., et al. (2019). "Epidemiology of pediatric traumatic brain injury at sylvanus olympio university hospital of lomé in Togo." Anesthesiology Research and Practice **2019**.

Introduction. Severe pediatric traumatic brain injury (pTBI) is a leading cause of disability and death in children worldwide. Children victims of pTBI are admitted to the Sylvanus Olympio University Hospital (SOUH) at the multipurpose Intensive Care Unit (ICU). We aimed in this study to describe the epidemiologic characteristics and outcomes of pTBI patients admitted in this ICU. Patients and Methods. This study was conducted at the ICU of SOUH of Lome. It was a retrospective study based on patients' records from 0 to 15 years old admitted during the period from 1 January 2012 to 30 June 2018 (5 years and 6 months). Results. We recorded 91 pTBI included in the study. The mean age was 7.7 ± 4.3 years. The male predominated with 67.0%. Road traffic accidents were the most common cause (79.1%), followed by falls (19.8%). The average pediatric Glasgow Coma Scale (pGCS) was 6.6 ± 1.4, with a mean Injury Severity Score (ISS) of 23.1 ± 8.4. The most common brain injuries found in the CT scan were brain edema (72.9%), skull fracture (69.5%), and brain contusion (55.9%). The average duration under mechanical ventilation was 2.1 ± 2.9 days, and the mean ICU stay was 4.9 ± 4.4 days. Overall mortality was 31.9% (29 cases). Factors significantly associated ($p<0.05$) with death were hypotension (51.7%), anemia (43.1%), hyperthermia (46.7%), GCS < 6 (64%), and ISS > 20 (48.9%). Conclusion. pTBI mortality remains high in SOUH ICU. Factors associated with mortality were secondary systemic insults, worse GCS < 6, and ISS > 20.

1540. Egea-Guerrero, J. J., et al. (2013). "S100B protein may detect brain death development after severe traumatic brain injury." Journal of neurotrauma **30**(20): 1762-1769.

Despite improvements in the process of organ donation and transplants, the number of organ donors is progressively declining in developed countries. Therefore, the early detection of patients at risk for brain death (BD) is a priority for transplant teams seeking more efficient identification of potential donors. In the extensive literature on S100B as a biomarker for traumatic brain injury (TBI), no evidence appears to exist on its prognostic capacity as a predictor of BD after severe TBI. The objective of this study is to assess the value of including acute S100B levels in standard clinical data as an early screening tool for BD after severe TBI. This prospective study included patients with severe TBI (Glasgow Coma Scale score [GCS] <= 8) admitted to our Neurocritical Care Unit over a 30 month period. We collected the following clinical variables: age, gender, GCS score, pupillary alterations at admission, hypotension and pre-hospital desaturation, CT scan results, isolated TBI or other related injuries, Injury Severity Score (ISS), serum S100B levels at admission and 24 h post-admission, and a final diagnosis regarding BD. Of the 140 patients studied, 11.4% developed BD and showed significantly higher S100B concentrations (p<0.001). Multivariate analysis showed that bilateral unresponsive mydriasis at admission and serum S100B at 24 h post-admission had odds ratios (ORs) of 21.35 (p=0.005) and 4.9 (p=0.010), respectively. The same analysis on patients with photomotor reflex in one pupil at admission left only the 24 h S100B sample in the model (OR=15.5; p=0.009). Receiver operating characteristics (ROC) curve analysis on this group showed the highest area under the curve (AUC) (0.86; p=0.001) for 24 h S100B determinations. The cut off was set at 0.372 mug/L (85.7% sensitivity, 79.3% specificity, positive predictive value [PPV]=18.7% and negative predictive value [NPV]=98.9%). This study shows that pupillary responsiveness at admission, as well as 24 h serum S100B levels, could serve as screening tools for the early detection of patients at risk for BD after severe TBI.

1541. Egger, C., et al. (2015). "An extraordinary case of an intracranial foreign body after a gunshot to the head." International journal of legal medicine **129**(1): 149-152.

Intermediate targets (IT) can modify the morphology of an entrance wound, the trajectory of the bullet, and contaminate the path with fragments or material from the target. The penetration into the body of big fragments or even of an entire IT is exceptional and only rarely reported in the literature. The interpretation of a gunshot wound after contact of the bullet with IT can sometimes be very tricky as the classical morphology can be missing. The presented case is a rare example of atypical entrance wound and path due to a surprising intermediate target of a gunshot fired against the head.

1542. Eghwrudjakpor, P. O., et al. (1991). "Central nervous system bioaminergic responses to mechanical trauma. An experimental study." Surgical neurology **35**(4): 273-279.

Changes in biogenic amines in the brain and spinal cord following penetrating injury were studied in male Wistar rats using high-performance liquid chromatography with electrochemical detection. Rapid increase in hemispheric concentration of these substances was noted beginning shortly after trauma. This trend continued until they were about three to four times control levels by about 24 to 48 hours postinjury. In the spinal cord, however, there was an initial sharp reduction in regional concentrations 2 hours postinjury followed by a slow rise thereafter. By 48 hours postinjury, levels of norepinephrine, dopamine, and serotonin of the cords of injured animals were still less than those of nontraumatized controls. This variation in the central nervous system bioaminergic response with the level of injury raises questions as to its precise role in neurological damage following mechanical insult.

1543. Egorova, O. A. (2011). "[Two cases of stab and slash wounds in the vitally important body regions]." Sudebno-meditsinskaia ekspertiza **54**(4): 44-45.

Two cases of severe injuries to the head and the neck are reported. Both patients recovered after the traumas.

1544. Egorova, O. A., et al. (2010). "[Assessment of injuries to the neck and dentomandibular system complicated by the infectious process]." Sudebno-meditsinskaia ekspertiza **53**(4): 15-18.

The objective of the present work was to consider problems pertaining to forensic medical examination of injuries to the neck and dentition system complicated by pyoinflammatory processes. Two clinical observations are

reported to illustrate significant difficulties encountered by forensic medical experts during assessment of the severity of harm inflicted to human health in the cases requiring differential characteristic of injuries, evaluation of opportuneness and completeness of the provided medical aid, and the role of these factors in the development of fatal pyoseptic complications. Special emphasis is laid on the analysis of possibilities to attain these goals based on the "Medical criteria for the assessment of severity of harm inflicted to human health" (2008).

1545. Ehlers, J. P., et al. (2008). "Metallic intraocular foreign bodies: characteristics, interventions, and prognostic factors for visual outcome and globe survival." American journal of ophthalmology **146**(3): 427-433.

PURPOSE: To describe metallic intraocular foreign body (IOFB) injuries and identify prognostic factors for visual outcome and globe survival., DESIGN: Interventional, consecutive, retrospective case series., METHODS: setting: Wills Eye Hospital. study population: Ninety-six eyes of 96 patients with metallic intraocular foreign bodies. procedures: Metallic IOFB injuries between January 1991 to June 2002 were reviewed for clinical characteristics, surgical intervention, and outcome. Univariate and multivariate analyses were performed to identify prognostic variables. main outcome measures: Final visual acuity and globe survival., RESULTS: The average patient age was 33.0 years with a male predominance (94%). Forty percent of eyes had a presenting vision of 20/50 or better. Following IOFB removal, 40% of patients required additional interventions. Thirty-one percent of eyes had a final acuity of 20/50 or better. Eight percent of patients ultimately required enucleation or evisceration. Excellent visual outcome (defined as > or =20/50) was associated with multiple variables, including normal lens at presentation and anterior segment IOFB (P< .003). Factors associated with poor visual outcome (defined as <20/200) included uveal prolapse and posterior segment IOFB (P < .0003). Globe loss was associated with younger age, presenting light perception (LP) or no light perception (NLP) vision, BB/pellet injury, and the presence of an afferent pupillary defect (P < .01)., CONCLUSIONS: Multiple prognostic factors were identified in this large analysis of metallic IOFB injuries, which may help predict visual outcome and globe survival. Most of these variables were independent of intervention and can be identified at the time of initial presentation.

1546. Eid, R. A. C., et al. (2017). "How trauma patients are discharge home regards to functionality?" American Journal of Respiratory and Critical Care Medicine **195**.

Introduction: Trauma patients due to its severity tends to decrease functionality during hospital stay. Physiotherapy during hospital stay may minimize this impact. But how these patients return home after hospital discharge regards to functionality? Objective: To evaluate trauma patient's functionality at hospital discharge. Methods: A retrospective study, through medical chart and a specific prospective database of trauma patients admitted to a private hospital. All patients admitted with trauma diagnosis in the hospital, and that had information regards to functionality were included. Demographic data, trauma diagnosis, patients' severity (through SAPS), mechanical ventilation time, length of hospital stay and functionality were collected. We classified functionality in 5 categories: totally independent, modified independence (patient is independent but needs help with a specific device as walking stick, walker, etc), 25% functionality dependence, 50% functionality dependence, and total dependence. Results: 26 trauma patients were admitted to the hospital in 2015 and 2016. Of these patients 42% were polytrauma patients, followed by 27% with polytrauma and brain injury associated, 11.5% firearm injury, 11.5% blunt trauma, 3.8% stab wound, 3.8% brain injury. Most patients were male (77%), with median age of 42 years old (range of 13-64), mean SAPS of 26 (±4,2), median mechanical ventilation time of 15 (range of 4-26), median length of hospital stay of 4 days (range of 1-48), most patients were sent home after hospital discharge (96%). At hospital admission, 11.5% of patients had independent functionality, 30% had 25% functionality dependence, 50% of patients had 50% functionality dependence, and 7.7% had total dependence. At hospital discharge most patients had modified independent functionality (34%), 30% were totally independent, 19.2% had 25% functionality dependence, 15.4% had 50% functionality dependence, and no patients were discharge from the hospital totally dependent, showing an improvement of patients' functionality. There was no correlation of functionality with patients' severity or hospital length of stay. Conclusion: At hospital discharge there was an improvement in trauma patients' functionality, most patients with modified independent functionality. But some patients are still dependent in some degree, they would probably benefit from post hospital rehabilitation program.

1547. Eid, R. A. C., et al. (2017). "Trauma patients' functional outcomes at discharge." Critical Care **21**(2).

Introduction: Trauma patients due to its severity tends to decrease functionality during hospital stay. Physiotherapy during hospital stay may minimize this impact. But how these patients return home after hospital discharge regards to functionality? Objective: To evaluate trauma patient's functionality at hospital discharge. Methods: A retrospective study, through medical chart and a specific prospective database of trauma patients admitted to a private hospital. All patients admitted with trauma diagnosis in the hospital, and that had information regards to functionality were included. Demographic data, trauma diagnosis, patients' severity (through SAPS), mechanical ventilation time, length of hospital stay and functionality were collected. We classified functionality in 5 categories: totally independent, modified independence (patient is independent but needs help with a specific device as walking stick, walker, etc), 25% functionality dependence, 50% functionality dependence, and total dependence. Results: 26 trauma patients were admitted to the hospital in 2015 and 2016. Of these patients 42% were polytrauma patients, followed by 27% with polytrauma and brain injury associated, 11.5% firearm injury, 11.5% blunt trauma, 3.8% stab wound, 3.8% brain injury. Most patients were male (77%), with median age of 42 years old (range of 13-64), mean SAPS of 26 (±4,2), median mechanical ventilation time of 15 (range of 4-26), median length of hospital stay of 4 days (range of 1-48), most patients were sent home after hospital discharge (96%). At hospital admission, 11.5% of patients had independent functionality, 30% had 25% functionality dependence, 50% of patients had 50% functionality dependence, and 7.7% had total dependence. At hospital discharge most patients had modified independent functionality (34%), 30% were totally independent, 19.2% had 25% functionality dependence, 15.4% had 50% functionality dependence, and no patients were discharge from the hospital totally dependent, showing an improvement of patients' functionality. There was no correlation of functionality with patients' severity or hospital length of stay. Conclusions: At hospital discharge there was an improvement in trauma patients' functionality, most patients with modified independent functionality. But some patients are still dependent in some degree, they would probably benefit from post hospital rehabilitation program. Download to read this full article text.

1548. Eimontaite, I., et al. (2018). "Differential roles of polar orbital prefrontal cortex and parietal lobes in logical reasoning with neutral and negative emotional content." Neuropsychologia **119**: 320-329.

To answer the question of how brain pathology affects reasoning about negative emotional content, we administered a disjunctive logical reasoning task involving arguments with neutral content (e.g. Either there are tigers or women in NYC, but not both; There are no tigers in NYC; There are women in NYC) and emotionally laden content (e.g. Either there are pedophiles or politicians in Texas, but not both; There are politicians in Texas; There are no pedophiles in Texas) to 92 neurological patients with focal lesions to various parts of the brain. A Voxel Lesion Symptom Mapping (VLSM) analysis identified 16 patients, all with lesions to the orbital polar prefrontal cortex (BA 10 & 11), as being selectively impaired in the emotional reasoning condition. Another 17 patients, all with lesions to the parietal cortex, were identified as being impaired in the neutral content condition. The reasoning scores of these two patient groups, along with 23 matched normal controls, underwent additional analysis to explore the effect of belief bias. This analysis revealed that the differences identified above were largely driven by trials where there was an incongruency between the believability of the conclusion and the validity of the argument (i.e. valid argument/false conclusion or invalid argument/true conclusion). Patients with lesions to polar orbital prefrontal cortex underperformed in incongruent emotional content trials and over performed in incongruent neutral content trials (compared to both normal controls and patients with parietal lobe lesions). Patients with lesions to parietal lobes underperformed normal controls (at a trend level) in neutral trials where there was a congruency between the believability of the conclusion and the validity of the argument (i.e. valid argument/true conclusion or invalid argument/false conclusion). We conclude that lesions to the polar orbital prefrontal cortex (i) prevent these patients from enjoying any emotionally induced cognitive boost, and (ii) block the belief bias processing route in the neutral condition. Lesions to parietal lobes result in a generalized impairment in logical reasoning with neutral content.

1549. Eisen, M. D. and L. R. Lustig (2002). "Otolaryngologic aspects of the Lewis & Clark Expedition, 1803-1806." The Laryngoscope **112**(6): 1065-1071.

Medical difficulties related to otolaryngology that occurred during the Lewis & Clark Expedition (1803-1806) are highlighted. These difficulties included ear and face frostbite, upper respiratory infections, temporal vessel laceration from an air gun accident, neck scrofula, and a pediatric neck mass. The custom of Clatsop Indian head flattening is also described. These descriptions also aim to illustrate the state of otolaryngology during the early 19th century in America.

1550. Ekong, C. E. and Y. H. Gabriel (1980). "Unusual head trauma by a rearview mirror." The Journal of trauma **20**(5): 422-423.

An unusual case of penetrating head injury by rearview mirror is reported. The case demonstrates an important mechanical principle that when a relatively small impact is applied over a small area, it is converted to a large force with potential to cause substantial tissue damage. At 1-year followup the patient showed no complications, following craniotomy and removal of the foreign body.

1551. El Chehab, H., et al. (2018). "Cephalic region war injuries in children: Experience in French NATO hospital in Kabul Afghanistan." Injury **49**(9): 1703-1705.

BACKGROUNDS: The NATO KAIA Hospital (Kabul International Airport), under French command, provided medical support for NATO forces in the Kabul region from 2009 to 2014. Medical assistance to civilians was an additional mission which included support for children who were war injured. The objective of this study was to analyze characteristics of cephalic injuries in children victims of war trauma., METHODS: A retrospective study was conducted and commenced with the hospital opening (July 2009) to March 2012 on all children (<15years) with war trauma. We distinguished cephalic lesions in cranial (neuro-surgical), ophthalmological and neck regions. We analyzed mechanism, region, severity score, surgeries and resuscitation efforts., RESULTS: 217 children were operated on with 81 war traumas (mean age 10.2years). 36 children (44.4%) had a cephalic injury. 52.9% of the injured had an ophthalmological injury, 38.2% a cranial region injury and 29.4% a neck lesion. Mortality rate was 5.6% (1 hemorrhagic shock and 1 cerebral wound) in this cephalic lesion group. Ophthalmic injuries were the most common of cephalic injuries; 19 children of which 7 had a bilateral injury (26 eyes). In this group, fragmentary injuries were the most frequent (64% of eyes). In cerebral lesion group, the lesions were linked to a bullet or a shrapnel in 9 of 13 children. This mechanism systematically caused a crania-cerebral wound. Explosion (fragmentary and shrapnel) was the most important in the neck lesions (7 children of 10)., CONCLUSIONS: The cephalic lesions were the second most common region in children during our experience in Afghanistan. Lack of protection (helmet) in children may explain the frequency of cephalic wounds.

1552. El Hajj Abdallah, Y., et al. (2019). "Devastating neurologic injuries in the Syrian war." Neurology: Clinical Practice **9**(1): 9-15.

BackgroundSince 2011, hundreds of thousands of Syrians have been displaced and injured due to the ongoing Syrian civil war. In this study, we report the prevalence of neurologic injuries in a major rehabilitation center on the Turkish-Syrian border where death and injury tolls continue to rise.MethodBased on several on-site visits from 2013 to 2016, medical practitioners collected data from patients in the major rehabilitation center on the border of Turkey and Syria. The clinical data, which included the type and cause of injury, laterality, paralysis, areas injured, and treatment offered, were analyzed.ResultsA total of 230 patients were identified as having sustained a neurologic injury, 221/230 (96.1%) male and 9/230 (3.91%) female, ranging from ages 2-52 years. A total of 305 total injuries were documented over the course of a 4-year analysis due to several patients having multiple injuries. Gunshot wounds were the dominant mechanism of injury in 125/230 (54.3%) patients. Patients more frequently sustained single injuries 152/230 (66.1%) than multiple injuries 78/230 (33.9%). Peripheral nerve injuries were the most prevalent injuries, at 92.5% of all neurologic injuries (282/305), specifically injury to the radial nerve, at 19.1% (54/282) of peripheral injuries. Patients with spinal cord injuries made up 20/230 (8.7%) of all patients, with thoracic spine injuries composing 50% (10/20). Traumatic brain injuries were the least prevalent, 3/230 (1.3%), with an equal distribution of subtypes.ConclusionThis study and critical analysis of the devastation in Syria suggests the desperate need for emergency aid.

1553. El Khatib, K., et al. (2004). "The frontal sinus: a culprit or a victim? A review of 40 cases." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **32**(5): 314-317.

PURPOSE: Frontal sinus fractures represent 2-12% of facial trauma. The purpose of this article is to discuss proper management of these fractures and to evaluate the indications for treatment, the complications and the morphologic results of surgery., MATERIAL AND METHODS: The records of 40 patients admitted to this department with a frontal sinus fracture were reviewed. Sex, age, the circumstances of injury, the imaging techniques, fracture patterns,

associated injuries, length of hospital stay, surgical approaches and the complications were analysed. The operations included 3 main options: cranialization, obliteration or reconstruction of the frontal sinus., RESULTS: There were 32 men and 8 women (average 34 years). The most common cause of injury was motor vehicle accidents. Conventional radiography of the face was complemented by computed tomography and 3D reconstructions. Isolated anterior table fractures were found in 72.5% and combined anterior/posterior table fractures in 27.5% of the cases. The treatment was surgical for 70% of the patients; the average length of hospitalization was 1 week. Postoperative complications were: 1 brain abscess, 2 cases of frontal sinusitis and 2 cases of chronic headache., CONCLUSION: Long-term complications in frontal sinus fractures are intracranial infection, sinusitis and forehead defects. To avoid these it was decided to treat all displaced fractures surgically in displaced anterior table fractures the sinus was obliterated with cancellous bone and in displaced posterior table fractures the sinus was cranialized.

1554. El Sayed, M., et al. (2018). "Undiagnosed impacted knife blade from a penetrative orbital injury: A case report." International journal of surgery case reports **53**: 254-258.

INTRODUCTION: Impacted foreign bodies in the complex maxillofacial region is uncommon and their safe removal is a challenge., CASE PRESENTATION: The authors report an unusual case of a 41 year old male patient who suffered from violence-related orbital trauma with a knife. The presence of this foreign body was not diagnosed for a period of 20 months. After proper clinical and radiologic examination it was localized and extracted in the theater in a safe controlled manner. Although the tip of the blade was left in situ, the patient had a rapid uneventful recovery and follow up., DISCUSSION: The path of penetration of the foreign body in presented case didn't follow the predicted patterns of orbital injury described in literature. A dilemma exists as to how aggressive such injuries should be managed. Thus the surgical approach implemented for retrieving the current foreign body was highlighted., CONCLUSION: Radiographs are a crucial element for early diagnosis and proper management of foreign body injuries. Rapid postoperative recovery can be achieved with simple safe surgical retrieval maneuvers. Copyright © 2018. Published by Elsevier Ltd.

1555. El-Anwar, M. W. (2018). "A rare penetrating trauma of both orbit and nasal cavity." Iranian Journal of Otorhinolaryngology **30**(6): 365-367.

Introduction: Diagnosis of orbital foreign body (FB) penetration is usually obvious when part of the FB is still attached at the entry wound (1). However, the depth and course of the FB in this case was not visible. Case Report: A 5-year old female presented with a pencil penetrating the left orbit. A computed tomography (CT) scan showed that the pencil penetrated the left orbit (extraseptal) through the lacrimal bone to the left nasal cavity, then perforated the nasal septum, crossing the right nasal cavity. Finally, the pencil penetrated the lamina paperatea to the right orbit and stopped near the right optic nerve. The pencil was gently removed under general anesthesia with close observation of the eyes. Conclusion: A case of a pencil penetrating both orbits and nasal cavities was reported, and the pencil was safely removed. This draws attention to the possible penetration power of a pencil, with the possibility of injury to the orbit and optic nerve on the opposite side of the penetration. It also demonstrates the feasibility of safe removal.

1556. Elarbi, M. (2015). "War injuries in west of Libya." International journal of oral and maxillofacial surgery **44**: e57.

Injuries to face from different weapons used during war differ from injuries caused by other means loss of both hard and soft tissue, damage to vital structures is common in these circumstances, early intervention and proper management required. Objectives: This is 4 years retrospective study of patients sustained firearm maxillofacial injuries during war in Libyan revelations and a total of 41 patients with 55 fractures and isolated soft tissue in 9 cases treated in Ali Omar Askar Center for Neurosurgery, maxillofacial surgery department Esbea Tripoli. Patients and methods: in juries involves facial bones and soft tissues such as eyes, lips cheeks and tongue. Patients and methods: From February 2011 to December 2014 a total of 41 patients with maxillofacial firearm injuries to soft and hard maxillofacial region. Patients either referred for maxillofacial injuries after had the initial treatment elsewhere or had the full management in our hospitals including the maxillofacial team, initial assessment and life saving procedures at the accident and emergency applied to all cases proper clinical and radiographic assessment antibiotic therapy, wound debridement done for all patients and closure using local flaps when required. Treatment range from immediate intervention to 5 days. Results: The pure soft tissue injuries were in 9 patients 14%, Bony fractures involves mostly the mandible in 31 cases 48%, 37 males 90% and only 4 females 10% with a ration 9:1 the youngest patient was 15 years and oldest 60 years, the age

group 21-30 years forming 44% followed by 15-20 years 29% and 31-40 were 24% with only one patient aged 55 years 2%. 31 patients with mandibular fractures mainly angle and body 26% and 23% respectively, 11 cases of maxillary fractures, 4 cases 36% in both Lefort I and Dentoalveolar Fractures with 3 cases involves lateral wall of maxillary sinus 27%. 9 cases with isolated soft tissue involvement in the soft tissue around the mandible, forehead two cases each, cheek and tongue 3 cases which forms 33%. Associated injuries such as rupture of eye globe in one case, damage to facial nerve in 2 cases, fractures of cervical spine wing, tongue injury and loss of soft tissue in two cases. Postoperative wound infection reported in two cases. Treatment: Open reduction and rigid internal fixation used in 24 patients out of total of 44 cases forming 55%, conservative treatment in 9 cases 20%, intermaxillary fixation in 3 cases 7% and four cases had foreign body removed from soft tissue in head and neck area with or without bony involvement. Conclusion: Maxillofacial gunshot injuries with various types of arms and weapons lead to severe damage to facial bones and orofacial structures requires urgent surgical intervention to avoid postoperative infections. In this study most of the patients did not showfor followup and to knowthe progress of the treatment done.

1557. Eldridge, P. R. and J. A. Punt (1988). "Transient traumatic cortical blindness in children." Lancet (London, England) **1**(8589): 815-816.

1558. Elegbede, A., et al. (2019). "Survival following Self-Inflicted Gunshots to the Face." Plastic and reconstructive surgery **144**(2): 415-422.

BACKGROUND: Self-inflicted gunshot wounds involving the face are highly morbid. However, there is a paucity of objective estimates of mortality. This study aims to provide prognostic guidance to clinicians that encounter this uncommon injury., METHODS: A retrospective review of patients presenting to R Adams Cowley Shock Trauma Center (a Level I trauma center) with self-inflicted gunshot wounds to the face from 2007 to 2016. Isolated gunshot wounds to the calvaria or neck were excluded. The data were analyzed to determine predictors of survival., RESULTS: Of the 69 patients that met inclusion criteria, 90 percent were male and 80 percent were Caucasian, with an age range of 21 to 85 years. The most frequently seen injury patterns showed submental (57 percent), intraoral (22 percent), and temporal (12 percent) entry sites. Fewer than half (41 percent) of the cohort sustained penetrative brain injury. Overall, there were 18 deaths (overall mortality, 26 percent), 17 of which were secondary to brain injury. Independent predictors of death included penetrative brain injury (OR, 17; $p < 0.0001$) and age. Mortality was 17 percent among patients younger than 65 years, compared with 73 percent for those aged 65 years or older ($p = 0.0001$). Gastrostomy placement was independently associated with 25 percent reduction in length of hospitalization ($p = 0.0003$)., CONCLUSIONS: Despite tremendous morbidity, the overwhelming majority of patients who present with facial self-inflicted gunshot wounds will survive, especially if they are young and have no penetrative brain injury. These findings should help guide clinical decisions for this devastating injury., CLINICAL QUESTION/LEVEL OF EVIDENCE: Risk, III.

1559. Elewa, H. F., et al. (2006). "Minocycline for short-term neuroprotection." Pharmacotherapy **26**(4): 515-521.

Minocycline is a widely used tetracycline antibiotic. For decades, it has been used to treat various gram-positive and gram-negative infections. Minocycline was recently shown to have neuroprotective properties in animal models of acute neurologic injury. As a neuroprotective agent, the drug appears more effective than other treatment options. In addition to its high penetration of the blood-brain barrier, minocycline is a safe compound commonly used to treat chronic infections. Its several mechanisms of action in neuroprotection -- antiinflammatory and antiapoptotic effects, and protease inhibition -- make it a desirable candidate as therapy for acute neurologic injury, such as ischemic stroke. Minocycline is ready for clinical trials of acute neurologic injury.

1560. Elgamal, E. A. (2005). "Complete recovery of severe quadriparesis caused by stab wound at the craniocervical junction." Neurosurgical review **28**(1): 70-72.

Non-missile penetrating spinal cord injuries are uncommon, and involvement of the craniocervical junction is even less frequent. The author reports a case of 42-year-old male who presented with quadriparesis immediately following stab injury inflicted with a kitchen knife to the back of his neck. The knife was retained in the patient's neck. Neurological examination revealed spastic paraplegia and severe weakness of the left upper limb and the right-hand grip, and sensory disturbance from C2 and downwards. In addition to these symptoms, cerebrospinal fluid (CSF) was

leaking from the wound. Computerised tomography (CT) scan showed the blade passed through the spinal canal and its tip reached the odontoid peg. After retrieval of the knife, his quadriparesis recovered. The management and outcome of the patient are described.

1561. Elghoura, N. F. D. (2012). "[Meningitis can resemble subarachnoid haemorrhage]." Meningitis kan ligne subaraknoidal blodning. **174**(20): 1388-1389.

A 70 year-old man was admitted under the diagnosis of subarachnoid haemorrhage and presented with a history of ear pain, followed by acute onset of severe headache, nausea, vomiting, impaired consciousness, and fever. However, a computed tomography (CT) showed an acute mastoiditis and pneumocephalus, and a lumbar puncture confirmed the diagnosis meningitis. The increased middle ear pressure relative to the intracranial pressure had caused air and bacteria to penetrate intracerebrally. This case illustrates the importance of a rapid diagnostic workup in acute onset headache including a careful anamnesis, CT and lumbar puncture.

1562. Elia, M. D., et al. (2014). "Extraction of fronto-orbital shower hook through transcranial orbitotomy." Craniomaxillofacial Trauma and Reconstruction **7**(2): 147-148.

Transorbital foreign bodies threaten both the integrity of the globe and the brain. We present an unusual case of a penetrating right frontal lobe-orbital metallic shower hook. Extensive intracranial involvement necessitated transcranial orbitotomy allowing for the removal of the object without loss of the globe. Copyright © 2014 by Thieme Medical Publishers, Inc.

1563. Elia, M. D., et al. (2013). "Extraction of fronto-orbital metallic radio antenna through Stallard orbitotomy." Orbit (Amsterdam, Netherlands) **32**(2): 141-142.

A 39-year-old man presented after falling on a radio antenna while in his yard. Computed tomography revealed that the antenna entered the right superolateral orbit, penetrating through the right orbital roof and extending into the right frontal lobe. A Stallard orbitotomy was performed to remove the antenna resulting in blepharoptosis.

1564. Elias, P. Z. and M. Spector (2012). "Characterization of a bilateral penetrating brain injury in rats and evaluation of a collagen biomaterial for potential treatment." Journal of neurotrauma **29**(11): 2086-2102.

Penetrating brain injury (PBI) encountered in both the military and civilian sectors results in high morbidity and mortality due to the absence of effective treatment options for survivors of the initial trauma. Developing therapies for such injuries requires a better understanding of the complex pathology involved when projectiles enter the skull and disrupt the brain parenchyma. This study presents a histological characterization of bilateral PBI using a relatively new injury model in the rat, and also investigates the implantation of a collagen scaffold into the PBI lesion as a potential treatment option. At 1 week post-PBI, the lesion was characterized by dense macrophage infiltration, evolving astrogliosis, hypervascularity, and an absence of viable neurons, oligodendrocytes, and myelinated axons. Histomorphometric analysis revealed that the PBI lesion volume expanded by 29% between 1 week and 5 weeks post-injury, resulting in formation of a large acellular cavity. Immunohistochemistry showed a decrease in the presence of CD68-positive macrophages from 1 to 5 weeks post-PBI as the necrotic tissue in the lesion was cleared, while persistent glial scarring remained in the form of upregulated GFAP expression surrounding the PBI cavity. Implanted type I collagen scaffolds remained intact with open pores after time periods of 1 week and 4 weeks in vivo, and were found to be sparsely infiltrated with macrophages, astrocytes, and endothelial cells. Collagen scaffolds appear to be an appropriate delivery vehicle for cellular and pharmacological therapeutic agents in future studies of PBI.

1565. Elias, P. Z. and M. Spector (2015). "Treatment of penetrating brain injury in a rat model using collagen scaffolds incorporating soluble Nogo receptor." Journal of tissue engineering and regenerative medicine **9**(2): 137-150.

Injuries and diseases of the central nervous system (CNS) have the potential to cause permanent loss of brain parenchyma, with severe neurological consequences. Cavitary defects in the brain may afford the possibility of treatment with biomaterials that fill the lesion site while delivering therapeutic agents. This study examined the treatment of penetrating brain injury (PBI) in a rat model with collagen biomaterials and a soluble Nogo receptor (sNgR)

molecule. sNgR was aimed at neutralizing myelin proteins that hinder axon regeneration by inducing growth cone collapse. Scaffolds containing sNgR were implanted in the brains of adult rats 1 week after injury and analysed 4 weeks or 8 weeks later. Histological analysis revealed that the scaffolds filled the lesion sites, remained intact with open pores and were infiltrated with cells and extracellular matrix. Immunohistochemical staining demonstrated the composition of the cellular infiltrate to include macrophages, astrocytes and vascular endothelial cells. Isolated regions of the scaffold borders showed integration with surrounding viable brain tissue that included neurons and oligodendrocytes. While axon regeneration was not detected in the scaffolds, the cellular infiltration and vascularization of the lesion site demonstrated a modification of the injury environment with implications for regenerative strategies.

1566. Elias, W. J., et al. (2009). "Sulcal and ventricular trajectories in stereotactic surgery." Journal of neurosurgery **110**(2): 201-207.

OBJECT: The authors analyzed deep brain stimulation electrode trajectories on MR images to identify risks of cerebrovascular complications associated with the number of electrode insertions, traversal of a sulcus, and penetration of the ventricle., METHODS: Pre- and postoperative MR volumes were fused to determine the proximity of electrodes to a sulcus or ventricle and whether there were cortical, subcortical, or intraventricular complications. Complications were further classified as hemorrhagic or nonhemorrhagic and symptomatic or asymptomatic. The authors examined 258 electrode implantation for deep brain stimulation. There were 4 symptomatic events (1.6% incidence): 3 hemorrhagic and 1 nonhemorrhagic, all within the cortex. Asymptomatic events included cortical hemorrhage in 1 patient, nonhemorrhagic cortical changes in 6, pallidal hemorrhage in 1, thalamic infarction in 1, and intraventricular hemorrhage (IVH) in 5 patients., RESULTS: Proximity to a sulcus was a significant risk factor for hemorrhagic and nonhemorrhagic cortical complications ($p = 0.001$). There was a complication rate of 10.1% within the trajectories penetrating or adjacent to a sulcus, and a 0.7% rate with trajectories clearly positioned within the gyrus. Asymptomatic IVH was observed in 5% of ventricular penetrations. A history of hypertension was a risk factor for cortical hemorrhage ($p = 0.019$), but not for cortical ischemic/edematous events ($p = 0.605$). The number of electrode penetrations did not differ between patients with and without complications ($p = 0.868$), and the sequence of electrode insertions was not a risk factor in bilateral surgeries., CONCLUSIONS: Symptomatic cortical complications occur when electrodes traverse close to a sulcus. Asymptomatic IVH occurs infrequently with ventricular penetration. Despite intraoperative efforts to avoid cortical sulci, a higher than expected incidence of electrode proximity to the sulci was identified on careful postoperative trajectory analysis. This finding emphasizes the importance of assiduously planning trajectories and reviewing cases with thorough MR analysis.

1567. Elkbuli, A., et al. (2020). "A rare case of pre-hospital globe enucleation after a penetrating injury to the orbit during an assault: A case report and literature review." International journal of surgery case reports **75**: 231-234.

Introduction: Ocular trauma is a common occurrence in trauma settings but often occurs with little to no effect on the vision of the patient. Traumatic enucleation is a rare but devastating injury. Case presentation: A 40-year-old male presented to our trauma center after an assault resulting in right globe enucleation. CT confirmed absence of the globe with disruption of the ipsilateral orbital contents and distal optic nerve disruption. The patient was started on intravenous antibiotics and the right orbit was packed. He was taken to the operating room for exploration of the right orbit and placement of an implant. His remaining hospital course was unremarkable. Discussion: Documented mechanisms of injury for traumatic enucleation are diverse, but often involve significant retro-ocular force to completely dislodge the globe from the orbit. Optic nerve avulsion may cause associated optic nerve chiasm damage leading to temporal hemianopia in the uninjured contralateral eye. Treatment involves stabilization and preparation for future implant placement. Conclusion: Traumatic enucleation is extremely rare. Development of a grading system applicable to traumatic enucleation may be helpful in guiding management in this complex patient population.

1568. Elkhazh, M. K., et al. (2009). "[Gunshot combined spinal and craniocerebral injuries]." Vestnik khirurgii imeni I. I. Grekova **168**(6): 56-58.

An analysis of 32 case histories of patients with gunshot wounds of the cervical part of the spine and spinal cord in combination with cranio-cerebral injuries is presented. In 11 patients with injuries of the spine and spinal cord it was shown that in 4 patients tetraplegia persisted in the postoperative period, 3 patients had Brown-Sequard syndrome, 1

patient had superior paraparesis, 3 patients had pelvis disorders. Rehabilitation procedures started as early as possible allow minimization of the neurological problems and, correspondingly, the degree of disability of the patients.

1569. Ellenbogen, J. M., et al. (2005). "Ventromedial frontal lobe trauma." Neurology **64**(4): 757.

1570. Eller, K. M. and J. A. Kuller (1995). "Porencephaly secondary to fetal trauma during amniocentesis." Obstetrics and gynecology **85**(5 Pt 2): 865-867.

BACKGROUND: There has been one reported case of porencephaly diagnosed postnatally as a result of amniocentesis. We report the first antenatal diagnosis of porencephaly, which apparently resulted from penetration of the fetal skull during amniocentesis., CASE: A 37-year-old woman had genetic amniocentesis at 16 weeks' gestation. The fetal skull was penetrated during the unguided procedure. Porencephaly discovered at 28 weeks' gestation was confirmed by imaging studies in the neonatal period., CONCLUSION: Inadvertent fetal skull penetration appeared to result from amniocentesis unguided by continuous ultrasound.

1571. Ellis, E., 3rd, et al. (2003). "Treatment considerations for comminuted mandibular fractures." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **61**(8): 861-870.

PURPOSE: We sought to assess the methods of treatment used and outcomes for a large sample of patients with comminuted fractures of the mandible., PATIENTS AND METHODS: The records of all patients who were identified as having comminuted fractures of the mandible over a 10-year period with sufficient follow-up were collected and analyzed for demographic information, treatment rendered, and outcomes. Standard descriptive statistics and nonparametric statistics were used to analyze the data., RESULTS: A total of 196 patients (167 males and 29 females) with 198 comminuted fractures met the inclusion criteria. The mandibular body was the most commonly affected region. Approximately half were sustained in altercations. Gunshot wounds created fractures that were more comminuted than other causes. The comminuted regions were treated by closed reduction and maxillomandibular fixation (MMF) in 35 fractures, open reduction with stable internal fixation in 146 fractures, and 17 were treated with external pin fixation. For those patients treated with open reduction, a single reconstruction bone plate was used in the majority of cases (114). For those patients treated open, 98 were treated using an intraoral approach and 52 were treated using an extraoral approach. The mean follow-up was 140.6 days. Complications occurred in 26 fractures (13%). The complications were malocclusion in 8 fractures and nonocclusal (ie, infection, nonunion, etc) in 18 fractures. There was a statistically significant relationship between the development of complications and the degree of fragmentation ($P < .05$). There was also a significant relationship between treatment and the development of complications ($P < .05$). Patients treated with external pin fixation had a 35.2% complication rate compared with a 17.1% complication rate for patients undergoing closed treatment with MMF, or patients treated with open reduction and stable internal fixation (10.3%). However, patients treated with external pin fixation had more severe injuries., CONCLUSIONS: The results of this study show that, when possible, the use of open reduction and stable internal fixation is associated with a low complication rate. However, not all comminuted fractures are amenable to this treatment, and in those, alternatives such as closed reduction with MMF or the application of external pin fixation may be necessary.

1572. Ellis, E., 3rd and Y. Tan (2003). "Assessment of internal orbital reconstructions for pure blowout fractures: cranial bone grafts versus titanium mesh." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **61**(4): 442-453.

PURPOSE: To assess the adequacy of internal orbital reconstruction in pure blowout fractures using either cranial bone grafts or titanium mesh implants., PATIENTS AND METHODS: The preoperative and postoperative true coronal computed tomography (CT) scans of 58 patients with unilateral pure orbital blowout fractures were included in the study. Demographic data and measurements of the pretreatment size of the defects were tabulated. The accuracy of reconstruction was assessed subjectively by 1 surgeon by scoring the position of the implant/graft, repositioning of orbital soft tissues, and assessment of orbital volume using the uninjured side for comparison. The cross-sectional area of the anterior, middle, and posterior regions of the reconstructed defect was statistically compared with the same locations on the uninjured orbits by scanning the CT scans and calculating the number of pixels within the selected CT slices. A comparison of the accuracy of reconstructions for those reconstructed with cranial bone graft and those with

titanium mesh was statistically performed using parametric (for subjective analyses) and nonparametric tests (for cross-sectional area data)., RESULTS: Thirty-eight cases were classified as fractures of the orbital floor, 4 as isolated medial wall fractures, and 16 as combined floor/medial wall fractures. There was a statistically significant difference in the surgeon's subjective ratings of adequacy of reconstructions between titanium mesh and bone-grafted groups. Orbits reconstructed with titanium mesh were more accurate than those reconstructed with bone (P <.001). Overall, there was no significant difference in cross-sectional areas between the reconstructed and uninjured orbits in the middle and posterior regions of the defects, but the anterior region showed significantly smaller cross-sectional areas in the reconstructed orbits (P <.001)., CONCLUSIONS: Although there was great individual variability and both materials could be successfully used, the orbits reconstructed with titanium mesh showed better overall reconstructions than those reconstructed with bone grafts. Copyright 2003 American Association of Oral and Maxillofacial Surgeons J Oral Maxillofac Surg 61:442-453, 2003

1573. Ellis, P. K. (2013). "Supra-aortic arterial trauma." Cardiovascular and interventional radiology **36**: S173.

Supra-aortic trauma includes injuries to the carotid, subclavian, vertebral or innominate arteries and may be blunt or penetrating. The endovascular approach offers an alternative that avoids significant morbidity associated with open surgery. Experience in this area is growing; however, publications remain limited to case reports and small series with short-term follow-ups. Carotid and vertebral pseudoaneurysms may occur following trauma, catheterisation or mycotic infection and should be treated because they are associated with poor outcomes such as haemorrhage, enlargement and distal embolisation. There have been several case series detailing treatment of these lesions using covered stents or bare stents with coil occlusion. Outcomes have been generally good with mid-term follow-up. The endovascular technique is particularly attractive near the skull base, where surgery is technically challenging, and has been associated with high morbidity and mortality rates. There is no consensus for to the ideal regimen of anti-coagulation during or following an endovascular procedure. Some series have reported the use of clopidogrel administered as a loading dose during the procedure. Alternatives include the use of heparin during the procedure or ,on occasions, the use of no anti-coagulation during the acute traumatic phase. Following the treatment, various strategies have been employed, including warfarin and dual and single antiplatelet therapy, often for variable lengths of time. There is lack of sufficient evidence for recommending a particular strategy in all patients. Arteriovenous fistulae of the vertebral arteries can occur because of penetrating injuries and are often iatrogenic. Many are asymptomatic; others present with bruit, vertigo, diplopia or tinnitus. The goal of treatment should be the closure of the arteriovenous fistula with preservation of the parent artery. If a penetrating injury of the vertebral artery results in extensive damage to the vessel, possibly a transection, the endovascular approach may not always result in preservation of the parent artery and vascular sacrifice may be necessary. In this case, a balloon occlusion test will be necessary to exclude vascular ischemic symptoms. The fistula may be excluded using detachable balloons, coils or liquid agents such as N-butyl cyanoacrylate. Supporting stents may be helpful. Axillosubclavian arterial injuries are often difficult to repair surgically in view of the wide exposure required. Literature to date describes over 30 reports of endovascular treatment of these injuries, comprising a total of 160 patients. Most injuries were penetrating (gunshot wound, stab wound and iatrogenic catheter-related injury). Injuries included pseudoaneurysm, AV fistula, occlusion, transection and perforation. In most cases covered or uncovered stents were utilised. Coils or gelfoam can be used for bleeding branch vessels. Again, mid-term results in this area have been promising, with low morbidity and mortality. CONCLUSION: Endovascular techniques show great promise in traumatic injury to the supra-aortic vessels. The presentation will describe some of the techniques and review some of the literature to date.

1574. Ellis, P. S. (1997). "Fatal gunshot injury caused by an unusual projectile--a barrel-cleaning brush as a tandem bullet." The American journal of forensic medicine and pathology **18**(2): 168-171.

The case of a man who committed suicide by shooting himself in the head is reported. The rifle used by the decedent had been cleaned with the use of a barrel-cleaning brush, which had become detached and had been retained in the barrel. The brush together with the usual projectile were propelled into the head. A highly unusual radiograph was obtained. The implantation of a barrel-cleaning brush in the skull has not been reported in the English literature. This case is reported because of its unique nature and because of possible misinterpretation of an unusual radiological appearance. The potential dangers of inadequate care during weapon cleaning are also discussed.

1575. El-Menyar, A., et al. (2015). "Traumatic brain injury in pediatric population: A single-center analysis over 5 years." Critical care medicine **43**(12): 290.

Learning Objectives: Traumatic brain injury (TBI) is a major cause of morbidity and mortality in children and adolescents worldwide. We aimed to study the trends of pediatric TBI (pTBI) in terms of the demographics, etiology, clinical patterns, and outcomes in a level I trauma center in Qatar. Methods: For the period between 2010 and 2014, we conducted a retrospective observational analysis for all pTBI. Results: Over a 5-year period, 945 patients were admitted with TBI, out of them 17.7% were ≤ 18 yr old with a mean age of 10.6 ± 5.9 and 81% were males. MVCs were significantly higher in late adolescent (77.3%), whereas, FFH was significantly higher in infants/preschoolers (59%) group. Head injuries were common in late adolescents aged 15-18 (40%) and infants/preschool age group of 0-4 yr (23%). Fatal injuries were most frequent in infants/preschool age group, in which 21% of the injuries were fatal. Almost one-third of the pTBI needed neurosurgical intervention (insertion of monitoring [15%], drainage devices [6.4%] or outright surgery [10.2%]. The mean ISS was 20.7 ± 9.8 and the highest ISS was recorded in adolescents (24.2 ± 9.8).Fifty three (41%) patients were intubated at the scene. Although AIS showed no significant differences by age groups, it was higher in infants/preschoolers and late adolescents. Only brain contusion showed significant difference by age (p=0.04); higher in early adolescents (61.5%) and late adolescents (58.6%). Hospital complications included pneumonia (25.4%), sepsis (8%) and ARDS (1.6%). Pneumonia and sepsis showed significant differences (p<0.05) by age groups. Overall mortality rate was 13%. Higher mortality was seen in infants (20.5%, p=0.43). Half of the patients died within 24 hr; 8 (36%) patients died between 1- 7 days and 3 (14%) patients died after one week. Conclusions: The overall rate of pTBI is 5-14 cases per 100,000 children per year with high mortality in Qatar. FFH is the mechanism of pTBI for small children, whereas MVC was the cause of injury in adolescents. Public education regarding safety measures, injury prevention and Law enforcement are highly recommended.

1576. El-Menyar, A., et al. (2017). "Pediatric Traumatic Brain Injury: a 5-year descriptive study from the National Trauma Center in Qatar." World journal of emergency surgery : WJES **12**: 48.

Background: The epidemiologic characteristics and outcomes of pediatric traumatic brain injury (pTBI) have not been adequately documented from the rapidly developing countries in the Arab Middle East. We aimed to describe the hospital-based epidemiologic characteristics, injury mechanisms, clinical presentation, and outcomes of pTBI and analyze key characteristics and determinant of pTBI that could help to make recommendations for policies to improve their care., Methods: We conducted a retrospective observational study in a level 1 trauma center (2010-2014) for all pTBI patients. Data were analyzed and compared according to different patient age groups., Results: Out of 945 traumatic brain injury patients, 167 (17.7%) were <= 18 years old with a mean age of 10.6 +/- 5.9 and 81% were males. The rate of pTBI varied from 5 to 14 cases per 100,000 children per year. The most affected group was teenagers (15-18 years; 40%) followed by infants/toddlers (<= 4 years; 23%). Motor vehicle crash (MVC; 47.3%) was the most frequent mechanism of injury followed by falls (21.6%). MVC accounted for a high proportion of pTBI among teenagers (77.3%) and adolescents (10-14 years; 48.3%). Fall was a common cause of pTBI for infants/toddlers (51.3%) and 5-9 years old group (30.3%). The proportion of brain contusion was significantly higher in adolescents (61.5%) and teenagers (58.6%). Teenagers had higher mean Injury Severity Scoring of 24.2 +/- 9.8 and lower median (range) Glasgow Coma Scale of 3 (3-15) (P = 0.001 for all). The median ventilatory days and intensive care unit and hospital length of stay were significantly prolonged in the teenage group. Also, pTBI in teenage group showed higher association with pneumonia (46.4%) and sepsis (17.3%) than other age groups (P = 0.01). The overall mortality rate was 13% (n = 22); 11 died within the first 24 h, 7 died between the second and seventh day and 4 died one week post-admission. Among MVC victims, a decreasing trend of case fatality rate (CFR) was observed with age; teenagers had the highest CFR (85.7) followed by adolescents (75.0), young children (33.3), and infants/toddlers (12.5)., Conclusions: This local experience to describe the burden of pTBI could be a basis to adopt and form an efficient, tailored strategy for safety in the pediatric population.

1577. El-Naaj, I. A., et al. (2006). "Gunshot wounds: reconstruction of the lower face by osteogenic distraction." Plastic and reconstructive surgery **118**(5): 1271-1272.

1578. Eloy, J. A., et al. (2012). "Salvage endoscopic nasoseptal flap repair of persistent cerebrospinal fluid leak after open skull base surgery." American journal of otolaryngology **33**(6): 735-740.

PURPOSE: Persistent cerebrospinal fluid (CSF) rhinorrhea after open skull base surgery can be challenging to manage due to the risk of meningitis, brain abscess, surgical morbidity associated with revision craniotomy, and the lack of available healthy autologous tissue after failure of a pericranial flap. Given the recent success of the vascularized pedicled nasoseptal flap (PNSF) for reconstruction after endoscopic skull base surgery, we have adopted this technique as a salvage method to treat recalcitrant CSF rhinorrhea after previous open skull base surgery in order to avoid revision craniotomy. To our knowledge, use of the PNSF in this setting has not been previously described in the literature., METHODS: A retrospective analysis was performed on 4 patients who underwent endoscopic endonasal PNSF repair of persistent CSF rhinorrhea after having undergone previous open transcranial skull base operation. Pathologies consisted of one sinonasal anterior skull base squamous cell carcinoma, one recurrent petrosal skull base meningioma, and 2 traumatic gunshot wounds to the head., RESULTS: All 4 patients underwent successful repair of CSF rhinorrhea without complications using the salvage endoscopic endonasal PNSF technique after a mean follow-up of 21.5 months., CONCLUSIONS: In patients who have undergone previous open skull base surgery as the primary approach, persistent CSF rhinorrhea can be safely repaired using the vascularized PNSF via an endoscopic endonasal approach. This minimally invasive strategy has the advantage of providing new healthy vascularized tissue for skull base reconstruction while avoiding revision craniotomy.

1579. Eloy, J. A., et al. (2013). "Early harvesting of the vascularized pedicled nasoseptal flap during endoscopic skull base surgery." American journal of otolaryngology **34**(3): 188-194.

PURPOSE: The vascularized pedicled nasoseptal flap (PNSF) represents a successful option for reconstruction of large skull base defects after expanded endoscopic endonasal approaches (EEA). This vascularized flap can be harvested early or late in the operation depending on the anticipation of high-flow CSF leaks. Each harvesting technique (early vs. late) is associated with different advantages and disadvantages. In this study, we evaluate our experience with early harvesting of the PNSF for repair of large skull base defects after EEA., METHODS: A retrospective review was performed at a tertiary care medical center on patients who underwent early PNSF harvesting during reconstruction of intraoperative high-flow CSF leaks after EEA between December 2008 and March 2012. Demographic data, repair materials, surgical approach, and incidence of PNSF usage were collected., RESULTS: Eighty-seven patients meeting the inclusion criteria were identified. In 86 procedures (98.9%), the PNSF harvested at the beginning of the operation was used. In 1 case (1.1%), the PNSF was not used because a high-flow intraoperative CSF leak was not encountered. This patient had recurrence of intradural disease 8months later, and the previously elevated PNSF was subsequent used after tumor resection., CONCLUSION: Based on our data, a high-flow CSF leak and need for a PNSF can be accurately anticipated in patients undergoing EEA for skull base lesions. Because of the advantages of early harvesting of the PNSF and the high preoperative predictive value of CSF leak anticipations, this technique represents a feasible harvesting practice for EEA surgeries.

1580. Elron, M., et al. (1997). "Suboccipital tangential gunshot wound." Acta neurochirurgica **139**(4): 377-378.

1581. Elron, M., et al. (1998). "Profuse hemorrhage from cerebral vessels in tangential missile injuries." Acta neurochirurgica **140**(3): 255-259.

Tangential missile injuries are recognized as a cause of cerebral damage by in driven bone fragments, parenchymal lacerations and intracerebral haematomas. Severe blood loss from this type of injury was not reported. Four patients are described in whom high kinetic energy missiles caused severe tangential craniocerebral injuries. Their condition was aggravated by life threatening haemorrhage. The bleeding vessels were cerebral arteries or major veins entrapped in the fracture line and bleeding extracranially. This blood loss cannot be controlled by dressing and salvage could be achieved only by immediate resuscitation, vigorous fluid replacement and very rapid evacuation to a neurosurgical center.

1582. Elserry, T., et al. (2013). "Image guided surgery in the management of craniocerebral gunshot injuries." Surgical neurology international **4**(SUPPL.6): S448-S454.

Background: A craniocerebral trauma caused by firearms is a complex injury with high morbidity and mortality. One of the most intriguing and controversial part in their management in salvageable patients is the decision to remove

the bullet/pellet. A bullet is foreign to the brain and, in principle, should be removed. Surgical options for bullet extraction span from conventional craniotomy, through C-arm-guided surgery to minimally invasive frame or frameless stereotaxy. But what is the best surgical option? Methods: We prospectively followed up a cohort of 28 patients with cranio-cerebral gunshot injury (CCHSI) managed from January to December 2012 in our department of neurosurgery. The missiles were extracted via stereotaxy (frame or frameless), C-arm-guided, or free-hand-based surgery. Cases managed conservatively were excluded. The Glasgow Outcome Score was used to assess the functional outcome on discharge. Results: Five of the eight stereotactic cases had an excellent outcome after missile extraction while the initially planned stereotaxy missed locating the missile in three cases and were thus subjected to free hand craniotomy. Excellent outcome was obtained in five of the nine neuronavigation cases, five of the eight cases for free hand surgery based on the bony landmarks, and five of the six C-arm-based surgery. Conclusion: Conventional craniotomy isn't indicated in the extraction of isolated, retained, intracranial firearm missiles in civilian injury but could be useful when the missile is incorporated within a surgical lesion. Stereotactic surgery could be useful for bullet extraction, though with limited precision in identifying small pellets because of their small sizes, thus exposing patients to same risk of brain insult when retrieving a missile by conventional surgery. Because of its availability, C-arm-guided surgery continues to be of much benefit, especially in emergency situations. We recommend an extensive long-term study of these treatment modalities for CCGSI. © 2013 Elserry T.

1583. Elshafei, A. M. K., et al. (2017). "Clinical profile and outcomes of management of orbital cellulitis in Upper Egypt." Journal of Ophthalmic Inflammation and Infection **7**(1).

Background: The purpose of this paper is to study the etiology, clinical findings, and outcomes of management of cases of orbital cellulitis treated in Minia University Hospital in Upper Egypt over the period of 6 years from July 2009 to July 2015. One-hundred two patients diagnosed to have orbital cellulitis were admitted to the hospital and treated on inpatient basis from July 2009 to July 2015. All patients were subjected to full ophthalmological examination, systemic evaluation, and ear, nose, and throat (ENT) consultation. Axial and coronal CT scan and orbital echography were done for all patients. All patients received medical treatments, and 20 patients needed surgical intervention. Results: The source of infection was paranasal sinusitis in 66 patients, trauma in 14 cases, panophthalmitis in 6 patients, and dental infection in 2 cases, and no definite source was detected in 14 cases. Subperiosteal abscess (SPA) developed in 16 patients. The final best corrected visual acuity improved in 58% of the cases, decreased in 4%, and remained unchanged in 38% of cases. No intracranial complication was recorded. Conclusions: Good presenting visual acuity and appropriate medical treatment together with early surgical intervention in cases of SPA are important factors to achieve favorable outcomes in orbital cellulitis. All cases with SPA had paranasal sinusitis, and contrary to previous studies, superior SPA location was the most common followed by the medial location.

1584. El-Shoura, E. A. M., et al. (2018). "Perindopril ameliorates lipopolysaccharide-induced brain injury through modulation of angiotensin-II/angiotensin-1-7 and related signaling pathways." European journal of pharmacology **834**: 305-317.

Localized tissue renin-angiotensin system (RAS) is an interesting pathway of organ damage. Here, the effect of the brain-penetrating angiotensin converting enzyme (ACE) inhibitor perindopril was studied on lipopolysaccharide (LPS)-induced brain damage, with and without exogenous angiotensin (Ang)-II administration. Animals were divided into 6 groups; a normal control group, an LPS control group (LPS, 3mg/kg, i.p., single dose), two treatment groups receiving perindopril (1 and 2mg/kg/day, i.p.) for 7 days before LPS administration, and two Ang-II/perindopril/LPS groups receiving perindopril and LPS, followed by a single dose of Ang-II solution (5 microl, i.c.v.). Brain tissue Ang-II, Ang-1-7, and NADPH oxidase were estimated using ELISA technique. Nuclear factor kappa-B (NF-kB-p65) was estimated using real time PCR technique, while phosphorylated NF-kB-p65 (p-NF-kB-p65), phosphorylated and non-phosphorylated protein kinase B (p-Akt and Akt) and phosphorylated inhibitor of kappa-B (p-IkBa) were estimated by western blot analysis. Malondialdehyde (MDA), glutathione (GSH), superoxide dismutase (SOD), glutathione-S-transferase (GST), catalase, nitrite and myloperoxidase (MPO) were estimated colorimetrically. Brain tissue inducible and endothelial nitric oxide synthases (iNOS and eNOS) were estimated immunohistochemically, confirmed by a histopathological study. LPS-intoxicated rats showed significantly elevated Ang-II, NADPH oxidase, NF-kB-p65, p-NF-kB-p65, p-IkBa, p-Akt, Akt, p-Akt/Akt ratio, MDA, nitrite, MPO and iNOS levels, coupled with significantly suppressed Ang-1-7, GSH, SOD, GST, catalase, and eNOS levels, which were all corrected by pre-treatment with perindopril in both doses by varying degrees. Exogenous Ang-II significantly ameliorated the protective effects of perindopril. Conclusively, perindopril ameliorates

LPS-induced brain damage through modulation of RAS, iNOS/eNOS, p-Akt/Akt and NF-kB signaling pathways.

1585. Elterman, J., et al. (2011). "Independent predictors of 28-day survival in patients with severe traumatic brain injury." Journal of the American College of Surgeons **213**(3): S75.

INTRODUCTION: Traumatic brain injury (TBI) remains the leading cause of death after trauma. Normal saline has been shown to be equivalent to hypertonic saline=dextran for the treatment of severe TBI in a recent trial. While this trial showed no difference in outcome, we sought to identify independent predictors of mortality in this cohort. METHODS: A retrospective review was conducted on data collected prospectively as part of a multicenter, randomized, clinical trial within the Resuscitation Outcomes Consortium.We modeled the association between 28-day survival and fluid use with multivariable logistic regression using robust standard errors adjusting for age, sex, ISS, initial GCS, initial SBP, highest field HR, penetrating injury and study site. RESULTS: 1158 patients were enrolled in the study. The volume of pre-hospital crystalloid - odds ratio (OR) 0.85 per liter increase (95%CI [0.64, 1.13] p=0.27) and hospital crystalloid infused in the first 24 hours - OR 1.05 per liter (95%CI [0.98, 1.12] p=0.18) were not associated with a difference in 28-day survival. However, volume of PRBC in the first 24 hours - OR 0.76 per liter (95%CI [0.6,0.97] p=0.03) and volume of FFP in the first 24 hours - OR 0.59 per liter (95%CI [0.38,0.93] p=0.02) were both independently associated with decreased 28-day survival. CONCLUSIONS: In patients with severe TBI, volume of red blood cells and fresh frozen plasma transfused were independently associated with a statistically significant decrease in 28-day survival while volume of pre-hospital crystalloid and volume of initial 24-hour resuscitation were not.

1586. Elzayat, S. G. and A. A. Ameen (1986). "Incidence of post-traumatic epilepsy." Journal of Neurological and Orthopaedic Medicine and Surgery **7**(1): 69-70.

The incidence of early epilepsy in 200 consecutive patients with penetrating missile head injuries was studied and compared with that in non-missile head injuries. The points emphasized are that neither dural tears with brain penetration, nor the presence of retained metallic fragments, increase the incidence of early epilepsy. Also, it is apparent that anticonvulsants should be reserved for patients under real threat of status epilepticus.

1587. Emamhadi, M. R. and D. Mahmoudi (2015). "Recovery of facial nerve paralysis after temporal nerve reconstruction: A case report." Trauma Monthly **20**(4).

Introduction: Facial paralysis is common following accidents, trauma, viral infection or tumors. Case Presentation: A 24-year-old male patient was referred to us with a history of sharp penetrating trauma to the right temporal region causing unilateral paralysis of the muscles of the right forehead. He was unable to scowl or elevate his right eyebrow and there were no folds on his right forehead. Anastomosis of branches of the temporal nerve was done one month after trauma following regular physical therapy sessions, outcome was good and paralysis of the muscles of the right forehead improved after several months. Conclusions: Immediate repair of the facial nerve injury will improve the process of recovery and rehabilitation of the face and forehead muscles and may play a very important role in the patient's mental satisfaction and improve their quality of life.

1588. Emami, P., et al. (2012). "Case report: surviving a tiger attack." Neurosurgical review **35**(4): 621-624.

Attacks on humans by large predators are rare, especially in Northern Europe. In cases of involvement of the craniocervical compartment, most of the attacks are not survived. We report on a case where the patient survived a tiger attack despite severe head trauma and discuss the circumstances leading to the patient's survival and excellent outcome. The patient we report on is a 28-year-old tamer, who was attacked by three tigers during an evening show. A bite to the head resulted in multiple injuries including left-sided skull penetration wounds with dislocated fractures, dural perforations, and brain parenchyma lesions. The patient recovered without neurological deficits after initial ICU treatment. No infection occurred. In order to understand the mechanism of the tiger's bite to the patient's cranium, a simulation of the attack was performed using a human and a tiger skull put together at identical positions to the bite marks in a CT scan. It seems that during the bite, the animal was not able to clamp down on the patient's skull between its canine teeth and therefore reduced bite forces were applied. Survival of an attack by a large predator that targeted the cervical-cranial compartment with an excellent outcome is not described in the literature. We were surprised to find

only minor lesions of the brain parenchyma despite the obvious penetration of the skull by the tiger's canines. This seems to be related to the specific dynamics of the cranial assault and the reduced forces applied to the patient's head demonstrated in a 3D bite simulation.

1589. Emanuelson, I., et al. (1996). "Rehabilitation and follow-up of children with severe traumatic brain injury." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **12**(8): 460-465.

We studied the outcome of 25 patients [12 girls and 13 boys; mean age 13.7 (SD 3.9 years)] with severe traumatic brain injury (TBI). The Glasgow Coma Scale (GCS) score 6 h after the injury was (mean) 4.5 (SD 2.7), and the mean duration of unconsciousness was 15.8 (SD 10.6) days. Being the most severely brain-injured children in the health care region, they were all referred to its only regional pediatric rehabilitation center during 1986-1990. At discharge, 1 patient was healthy, 1 was in a vegetative state and 18 had multiple impairments. Motor problems were present in 22, epilepsy in 7 and speech impairment in 14. It was not possible to assess cognition in 3 of the children, and 15 of the remaining 22 fell in the normal range. At follow up 2-6 years after trauma, all 23 survivors reported at least one sequela, and 21 had multiple sequelae. As many as two-thirds had normal I.Q. and only 3 were non-ambulatory, but behavioral and personality disturbances were so disabling that none of the patients in this group had been able to readjust to a normal life in society after the trauma.

1590. Emby, D. J. (2009). "Retained glass fragments in body tissues." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde **99**(12): 858-859.

1591. Empey, P. E., et al. (2012). "Probenecid coadministration increases N-acetylcysteine concentrations following experimental pediatric traumatic brain injury." Clinical and translational science **5**(2): 193.

OBJECTIVES/SPECIFIC AIMS: Oxidative stress plays an important role in the pathophysiology of traumatic brain injury(TBI) but antioxidants have not shown clinical efficacy possibly due to poor brain penetration. Xenobiotic transporters are well known to impact entry of drugs into the brain. We hypothesized that coadministration of the transporter inhibitor, probenecid(PB), would increase plasma levels of the antioxidant, N -acetylcysteine (NAC), in a preclinical model of pediatric TBI. Th is study aimed to determine if this approach has the potential for direct clinical application to improve outcomes in pediatric TBI patients. METHODS/STUDY POPULATION: Juvenile rats (16-18 days old; ≥5/group) received a controlled cortical injury (2.5 mm deformation at 4 m/s) and intraperitoneal doses of NAC (163 mg/kg), PB (150 mg/kg), or the combination 10 min postinjury. Novel liquid chromatography tandem mass spectrometry assays were developed for both drugs and serial plasma concentrations were quantified. RESULTS/ANTICIPATED RESULTS: Drug assays were linear (NAC: 100-10000 ng/mL, R 2 = 0.9991; PB: 25-800μg/mL, R 2 = 0.9926), accurate(inter-/intra-assay variation ≤7.2%), and precise (inter-/intra-assay variation ≤8.4%). Coadministration of PB and NAC increased plasma NAC exposure ∼2-fold (AUC 1-6h : 1.16 ± 0.21×10 5 vs. 2.13 ± 0.40×10 5 ng/mL∗h; p = 0.006); PB levels were unchanged. DISCUSSION/SIGNIFICANCE OF IMPACT: PB coadministration increases systemic NAC exposure in juvenile rats following experimental TBI; suggesting that NAC is a transporter substrate and that brain levels may also increase. Transporter inhibition is a promising therapeutic strategy for future studies in pediatric TBI patients.

1592. Englot, D. J., et al. (2010). "Removal of nail penetrating the basilar artery." Neurosurgical review **33**(4): 501-504.

Nail-gun injuries have become an increasingly prevalent source of penetrating intracranial trauma. Few cases of intracranial nail-gun injuries disturbing major cerebrovascular structures have been reported, and none entailing basilar artery involvement. We report here the case of a 51-year-old male with an intracranial nail-gun injury involving penetration of the distal basilar artery. Operative removal was accomplished under direct vision using a double concentric cranioorbital zygomatic osteotomy for a trans-Sylvian approach. We highlight the principles involved in removing foreign bodies penetrating critical neurovascular structures.

1593. Engrav, L. H., et al. (1986). "Excision of burns of the face." Plastic and reconstructive surgery **77**(5): 744-751.

Sequential excision of burns is now a common technique. Nevertheless, standard texts, when describing the treatment of facial burns, recommend allowing spontaneous separation of the eschar and then grafting on granulation

tissue if healing does not occur. This method yielded disappointing results for us and the reconstructive procedures required were of great magnitude. Therefore, in January of 1979, we began primary excision and grafting of those face burns not essentially healed at 10 days. We have now treated 16 consecutive patients (approximately 5 percent of all face burns) in this manner who are at least 12 months postinjury. Three were lost to follow-up, leaving 13 for evaluation. This method yields better appearance and function than that obtained by allowing spontaneous healing over more than 3 weeks or grafting on granulation tissue and decreases the magnitude of subsequent reconstruction.

1594. Engum, S. A., et al. (2000). "Prehospital triage in the injured pediatric patient." Journal of pediatric surgery **35**(1): 82-87.

BACKGROUND/PURPOSE: Identifying major trauma patients in the prehospital setting is essential in determining management, destination, and best utilization of emergency department resources. Few methods of trauma triage have been accepted unanimously. This study prospectively evaluates the efficacy of comprehensive field triage using 12 criteria (simplified version of the American College of Surgeon's guidelines) in 1,285 pediatric trauma patients., METHODS: Major trauma was defined as occurring in those who died in the emergency room, had major surgery (penetrating injury involving surgery of the head, neck, chest, abdomen, or groin), or were admitted directly to the intensive care unit. The correlation between trauma triage criteria, hospital disposition, and triage accuracy were determined prospectively and compared in the pediatric patients (36 months) with an adult cohort of patients (12 months)., RESULTS: A total of 1,285 pediatric trauma patients were evaluated and compared with 1,326 adult trauma patients. The most accurate trauma triage criterion for major injury was a blood pressure < or = 90 mmHg (systolic) with an accuracy of 86%. This was followed by burn greater than 15% total body surface area (79%), Glasgow Coma Scale score < or = 12 (78%), respiratory rate less than 10/min or greater than 29/min (73%), and paralysis (50%). Less accurate criteria included a fall from greater than 20 feet (33%); penetrating injury to head, neck, chest, abdomen, or groin (29%); ejection from vehicle (24%); pedestrian struck at greater than 20 mph (16%); paramedic judgement (12%); rollover (3%); and extrication (0%). The Glasgow Coma Scale score was a more accurate indicator of major injury in children than adults, and paramedic judgement was less accurate in children when compared with adults. Of the 379 major pediatric trauma victims, the Revised Trauma Score and Pediatric Trauma Score missed 36% and 45% of these major trauma victims, respectively. The overtriage rate for children was 71% with a sensitivity of 100% (no missed major trauma patients)., CONCLUSIONS: Physiological variables, anatomic site, and mechanism of injury provide a sensitive and safe system of triage. Continued education of prehospital personnel regarding pediatric trauma and stratification of the current triage tools are necessary to minimize overtriage in an era of shrinking resources.

1595. Enicker, B. and T. E. Madiba (2014). "Cranial injuries secondary to assault with a machete." Injury **45**(9): 1355-1358.

BACKGROUND: Assaults with a machete cause compound skull fractures which present as a neurosurgical emergency. We aimed to profile cranial injuries caused by a machete over a 10 year period in a single neurosurgical unit., MATERIALS AND METHODS: Retrospective data analysis of cranial injuries following assault with a machete, admitted to the neurosurgery ward, from January 2003 to December 2012 was performed. Medical records were analyzed for demographics, clinical presentation, CT scan findings, surgical treatment and Glasgow Outcome Scale (GOS) at discharge. Management involved wound debridement with antibiotic cover., RESULTS: Of 185 patients treated 172 (93%) were male. Mean age was 31+/-11.4 years. Mean GCS on admission was 13+/-2. Presenting features were focal neurological deficit (48%), brain matter oozing from wounds (20%), and post traumatic seizures (12%). Depressed skull fractures were found in 162 (88%) patients. Findings on CT brain scan were intra-cranial haematoma (88%), pneumocephalus (39%) and features of raised intra-cranial pressure (37%). Thirty-one patients (17%) presented with septic head wounds. One hundred and fifty seven patients (85%) were treated surgically. The median hospital stay was 8 days (range 1-145). The median GOS at discharge was 5 (range 1-5). Twelve patients died within the same admission (6.5%)., CONCLUSION: Machetes cause complex cranial injuries with associated neurological deficit and should be treated as neurosurgical emergency. Timeous intervention and good surgical principles are advocated to prevent secondary infection and further neurological deterioration.

1596. Eolchiian, S. A., et al. (2011). "[Reconstructive surgery of cranio-orbital injuries]." Zhurnal voprosy neirokhirurgii imeni N. N. Burdenko **75**(2): 25-40.

The aim of study was to optimize evaluation and surgery of cranioorbital injuries in different periods after trauma. Material and methods. We analyzed 374 patients with cranioorbital injuries treated in Burdenko Neurosurgery Institute in different periods after trauma from January 1998 till April 2010. 288 (77%) underwent skull and facial skeleton reconstructive surgery within 24 hours - 7 years after trauma. Clinical and CT examination data were used for preoperative planning and assessment of surgery results. Stereolithographic models (STLM) were applied for preoperative planning in 89 cases. The follow-up period ranged from 4 months up to 10 years. Results . In 254 (88%) of 288 patients reconstruction of anterior skull base, upper and/or midface with restoration of different parts of orbit was performed. Anterior skull base CSF leaks repair, calvarial vault reconstruction, maxillar and mandibular osteosynthesis were done in 34 (12%) cases. 242 (84%) of 288 patients underwent one reconstructive operation, while 46 (16%)--two and more (totally 105 operations). The patients with extended frontoorbital and midface fractures commonly needed more than one operation--in 27 (62.8%) cases. Different plastic materials were used for reconstruction in 233 (80.9%) patients, of those in 147 (51%) cases split calvarial bone grafts were preferred. Good functional and cosmetic results were achieved in 261 (90.6%) of 288 patients while acceptable were observed in 27 (9.4%). Conclusion . Active single-stage surgical management for repair of combined cranioorbital injury in acute period with primary reconstruction optimizes functional and cosmetic outcomes and prevents the problems of delayed or secondary reconstruction. Severe extended anterior skull base, upper and midface injuries when intracranial surgery is needed produced the most challenging difficulties for adequate reconstruction. Randomized trial is required to define the extent and optimal timing of reconstructive surgery in patients with severe traumatic brain injury and craniofacial injury in acute period of trauma.

1597. Erbayraktar, S., et al. (2001). "Intracranial penetrating injury associated with an intraoperative epidural haematoma caused by a spring-laden pin of a multipoise headrest." British journal of neurosurgery **15**(5): 425-428.

Lack of an intermediary piece that should have been placed between the pin and spring resulted in skull penetration due to a rapid waste in the spring's compensatory capacity. Checking integrity of internal pieces should be performed regularly. Designing intermediary piece and spring as a single piece might increase safety.

1598. Erdogan, E., et al. (2002). "Craniocerebral gunshot wounds." Neurosurgery Quarterly **12**(1): 1-18.

Cranial gunshot wounds frequently produce devastating injuries to central nervous system (CNS) structures. Surgical therapy and primary and secondary debridement, including repair of dural defects and removal of retained intracranial bone and metal fragments, were applied to 374 cranial gunshot wound victims at Gulhane Military Medical School in Turkey from 1992 to 1999. Dural defects were closed primarily or with temporalis fascia, pericranium, and cadaver grafts. Central nervous system infections were mostly observed in cases with cerebrospinal fluid (CSF) fistulas. All patients underwent computed tomography (CT) scans periodically. In 119 of 374 (32%) patients, bone and metal fragments were determined on control CT scans. We also performed angiography in some patients to reveal traumatic vascular pathologic findings. Most of the deaths in this group of patients were attributed to the direct effects of brain injury and occurred within the first month after injury. Fragments retained after the first debridement were followed periodically by CT scan. Surgery was not performed until infection developed. Retained fragments did not increase the infection risk, but high rates of infection did occur in cases with CSF fistulas. The presence of diffuse brain damage, brainstem injury, CNS infection, or ventricular injury was associated with a poor outcome.

1599. Erdogan, E., et al. (2004). "Ventricular injury following cranial gunshot wounds: clinical study." Military medicine **169**(9): 691-695.

Gunshot wounds to the head are usually fatal injuries, despite all medical and surgical interventions. Ventricular injury is a poor prognostic factor-for penetrating cranial gunshot wounds. Intraventricular hemorrhage and ventricular lacerations are the main components of such injuries. The incidence, management, and outcomes of cases of ventricular injury secondary to cranial gunshot wounds that were treated during a 9-year period at Gulhane Military Medical Academy were examined. The study group consisted of 67 consecutive patients who were admitted to the Department of Neurosurgery with the diagnosis of ventricular injury, with different penetration sites. The patients had been injured by either bullets or shrapnel. Surgical treatment was performed for all patients with ventricular injuries and 22 (32.8%) died. Ventricular injury in cranial gunshot wounds is a complex severe type of trauma that requires serious treatment. Early radiological diagnosis and accurate treatment frequently had lifesaving roles for these patients.

1600. Eren, B., et al. (2013). "An unusual case of penetrating intracranial injury due to scissors." Soudni lekarstvi **58**(2): 29-30.

Craniocerebral penetrating non-missile injuries caused by metallic foreign bodies are uncommon events. Healthy 10 year-old boy applied to the hospital emergency service with his parents. Family members stated that the scissors have been stalled his head accidentally by his sister when they had played together. During physical examination the scissors located on left parietal region of the head was examined. There was no loss of consciousness and oriented with normal vital signs. Radiological investigation demonstrated a hyper dense foreign body (scissors) penetrating cranial cavity and ended before reaching posterior region of the left parietal lobe. To our knowledge, the presented was rare case of intracranial penetrating scissor, which was not removed until, injured, reached the hospital. Our goal was to discuss the rare case of penetrating non-missile foreign body cranial injury from medico legal aspect.

1601. Eren, B., et al. (2012). "Cranial injury caused by penetrating non-missile foreign body: an autopsy case." Soudni lekarstvi **57**(4): 62-63.

UNLABELLED: Presented case was 32-year-old male marble worker, who underwent industrial accident at workplace. On gross physical examination; on forehead region round skin wound in 0.9 cm diameter was detected, radiological examination showed the image of metallic object. in the skull cavity. Brain dissection showed obvious brain injury, haemorrahge explaining the pattern of injury caused by the metallic bodys path, from left frontal lobe to the left cerebellar hemisphere was identified. We presented rare case of penetrating injury of the cranial region caused by non-missile foreign body., KEYWORDS: cranial injury - non-missile foreign body - autopsy.

1602. Erickson, B. P., et al. (2015). "An Unexpected Intraorbital Foreign Body." Ophthalmic plastic and reconstructive surgery **31**(5): e140.

1603. Erickson, N. A., et al. (2016). "A typical foreign body disease in an atypical location." Journal of Comparative Pathology **154**(1): 83.

Introduction: Foreign body-associated encephalitis is a rare condition and can be observed mainly after severe, penetrating trauma of the skull, nose or ears. Materials and Methods: A 2-year-old Hungarian vizsla dog was presented with multiple epileptiform seizures approximately 6 weeks after hyperthermia of unknown origin. Magnetic resonance imaging revealed intra-axial changes in the right occipital lobe. Analysis of the cerebral spinal fluid (CSF) identified severe, neutrophilic to mixed cellular pleocytosis and highly increased protein, suggestive of meningoencephalitis. Bacterial culturing of the CSF and 16S rRNA gene sequencing failed to reveal bacterial involvement. The dog was humanely destroyed because of the poor prognosis. Results: A 1.75 cm long, linear, plant-like foreign body, penetrating 1.45 cm into the cerebral parenchyma was associated with a severe and focally extensive chronic pyogranulomatous meningoencepha-litis. Further histopathological lesions included unilateral rhinitis with focally extensive fibrosis on the right. The perineural connective tissue of the left optic nerve had mild multifocal lymphoplasmacytic infiltrates accompanied by macrophages and few multinucleated giant cells. Conclusions: Despite the size of the foreign body, a migration tract was not identified. Non-traumatic routes of entry may involve nasal migration, the inner otic canal, perforation of the pharyngeal soft tissue, the Foramen magnum or a periocular pathway, for which, in this case, the histological findings in the nasal and perineural tissue may be consistent. Encephalitis due to migrating plant material, most frequently involving a grass awn, with or without bacterial infection, is an unusual lesion, presenting a challenging ante-mortem diagnosis.

1604. Erikson, A. B., et al. (2010). "Evidence of perimortem trauma in free-ranging mountain gorillas (Gorilla beringei beringei) from Volcanoes National Park, Rwanda." American journal of physical anthropology **141**: 101-102.

Analyses of trauma and pathology in skeletal collections derived from wild great apes can provide unique insight and improve our understanding of mortality in living populations. Here we focus on perimortem trauma associated with a modern skeletal sample of Virunga mountain gorillas. The most common cause of death reported previously for mountain gorillas is trauma, resulting from conspecific aggression (most notably infanticide) or poaching-related incidents. Individuals also succumb to respiratory disease, another common source of fatality. The application of a

forensic perspective can aid in clarifying the circumstances of death from analyses of skeletal remains, when records are incomplete or cause of death unknown. We examined evidence of perimortem trauma in a skeletal collection comprised of 78 mountain gorillas (43 adults; 35 infants/juveniles) from Rwanda. Availability of associated veterinary and life history records for many individuals in this collection provides a unique opportunity to clarify the manner in which circumstances surrounding death leave their mark on the skeleton. Analysis of 66 crania and 57 postcrania revealed that blunt force trauma was most common, and regularly found on infants, corresponding with known incidents of conspecific aggression. Trauma associated with infanticide was preferentially distributed in the cranial vault, ribs, and pelvis. Sharp force trauma, inflicted by bladed instruments, was documented on four individuals. No clear skeletal evidence of gunshot wounds exists. Overall, a wide range of perimortem trauma is documented within this assemblage, providing many possible avenues of comparison with similar primate populations and skeletal collections from other parts of the world.

1605. Eriş, S., et al. (2009). "Factors affecting mortality in patients with gunshot injuries." Marmara Medical Journal **22**(3): 181-191.

Objective: We planned this study in order to determine the factors affecting mortality in patients with gunshot injuries in more than one organ. Methods: We retrospectively reviewed the hospital records of 714 patients admitted to the Emergency Department of Dicle University, between January 2000 and December 2004. The factors that we considered would affect mortality such as age, sex, attempts suicide, long barrelled gun injuries, pellet injuries, contact/near contact shot, delayed admission time, presence of serious anemia and shock during admission, more than four entrance wounds, injury areas, serious cranial, thorax and abdominal injuries, vascular injuries in the extremities, administration of multiple transfusion, and trauma scores as GCS, RTS, PATI were analyzed. Results: As a result of unvaried statistical analyses, we determined that suicide attempts (p=0.001), presence of serious anemia (p=0.001) and shock (p=0.001) during admission, presence of serious cranial (p=0.001), thorax (p=0.001) and abdominal (p=0.001) injury, femoral artery injury (p=0.001), multiple blood transfusion (p=0.009), , GCS 0-7, GCS 8-12 (p=0.001) and low RTS (p=0.001)were significant factors affecting mortality. Conclusion: Multivariate analysis showed that serious anemia during admission, serious cranial injury, serious abdominal injury and low RTS were independently significant in predicting mortality (p<0.05).

1606. Erkutlu, I., et al. (2011). "Unusual penetration of a construction nail through the orbit to the cranium: a case report." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES **17**(1): 79-82.

Penetrating head and neck trauma with construction nails are uncommon life-threatening injuries and an important problem in developing countries. Assessment of the neurovascular and systemic physical status is a first requirement, and the decision concerning which surgical approach to perform for the removal of the nail is of critical importance. A 10-year-old girl was presented one hour after a fall injury with complaint of a swelling and foreign body lodgment on the left forehead. Neurological and systemic physical examinations were normal except for weak direct pupillary light reflex on the left side and the patient's state of uneasiness. Radiological investigations showed that the head of the nail had entered from the left infra-orbital region and become lodged through the orbital roof, below the frontal bone. Surgical extraction of the nail in the operating room was performed successfully using left pterional craniotomy and lateral orbitotomy technique, and there was no complication after surgery. Here, we report a case with a rare craniocerebral penetrating wound and type, with the head of the nail lodged in the anterior fossa through the orbital roof, which may be defined as 'reverse penetration of the nail'.

1607. Erle, A. and R. Petz (1972). "[Various gunshot injuries in the maxillofacial region]." Uber einige Schussverletzungen im Kiefer-Gesichts-Bereich. **22**(6): 434-442.

1608. Ermilov, V. S., et al. (1975). "[Foreign body of fire-arm origin in the nasal accessory sinuses and orbit]." Inorodnye telo pri atochnykh pazukh nosa i glaznitsy ognestrel'nogo proiskhozhdeniia(2): 111-112.

1609. Erol, B., et al. (2004). "Maxillofacial fractures. Analysis of demographic distribution and treatment in 2901 patients (25-year experience)." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **32**(5): 308-313.

INTRODUCTION: The aim of this study was to analyse retrospectively the demographic distribution, treatment modalities, and complications of maxillofacial fractures in 2901 patients treated in this department in Southeast Anatolia between 1978 and 2002. In addition, the use of internal fixation was evaluated in an effort to determine whether there were changes in using internal fixation techniques., PATIENTS AND METHODS: Two thousand nine hundred and one cases of facial trauma were assessed according to age, sex, and aetiology, in addition to the distribution of the fractures relating to facial bones and seasons., RESULTS: It was found that facial fractures were most frequent in males (77.5%) and in the 0-10 year age group; they tended to be more frequent during summer (36.3%); and traffic accidents were the most common aetiological factor (38%). 77.9% of cases were treated with conservative methods, and 22.1% with one or more internal fixation techniques. The most favoured technique was miniplate osteosynthesis; the complication rate associated with internal fixation was 5.7%., CONCLUSION: Currently there are many techniques to be used in treating maxillofacial trauma. However, the experience of the surgical team is also an important factor in achieving satisfactory functional and aesthetic results, and in minimizing complications.

1610. Errando, C. L. (2005). "[Severe injury in the obstetric patient: considerations for anesthesiologist and critical care specialist]." La paciente gestante con traumatismo grave. consideraciones para el medico especialista en anestesiologia y reanimacion. **52**(6): 336-366.

In spite of the high incidence of moderately severe or severe injury in obstetric patients, the anesthesiology literature contains few references to their diagnosis and treatment. We review the epidemiology, etiology, treatment, and prognosis of severe or moderately severe injuries in obstetric patients.

1611. Ersahin, Y., et al. (1994). "Transorbital stab wound: a case report." The Turkish journal of pediatrics **36**(1): 71-75.

Stab wounds of the skull are uncommon. They are usually accidental in children. An apparently trivial wound may cause death due to vascular damage or infection. A 5-year-old boy presented with a nail in the left intraorbital region. He fell with a nail in his hand five hours prior to hospital admission. Computed tomographic scans displayed the nail penetrating the cranium through the left orbital roof and extending towards the left anterior clinoid process. The nail was removed under general anesthesia in the operating room. Meningitis developed two days after the removal of the penetrating object and responded well to antibiotics. The pertinent literature was reviewed.

1612. Ersahin, Y., et al. (1996). "Pediatric depressed skull fractures: analysis of 530 cases." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **12**(6): 323-331.

Depressed skull fractures (DSFs) account for 7-10% of children admitted to hospital with a head injury and 15-25% of children with skull fractures. We reviewed the records of 530 patients operated on for DSF from January 1, 1973, to December 31, 1993. This group was made up of 357 boys (67%) and 173 girls (33%) whose ages ranged from 1 day to 16 years (mean age 6.1 years). Fall was the most common cause of injury. Of the 530 patients with DSF, 66% had compound fractures. The incidence of compound fractures increased with age. Compound fractures caused more brain lacerations (29%) than simple fractures (15.5%) did. We also classified DSFs radiologically as true, flat, or ping-pong ball fractures. Associated intracranial lesions were found to be a bad prognostic factor. There were 13 deaths (2.5%) in this series. Satisfactory results were achieved in over 95% of the patients. Compound fractures are associated with a worse outcome and a higher incidence of intracranial lesions and cortical laceration. Unilateral pupillary dilatation and an admission GCS score of 8 or less are ominous signs in regard to mortality. We also found that the deeper the depressed bone, the higher the risk of both dural tear and cortical laceration and the worse the prognosis. A conservative approach should be followed in cases of simple DSF without associated intracranial hematoma and in cases in which the bone depression is not deeper than 1 cm.

1613. Ersahin, Y., et al. (1999). "Transorbital stab wound from a speargun: A case report." Turkish neurosurgery **9**(3-4): 133-136.

Penetrating stab wounds of the skull rarely occur in civilians. In the absence of direct injury to the brainstem or laceration of a major intracranial vessel, the prognosis for these injuries is good. Transorbital stab wounds causing intracranial complications are more common in children than in adults, and are reported more often in boys than girls. A 9-year-old girl presented with a spear penetrating her left orbita. A cranial computed tomographic scan confirmed that the tip of the spearhead had passed through the left orbital roof and was penetrating the left temporal lobe. The barbed spearhead was removed via craniotomy after cutting off three of the spear's prongs. The child recovered completely after surgery and was neurologically intact 1 year following the injury. Postoperative magnetic resonance angiography (MRA) was also normal. Barbed objects should not be removed by retracing their route of entry. MRA can be used to screen for important potential vascular complications.

1614. Erwin, D. Z. and M. Earley (2021). "A Mysterious Odor After Nose Blowing." JAMA otolaryngology-- head & neck surgery **147**(5): 479-480.

1615. Escudero, D., et al. (2022). "Clinico-radiological related to early brain death factors." Medicina intensiva **46**(1): 1-7.

OBJECTIVE: To identify clinical and radiological factors associated to early evolution to brain death (BD), defined as occurring within the first 24h., DESIGN: A retrospective cohort study was made covering the period 2015-2017., SETTING: An adult Intensive Care Unit (ICU)., PATIENTS/METHODS: Epidemiological, clinical and imaging (CT scan) parameters upon admission to the ICU in patients evolving to BD., RESULTS: A total of 166 patients with BD (86 males, mean age 62.7 years) were analyzed. Primary cause: intracerebral hemorrhage 42.8%, subarachnoid hemorrhage 18.7%, traumatic brain injury 17.5%, anoxia 9%, stroke 7.8%, other causes 4.2%. Epidemiological data: arterial hypertension 50%, dyslipidemia 34%, smoking 33%, antiplatelet medication 21%, alcoholism 19%, anticoagulant therapy 15%, diabetes 15%. The Glasgow Coma Score (GCS) upon admission was 3 in 68.8% of the cases in early BD versus in 38.2% of the cases in BD occurring after 24h (p=0.0001). Eighty-five patients presented supratentorial hematomas with a volume of 90.9ml in early BD versus 82.7ml in BD>24h (p=0.54). The mean midline shift was 10.7mm in early BD versus 7.8mm in BD>24h (p=0.045). Ninety-one patients presented ventriculomegaly and 38 additionally ependymal transudation (p=0.021). Thirty-six patients with early BD versus 24 with BD>24h presented complete effacement of basal cisterns (p=0.005), sulcular effacement (p=0.013), loss of cortico-subcortical differentiation (p=0.0001) and effacement of the suprasellar cistern (p=0.005). The optic nerve sheath measurements showed no significant differences between groups., CONCLUSIONS: Early BD (>24h) was associated to GCS<5, midline shift, effacement of the basal cisterns, cerebral sulci and suprasellar cistern, and ependymal transudation.

1616. Escudero, D. and J. Otero (2015). "Intensive care medicine and organ donation: exploring the last frontiers?" Medicina intensiva **39**(6): 373-381.

The main, universal problem for transplantation is organ scarcity. The gap between offer and demand grows wider every year and causes many patients in waiting list to die. In Spain, 90% of transplants are done with organs taken from patients deceased in brain death but this has a limited potential. In order to diminish organ shortage, alternative strategies such as donations from living donors, expanded criteria donors or donation after circulatory death, have been developed. Nevertheless, these types of donors also have their limitations and so are not able to satisfy current organ demand. It is necessary to reduce family denial and to raise donation in brain death thus generalizing, among other strategies, non-therapeutic elective ventilation. As intensive care doctors, cornerstone to the national donation programme, we must consolidate our commitment with society and organ transplantation. We must contribute with the values proper to our specialization and try to reach self-sufficiency by rising organ obtainment.

1617. Escudero, D., et al. (2017). "Organ Donation and Elective Ventilation: A Necessary Strategy." BioMed research international **2017**: 7518375.

Organ transplantation is the sole treatment to improve or save the life of patients with final-stage organ failure. The shortage of available organs for transplantation constitutes a universal problem, estimating that 10% of patients on waiting lists die. Brain death is an undesirable result; nevertheless, it has beneficial side-effects since it is the most

frequent source of organs for transplantation. However, this phenomenon is relatively uncommon and has a limited potential. One of the options that focuses on increasing organ donation is to admit patients with catastrophic brain injuries (with a high probability of brain death and nontreatable) to the Intensive Care Unit, with the only purpose of donation. To perform elective nontherapeutic ventilation (ENTV), a patient's anticipated willingness to donate organs and/or explicit acceptance by his/her relatives is required. This process should focus exclusively on those patients with catastrophic brain injuries and imminent risk of death which, due to its acute damage, are not considered treatable. This article defends ENTV as an effective strategy to improve donation rate, analyzing its ethical and legal basis.

1618. Eskildsen, J. F., et al. (2016). "Airway Management of a 3-Year-Old Child With a Penetrating Oropharyngeal Foreign Body Risking Vascular Injury." A & A case reports **7**(12): 256-259.

Management of anesthesia for a child with an upper airway foreign body is fraught with particular challenges. We present the case of a 3-year-old girl who presented to the emergency department with a 12-cm sewing needle protruding from her mouth and unknown vascular involvement. We were faced with establishing a secure airway despite exclusion of mask ventilation or use of a laryngeal mask airway. Moreover, peripheral intravenous access was lost before adequate sedation. Ultimately, we were able to safely induce anesthesia and achieve endotracheal intubation. The penetrating foreign body was removed with no perioperative complications.

1619. Esmaeilzadeh, M., et al. (2010). "One life ends, another begins: Management of a brain-dead pregnant mother-A systematic review." BMC medicine **8**: 74.

BACKGROUND: An accident or a catastrophic disease may occasionally lead to brain death (BD) during pregnancy. Management of brain-dead pregnant patients needs to follow special strategies to support the mother in a way that she can deliver a viable and healthy child and, whenever possible, also be an organ donor. This review discusses the management of brain-dead mothers and gives an overview of recommendations concerning the organ supporting therapy., METHODS: To obtain information on brain-dead pregnant women, we performed a systematic review of Medline, EMBASE and the Cochrane Central Register of Controlled Trials (CENTRAL). The collected data included the age of the mother, the cause of brain death, maternal medical complications, gestational age at BD, duration of extended life support, gestational age at delivery, indication of delivery, neonatal outcome, organ donation of the mothers and patient and graft outcome., RESULTS: In our search of the literature, we found 30 cases reported between 1982 and 2010. A nontraumatic brain injury was the cause of BD in 26 of 30 mothers. The maternal mean age at the time of BD was 26.5 years. The mean gestational age at the time of BD and the mean gestational age at delivery were 22 and 29.5 weeks, respectively. Twelve viable infants were born and survived the neonatal period., CONCLUSION: The management of a brain-dead pregnant woman requires a multidisciplinary team which should follow available standards, guidelines and recommendations both for a nontraumatic therapy of the fetus and for an organ-preserving treatment of the potential donor.

1620. Esme, H., et al. (2006). "Blunt and penetrating traumatic ruptures of the diaphragm." The Thoracic and cardiovascular surgeon **54**(5): 324-327.

BACKGROUND: The difficulties in diagnosing traumatic diaphragmatic rupture (TDR) at the first admission are the most common causes of morbidity and mortality. The purpose of this study was to review our experience with the management of TDR in order to identify the factors contributing to diagnostic delay and associated morbidity and mortality., METHODS: Fourteen patients with TDR were treated in our hospital between January 2000 and June 2005. They have been investigated retrospectively., RESULTS: The study identified 9 men (64 %) and 5 women (36 %), with ages ranging from 19 to 65 years (mean 35.3 years). Rupture of the diaphragm was left-sided in 10 (71 %) and right-sided in 4 (29 %) of the patients. Blunt trauma accounted for the injuries of 11 patients (79 %). Early diagnosis was obtained in 9 patients (64 %). The diagnosis was established preoperatively in 8 patients (57 %), and intraoperatively in 4 (29 %). The diagnosis was missed in 2 (14 %) patients in the first operation. Multiple associated injuries were observed in 12 patients (85 %). Postoperative complications were encountered in five patients (35 %), and the overall mortality was 7 %., CONCLUSIONS: Diaphragmatic rupture should be suspected in all blunt or penetrating traumas of the thorax and abdomen, and the presence of such an injury should be excluded before terminating the exploratory procedure.

1621. Espaillat, A., et al. (1998). "Intraorbital metallic foreign body." Archives of ophthalmology (Chicago, Ill. : 1960) **116**(6): 824-825.

1622. Esposito, D. P. and J. B. Walker (2009). "Contemporary management of penetrating brain injury." Neurosurgery Quarterly **19**(4): 249-254.

Penetrating brain injury includes all traumatic brain injury that is not the result of a blunt mechanism. Concerning these injuries, gunshot wounds are by far the most prevalent. Despite law enforcement efforts, these injuries unfortunately continue to be commonplace in large trauma centers as well as in metropolitan and large community emergency departments. Great efforts have been undertaken to standardize the medical and surgical management of these patients. The authors review the Guidelines of Penetrating Brain Injury published in 2001 and performed an updated literature search concerning this topic. There is evidence to suggest based upon current data that aggressive antibiotic prophylaxis and avoidance of aggressive debridement of deep-seated bone and bullet fragments has improved morbidity and mortality over the last 35 years.

1623. Essex, R. W., et al. (2004). "Post-traumatic endophthalmitis." Ophthalmology **111**(11): 2015-2022.

OBJECTIVE: To establish risk factors for the occurrence of post-traumatic endophthalmitis, to observe the efficacy of prophylaxis, and to describe the clinical features of post-traumatic endophthalmitis., DESIGN: Partially prospective consecutive case-control study., PARTICIPANTS: A total of 250 consecutive patients admitted to a single ophthalmic hospital with open globe injuries during a 3-year period were included., METHODS: Patients with post-traumatic endophthalmitis were identified prospectively and added to an endophthalmitis database. All open globe injuries during the same time period were identified through a retrospective search of inpatient admissions, and their charts were reviewed. Information collected from all patient files included patient age; gender; injury setting (indoor/outdoor); wound contamination; nature of injury (site on eye, lens involvement, retained intraocular foreign body); mechanism of injury (penetration/perforation/rupture/ruptured surgical wound); prophylactic antibiotic administration, including route and timing; timing of primary repair; lensectomy at the time of primary repair; and depot corticosteroid at the time of primary repair. Any association between these parameters and the subsequent development of endophthalmitis was investigated. Any association between endophthalmitis and final visual acuity (VA) and also enucleation was evaluated., MAIN OUTCOME MEASURE: Development of endophthalmitis., RESULTS: The frequency of endophthalmitis after open globe injury was 6.8%. The following factors were associated with the subsequent development of endophthalmitis by univariate analysis: dirty wound (14.3% vs. 4.1%, P = 0.01), retained intraocular foreign body (13.0% vs. 4.4%, P = 0.02), lens capsule breach (12.8% vs. 3.2%, P = 0.01), delayed primary repair (> or =12 hours) (11.3% vs. 2.9%, P = 0.02), and rural address (10.1% vs. 4.3%, P = 0.07). Risk factors identified after multivariate analysis were dirty injury (odds ratio [OR], 5.3; 95% confidence interval [CI)], 1.5-18.7), breach of lens capsule (OR, 4.4; 95% CI, 1.2-15.6), and delay in primary repair (per hour: OR, 1.013; 95% CI, 1.002-1.024). None of the following factors was found to be associated with post-traumatic endophthalmitis: patient age, gender, injury setting, site of injury on eye, mechanism of injury, antibiotic administration, lensectomy at the time of primary repair, and depot corticosteroid at the time of primary repair. Final VA tended to be worse in eyes with endophthalmitis (P = 0.08). Endophthalmitis did not significantly influence the frequency of enucleation/evisceration (5.9% vs. 4.3%, P = 0.55)., CONCLUSIONS: Delay in primary repair, ruptured lens capsule, and dirty wound were each independently associated with the development of post-traumatic endophthalmitis. Patients with > or =2 of these 3 risk factors had a particularly high frequency of infection.

1624. Estebanez, G., et al. (2014). "Penetrating orbital-cranial injuries management in a limited resource hospital in Latin America." Craniomaxillofacial Trauma and Reconstruction **8**(4): 356-362.

Penetrating orbital-cranial injuries (POCIs) are difficult cases especially in hospitals in low-middle-income countries (LMIC) where resources are limited. We present a case series of POCI managed in a university hospital in such scenario. A retrospective case series was conducted including patients with POCI in 2011. Mechanism of injury, Glasgow Coma Scale score, imaging, medical and surgical management, complications, and Glasgow Outcome Scale (GOS) score were analyzed. A total of 30 patients with penetrating orbital injuries were admitted from March 2011 to December 2011. Of this group, only four patients were diagnosed with cranial penetration. Computed tomography (CT) angiography revealed orbital fractures and injury to frontal, temporal, or occipital lobes. Urgent craniotomy with

isolation of ipsilateral carotid artery was performed. GOS score at discharge was 5 in three patients and 4 in one patient. POCIs are not uncommon in hospitals of LMIC. In such scenarios, a standard approach with CT angiography and early neurosurgical intervention results in good outcome.

1625. Estébanez Montiel, B., et al. (2018). "Brain dead donors (BDD) following cerebral gunshot wounds: Renal allografts validity." Intensive Care Medicine Experimental **6**.

INTRODUCTION. Severe brain injury, after cerebral gunshot wounds, may release large amounts of tissue factor to the circulation, may develop disseminated intravascular coagulation (DIC) and it can lead to renal dysfunction. OBJECTIVES. Analyse the validity for transplantation of kidneys harvested from BDD following cerebral gunshot wounds and the outcome of the transplanted renal grafts. METHODS. Retrospective descriptive study of renal allografts harvested from BDD following cerebral gunshot wounds, at a single center, between January 1, 2007 and May 31, 2017. Donorś data (patientś characteristics, blood tests, associated injuries) and recipients (graft survival, rejection) were collected. RESULTS. We analysed data from six BDD following cerebral gunshot wounds (age 40.3 ± 9.6 years) without any cardiovascular risk factors, except one patient who had hypertension. All patients presented brain death in the first 24 hours of hospital admission. None of them had any associated injuries. One patient suffered a cardiopulmonary arrest (during 20 minutes) prior to ICU admission. One of the patients had elevated creatinine levels in the blood tests when he was admitted to the hospital. But, during the ICU length of stay, up to 50% of the patients presented acute renal failure. Fifty percent of the patients presented compatible or suggestive criteria for DIC. Four kidney grafts were not valid for transplantation because: acute renal failure (two kidney grafts), poor graft perfusion (one case) and complex vascular anomalies (one case). Eight kidney grafts (66.67%) were transplanted. Seven kidney grafts were transplanted in our center. One of them was explanted, in the first 24 hours after transplantation, due to cortical necrosis (pathology exam: glomerular and vascular thrombotic microangiopathy lesions). Fig 1. CT scan. The donorś contralateral kidney was not implanted due to poor perfusion. The pathology exam of this kidney showed multiple fibrin trombi in glomerular capillaries and small-vessels (Figure 2). The remaining 6 grafts presented adequate function one year after the transplantation, except in one case which suffered underlying disease recurrence. CONCLUSIONS. An accurate evaluation of kidney grafts from BDD following cerebral gunshot wounds is required, because they are patients at risk for DIC and acute renal failure. Pre-transplant biopsy and reduction of ischemia time may be indicated. Almost all transplanted renal allo-grafts from BDD, following cerebral gunshot wounds, had good results in our study. Further studies with larger simple sizes are needed.

1626. Estebe, J. P., et al. (1994). "[Intracranial insertion of a nasogastric tube in a patient with severe head injuries]." Penetration intracranienne d'une sonde nasogastrique chez un traumatise cranien grave. **13**(6): 843-845.

The accident intracranial insertion of a nasogastric tube is a well known complication. We report the case of 19-year-old girl with a severe craniofacial trauma who had a nasogastric tube inserted at the site of the traffic accident. The aspiration gave issue of haemorrhagic fluid. At admission the X-ray of the skull showed the intracerebral penetration of the tube. It was removed but the patient died two days later. The various means of prevention and treatment of this complication are discussed.

1627. Eswara, J., et al. (2014). "Epidemiology of adrenal injuries requiring adrenal surgery." Urology **84**(4): S91.

Introduction and Objectives: Adrenal trauma is extremely rare and current literature is lacking in data from large case series. In this study, we analyze adrenal injuries using the National Trauma Data Bank (NTDB). Materials and Methods: We performed a retrospective analysis of the NTDB from the years 2007-2011. Patient demographics, Injury Severity Score (ISS), mechanism of injury, and blunt versus penetrating trauma, associated injuries and hypovolemic shock were assessed. Multivariable models were used to determine associations with outcomes such as need for surgery, type of surgery mean length of stay, need for ICU, and death. Results: Of the 1,766,606 trauma cases in the data set, 8683 were identified involving one or both adrenal glands. There were 7835 blunt and 663 penetrating injuries, and 184 of these injures were isolated to the adrenal glands. Of the 8683 adrenal injuries, 80 (0.9%) required surgery. However, none of the 184 isolated adrenal injures required surgery (p=0.42). Factors associated with isolated adrenal injury include lower ISS (p<0.001), younger age (p<0.001), and penetrating injury (p<0.001). No isolated adrenal injuries were associated with death (12% vs. 0%, p<0.0001). The most common associated organ injuries were ribs (50.9%), thoracic (50.0%), liver (41.6%), vertebrae (30.9%), kidney (27.8%), and spleen (22.0%). Logistic regression showed that

injures to the thorax (p=0.0014) and multiple abdominal injuries (p<0.001) were associated with a lower rate of undergoing adrenal surgery. Higher ISS score (p=0.007), penetrating injury (p<0.001), race (Black) (p=0.029) and concurrent injuries to the spleen (p<0.001) and intestines (p=0.016) were associated with a higher likelihood of requiring adrenal surgery. Older age (p<0.001), higher ISS score (p<0.001), race (Black, Other) (p=0.03, p=0.02), penetrating injuries (p<0.001) and injuries to the aorta/vena cava (p=0.008), vessels (p=0.001), thorax (p=0.03), ribs (p=0.005), stomach (p=0.02), liver (p=0.03), multiple abdominal injuries (p=0.002), and brain/spinal cord (p<0.001) were associated with a higher mortality rate. Conclusions: Adrenal injuries are rare, comprising 0.49% of all traumatic injuries. In our database, isolated adrenal injuries were not fatal and did not require surgery. Younger age, race (Black), higher ISS score, penetrating injury, and concurrent injuries to the spleen/intestines were associated with a higher likelihood of requiring an adrenalectomy.

1628. Eswara, J. R., et al. (2015). "Adrenal injuries: A national trauma data bank analysis." Journal of Urology **193**(4): e208.

INTRODUCTION AND OBJECTIVES: Adrenal trauma is extremely rare and current literature is lacking in data from large case series. In this study, we analyze adrenal injuries using the National Trauma Data Bank (NTDB). METHODS: We performed a retrospective analysis of the NTDB from the years 2007-2011. Patient demographics, Injury Severity Score (ISS), mechanism of injury, blunt versus penetrating trauma, associated injuries and hypovolemic shock were assessed. Multivariable models were used to determine associations with outcomes such as need for surgery, type of surgery mean length of stay, need for ICU, and death. RESULTS: Of the 1,766,606 trauma cases in the data set, 8683 were identified as involving one or both adrenal glands. There were 7835 blunt and 663 penetrating injuries, and 184 of these injures were isolated to the adrenal glands. Of the 8683 adrenal injuries, 80 (0.9%) required surgery. However, none of the 184 isolated adrenal injures required surgery (p=0.42). Factors associated with isolated adrenal injury include lower ISS (p<0.001), younger age (p<0.001), and penetrating injury (p<0.001). No isolated adrenal injuries were associated with death (12% vs. 0%, p<0.0001). The most common associated organ injuries were ribs (50.9%), thoracic (50.0%), liver (41.6%), vertebrae (30.9%), kidney (27.8%), and spleen (22.0%). Logistic regression showed that injures to the thorax (p=0.0014) and multiple abdominal injuries (p<0.001) were associated with a lower rate of undergoing adrenal surgery. Higher ISS score (p=0.007), penetrating injury (p<0.001), race (Black) (p=0.029) and concurrent injuries to the spleen (p<0.001) and intestines (p=0.016) were associated with a higher likelihood of requiring adrenal surgery. Older age (p<0.001), higher ISS score (p<0.001), race (Black, Other) (p=0.03, p=0.02), penetrating injuries (p<0.001) and injuries to the aorta/vena cava (p=0.008), vessels (p=0.001), thorax (p=0.03), ribs (p=0.005), stomach (p=0.02), liver (p=0.03), multiple abdominal injuries (p=0.002), and brain/spinal cord (p<0.001) were associated with a higher mortality rate. CONCLUSIONS: Adrenal injuries are rare, comprising 0.49% of all traumatic injuries. In our database, isolated adrenal injuries were not fatal and did not require surgery. Younger age, race (Black), higher ISS score, penetrating injury, and concurrent injuries to the spleen/intestines were associated with a higher likelihood of requiring an adrenalectomy.

1629. Etheridge, J. C., et al. (2017). "Duration of Antibiotic Prophylaxis in Patients with Gunshot Wounds to the Head." The American surgeon **83**(8): e271-273.

1630. Etl, S., et al. (2000). "[Cervical vascular penetrating trauma]." Stichverletzungen der grossen Halsgefasse. **103**(1): 64-67.

The case of a 25 year old male with a stab wound of common carotid artery and the internal jugular vein is reported. He was admitted in severe hemorrhagic shock and immediately treated successfully by arterial reconstruction by means of a venous patch. Mild, declining neurological deficits correlated in magnetic resonance imaging with disturbances in the perfusion area of the medial cerebral artery. A survey of the literature shows that the fast repair of the carotid artery is clearly to be given preference to ligature. First can be executed successfully in exceptional emergency cases also by non-carotid surgeons, if basic vascular-surgical techniques are controlled.

1631. Euteneuer, J., et al. (2019). "Evaluation of the backspatter generation and wound profiles of an anatomically correct skull model for molecular ballistics." International journal of legal medicine **133**(6): 1839-1850.

Molecular ballistics connects the molecular genetic analysis of biological traces with the wounding events and complex forensic traces investigated in terminal ballistics. Backspatter, which originates from a projectile hitting a biological target when blood and/or tissue is propelled back into the direction of the gun, is of particular interest; those traces can consolidate and persist on the outer and inner surfaces of firearms and serve as evidence in criminal investigations. Herein, we are the first to present an anatomically correct head model for molecular ballistic research based on a polyurethane skull replica enclosing tissue-simulating sponge material that is doped with "triple-contrast" mixture (EDTA-blood, acrylic paint, and an x-ray contrast agent). Ten percent ballistic gelatin was used as brain simulant. We conducted contact and intermediate-range shots with a Glock 19 pistol (9 mm Luger), a pump-action shotgun (12/70 slugs), and blank cartridge handguns. Each shot was documented by a high-speed camera at 35,000 fps. Apart from the blank cartridge guns, all gunshots penetrated the skull model and created backspatter, which was recovered from the distal part of the barrels and analyzed. The pistol contact shots and one of three shotgun shots yielded full STR profiles. While the shotgun slugs destroyed the skulls, the remaining models could be used for radiological and optical fracture and wound channel evaluation. Known backspatter mechanisms and their respective timing could be confirmed visually by video analysis. Our complete model setup proved to be well applicable to molecular ballistic research as well as wound channel and fracture pattern investigation.

1632. Evans, R. W. and R. C. Packard (2000). "Fifteen-minute, bilateral, posttraumatic headaches." Headache **40**(9): 763-764.

1633. Eviz, E., et al. (2013). "A case of avoidant/restrictive food intake disorder (ARFID): a new conceptual approach in DSM 5." Bulletin of Clinical Psychopharmacology **23**: S200.

Loss of appetite that may cause weight loss is a common symptom in Major Depressive Disorder. On the other hand Anorexia Nervosa is described as restriction of energy intake leading to significantly low body weight, accompanying intense fear of gaining weight or of becoming fat. Significant weight loss that does not occur exclusively during the course of anorexia nervosa or bulimia nervosa is included in the new DSM-5. Avoidant/restrictive food intake disorder (ARFID) is a new diagnostic category in DSM-5. Although described as Feeding Disorder of Infancy or Early Childhood before, it is not restricted to childhood in DSM-5. As ARFID is categorized within Feeding and Eating Disorders in DSM-5, new researches focusing prevalence and incidence in different populations will facilitate the development of innovations for this group of patients. Here in this case report, we present a patient with significant weight loss without fear of gaining weight or becoming fat. A 33-year-old, married female patient, known to have depressive symptoms for nearly 16 years without full remission and no prior psychiatric admission or treatment. She had been lost 20 kg in the last ten months' period, she has been 40.5 kg and BMI was 15.8 at the time of examination, was our case. She was hospitalized because of depressed mood, markedly diminished interest and pleasure, significant weight loss and suicidal ideation. During her first evaluation after hospitalization, she reported that she couldn't eat anything, never felt hunger and eating reminds her of 'death'. She was uncomfortable for being so thin, loosing her hair and having problems with her teeth. 'My legs look like a child's' she said and reported no binge eating, provoked vomiting or excessive exercising. Her menstruations were periodic with normal duration. In her psychiatric evaluation she was depressive with suicidal ideas and plans. Her sleep pattern was evidently affected which she reported to be increased. She had marked anhedonia and hopelessness with lack of energy and concentration. She felt guiltiness because of her incapacity of household responsibilities and diminished social functioning. Besides she had no psychotic features. This case example with ARFID illustrates the importance of differential diagnosis. We also make a revision of the topic, rare in literature, in clinical features, differential diagnosis and treatment approaches, suggesting a conceptual approach for ARFID. Key research findings and core clinical features focusing on diagnosis and treatment are highlighted. The clinicians should pay attention to the eating disorders' group that may be concealing a broader diagnosis. of Turkish Forensic Medicine between the years 2005-2010 were reviewed and 27 cases related Psychiatry were included. Results: Eight of the grievances occurred in dispensaries and military hospitals, 7 in psychiatric hospitals, 6 in emergency services and the others were in different places. 23 of the defendants were psychiatrists and 4 of them were medical doctors from other clinics. 9 of the defendants were complained together with medical doctors from other clinics or health care workers. 16 of the defendants were male, 11 of them were female. 3th Speciality Board of Institute of Forensic Medicine's decisions about the cases were as below; in 14 of the cases there were no malpractice, in 9 of the cases there was malpractice, 3 of them couldn't be evaluated and in one of the cases must be evaluated by the court because of missing file. 16 of the victims were male and 11 of them were female. The average age of the cases was 35.1, (between 19 and 66 years old)

22 of the victims were dead, 5 of them were alive and well and one of them was disabled because of sequel of encephalitis. The autopsy was performed for 16 of dead victims and not performed for the rest of them. The boards decisions about the cause of death were as below: 7 of them couldn't be determined, 3 of them were because of pneumonia, 2 of them were due to hanging, and the others were different causes ike sepsis, brain damage due to gun shot injury, gastric perforation and hemorrhage due to taking a corrosive substance, myocardial infarction, cardiac arrest due to taking haloperidol, cardiovascular disease resulting pulmonary edema, cerebral hemorrhage, blunt head-abdominal and thoracic trauma, penetrating thoracic injury, general body trauma due to jump from a height. Conclusion: Most of the victims were young adults. Most of the complaints about Psychiatric malpractice were cases with death. Therefore psychiatrists have to do a detailed evaluation, be careful and intentive about requested consultations from emergency services or other clinics, exclude the organic etiology and also be aware of the risk of suicide.

1634. Ewing-Cobbs, L., et al. (1994). "Gunshot wounds to the brain in children and adolescents: age and neurobehavioral development." Neurosurgery **35**(2): 225-233.

Neurobehavioral outcome after craniocerebral gunshot wounds was evaluated in a prospective, 3-year, longitudinal follow-up of a consecutive case series of 13 children and adolescents. The younger group was composed of seven children, ages 1.5 to 4 years, and the older group contained six children, ages 5 to 14. Outcome measures included the Glasgow Outcome Scale and neuropsychological assessment of intelligence, language, motor, memory, attention, academic achievement, and adaptive behavior. Glasgow Outcome Scale scores at baseline indicated moderate and severe disabilities in 69 and 23%, respectively. At the 3-year follow-up, 85% had moderate disabilities but only 8% were severely disabled. Significant and persistent neurobehavioral deficits varied with developmental level at the time of cerebral insult. Intellectual functioning was clearly more impaired in children younger than 5 years of age at the time of injury than in older children. Cognitive and motor factors were most closely related to deficits in the younger group. Disability in older children and adolescents was associated with impaired attention, adaptive behavior, and behavioral disturbance. Disabilities appear to be at least as severe in our sample after cerebral gunshot wounds as in our studies of severe pediatric closed-head injury. At the time of follow-up, younger children sustaining gunshot wounds had slightly lower intelligence quotient scores and similar receptive language, expressive language, and gross motor scores compared with children with severe closed-head injury. The older gunshot wound patients were significantly more impaired than patients with severe closed-head injuries on measures of adaptive behavior and attention.(ABSTRACT TRUNCATED AT 250 WORDS)

1635. Exadaktylos, A. K., et al. (2002). "The value of protocol-driven CT scanning in stab wounds to the head." The American journal of emergency medicine **20**(4): 295-297.

A prospective study involving 179 patients with cranial and orbital stab wounds was undertaken to evaluate the incidence and relationship of clinical findings, radiographs, and computed tomography (CT) findings and treatment decision. Indications for a CT scanning of the head are a of loss of consciousness, convulsions, any neurological deficit, palpable or visible fracture on the skull X-ray film after an attack with a sharp instrument, presence of an impaling weapon. A CT scan and plain radiography were performed in 179 patients. There were pathological CT findings in 128 patients (71.51%). In contrast only 35/179 (19.5%) X-ray films were positive; 11 (6.15%) patients had a palpable fracture. Approximately 80% of all cranial injuries would remain undetected if the diagnosis would be based on a visible fracture. Fifty percent of patients had an admission GCS of 15/15. The importance of a CT scan and the limited benefit of plain radiography alone in stab injuries to the head is discussed. Copyright 2002, Elsevier Science (USA). All rights reserved.)

1636. Ey, W. (1981). "[Orbital involvement in frontobasal injuries]." Mitbeteiligung der Orbita bei frontobasalen Traumen. **60**(4): 162-167.

In the mechanism of fracturing in the region of the frontobasis and of the midface there is the possibility of an orbital involvement. If the traumatic forces affect directly the frontal zone we may find a latero-orbitalfrontobasilar fracture--the socalled type IV according to the classification of frontobasilar fractures by Escher. If the middle face is more affected, the type III will result with tearing off the midface bones from the skull at the frontobasis. In a few cases there are indirect blow-out fractures of the orbital roof in communication with frontobasilar fractures especially in the ethmoidal or frontal sinus region. Penetration of foreign bodies through the orbital roof and through the lamina

cribriformis cause an open frontobasal cerebral trauma. The problem of the penetrating fronto-orbital traumata is to find the foreign body and to remove it. The danger is the infection with possible development of meningitis or brain abscess. The quota of lesions of the optic nerve in frontobasilar fractures seems to be relatively high. The pathogenesis of optic nerve injury is rather unknown. Mechanisms to be considered are discussed as well as indications and contraindications for a rhinosurgical decompression operation in the optic canal.

1637. Eze, K. C., et al. (2009). "Ultrasonic evaluation of orbito-ocular trauma in Benin-City, Nigeria." The Nigerian postgraduate medical journal **16**(3): 198-202.

AIMS AND OBJECTIVES: To find out the causes, time of presentation for ultrasound scan, pattern of eye injuries and orbital ultrasound findings in patients with orbito-ocular trauma., MATERIALS AND METHODS: Retrospective study of request cards, case notes and ultrasound reports of 67 patients who had trauma to the eye and were assessed with ultrasonography over a 3-year period (between 20th January 2000 and 19th January 2003) was done. The collected data included age, sex, presenting complaint, past medical history, duration of the injury before presentation to ultrasonographic study and ultrasound findings., RESULT: Sixty-seven patients were seen consisting of 54 males (83.58%) and 11 females (16.42%) with male to female ratio of 5:1. Age range was 4 to 91 years with mean age of 30.8 years. 44 patients (65. 67%) had blunt trauma while 23 patients (34.32%) had penetrating trauma. The causes of the ocular trauma include road traffic accidents 32 (47.76%), assaults 16 (23.88%), gunshot injuries 10 (14. 93%), sports injuries 5 (7.46%), and falls from heights 4 (5.92%) patients. 42 patients (53.73%), especially those with severe injuries presented late for ultrasonography. Those who made early presentation were cases of assault because of police involvement. Forty-five patients (67.16%) had structurally identifiable pathology in one or both eyes. Retinal detachment 18 (26.87%), vitreous haemorrhage 17 (25.37%), traumatic cataract 13 (19.40), ruptured globe 6 (8.96%) and posterior dislocation of the lens 6 (8.96) were the commonest abnormal sonographic findings. In 22 patients (32.84%) both eyes were normal., CONCLUSION: Ultrasound scan is a useful imaging modality for examination of the globe in patients with ocular trauma. Road traffic accident is the commonest cause of traumatic ocular injury affecting the globe. Retinal detachment and vitreous haemorrhage are the most frequent injuries to the globe diagnosed by ultrasound scan. Measures to reduce road traffic accidents will have far reaching positive effect in preventing blindness resulting from orbito-ocular trauma in Nigeria.

1638. Fabbri, M., et al. (2010). "Persistent pre-sleep behaviour and paroxysmal sweating with a stab lodged in the head." Journal of neurology **257**(3): 478-480.

1639. Fabian, T. and K. Lohmann (1999). "Nerve transplantation: a father's final gift." Journal of transplant coordination : official publication of the North American Transplant Coordinators Organization (NATCO) **9**(3): 175-176.

Offering the option of organ and tissue donation to grieving families may seem stressful, but asking the question may provide a positive means to extend care to the bereaved family and help others in return. Many donor families have said donation was an opportunity to make some sense out of a senseless situation and to relieve some of the grief they experienced. This article presents a case that started with such a discussion by ICU nurses in one of our donor hospitals, and ended with successful organ and tissue recovery and transplantation. As "routine" as this may sound, it was anything but routine--it made history.

1640. Fabian, T. C., et al. (1991). "Factors affecting morbidity following hepatic trauma. A prospective analysis of 482 injuries." Annals of surgery **213**(6): 540-548.

During a 5-year period, 482 patients with liver injuries were studied prospectively: 65% resulted from penetrating and 35% from blunt injuries. The injuries were graded by the hepatic injury scale (grades I to VI); transfusion requirements and perihepatic abscesses correlated with increasing scores. Minor surgical techniques were needed in 338 patients and 144 patients required major techniques. Omental packing was used in 60% of the major injuries and yielded 7% mortality and 8% abscess rates. Gauze packs were used for management of 10% of major injuries and yielded 29% mortality and 30% abscess rates. The patients were randomized to no drain, closed suction, or sump drainage and respective perihepatic abscess rates were 6.7%, 3.5%, and 13% (p less than 0.03; suction compared to closed suction).

Multivariate analysis demonstrated increasing abdominal trauma indices and transfusion requirements as well as sump drainage to be associated independently with perihepatic infection.

1641. Fabian, T. C., et al. (1990). "Carotid artery trauma: management based on mechanism of injury." The Journal of trauma **30**(8): 953-953.

Fifty-six patients with carotid injuries were reviewed (35 penetrating and 21 blunt). Shock correlated with a profound neurologic deficit on admission (p less than 0.03) in those with penetrating wounds. Thirty-one percent had primary repair, 25% had interposition grafting, 17% were ligated, and 17% were anticoagulated. Two graft failures resulted in death. Three blunt common carotid injuries followed direct cervical soft-tissue trauma; 18 internal carotid (ICA) dissections followed apparent extreme neck extension or flexion. Seven had bilateral ICA dissections (39%); none of these died. All dissections were diagnosed by angiography prompted by a change in the neurologic examination or an initial neurologic deficit unexplained by CT scan. Seventy-one percent had major associated injuries; 43% intra-abdominal solid viscus, 24% pelvis/long bone fractures, and 24% cervical spine/facial fractures. Dissections were treated with anticoagulation; 60% improved, 23% were unchanged, and 17% deteriorated. It is concluded that interposition grafting should be avoided if possible following penetrating wounds; liberal angiography is warranted with incompatible CT findings following blunt trauma; and anticoagulation is safe and effective therapy for blunt carotid dissections.

1642. Facione, J., et al. (2016). "[Rehabilitation after a war injury]." Des blesses jeunes et sportifs polytraumatises <>. **66**(7): 799-803.

Rehabilitation after a war injury. Combat wounds can be the cause of serious physical and mental trauma. Injuries caused by the explosion of improvised devices are responsible for multiple penetrating injuries, limb amputations, brain or spinal-cord injuries, and sometimes severe burns. The performance of protective equipment and the effectiveness of the initial medical care allow those injured to survive, often at the cost of severely compromised functional prognoses. Following critical and surgical care, the multidisciplinary teams of Physical Medicine and Rehabilitation (PM et R) intervene with the wounded to initiate rehabilitation and assist with social and occupational reintegration. This support takes place in two steps: the primary phase of "acute rehabilitation" is aimed at preventing and treating complications and starting to relearn activities of daily living; the second phase of "rehabilitation-reintegration" encompasses both the medical and social fields. The implementation of individualized rehabilitation requires the collaboration of PM et R and psychiatric teams, along with various officials within the military institution. New processes specific to the military environment and adapted to the war wounded have been developed: the creation of the War Wounded Rehabilitation and Reintegration Unit (C2RBO: Cellule de Readaptation et Reinsertion des Blesses en Operation); the use of new technologies and funding of bionic prostheses for amputees; the development of sports rehabilitation programs; the creation of tools to promote social and family reintegration; and the improved recognition of and compensation for injuries. In parallel, the care connection has been reorganized to create a "Defense Rehabilitation Pole" underpinned by a territorial network ensuring the implementation of a care course for every injured soldier, from the initial care in the Parisian military hospital complex to the military medical centers closer to the forces.

1643. Fadeev, S. P. and M. I. Shakhina (1998). "[Errors in examining a cadaver at the site of its discovery]." Ob oshibkakh pri osmotre trupa na meste ego obnaruzheniia. **41**(3): 29-30.

Presents data on detection of corporal injuries in subjects without signs of violent death delivered to Bureau of Forensic Medical Expert Evaluation. Recommendations for analysis of such cases are offered.

1644. Fagin, A. P., et al. (2019). "Infection prevalence and patterns in self-inflicted gunshot wounds to the face." Oral surgery, oral medicine, oral pathology and oral radiology **128**(1): 9-13.

OBJECTIVE: Self-inflicted gunshot wounds (SIGSWs) to the craniomaxillofacial region are uncommon injuries but are associated with a high mortality rate. Therefore, treating these patients is a rare occurrence even in the largest trauma centers. As with many rare conditions, data specifically addressing this injury pattern are scarce. Because of the proximity of the blast, even low-velocity injuries can be associated with significant avulsion of tissue, comminution of structures, and tissue die back. Previous case reports have recommended the use of prophylactic antibiotics, but no study has specifically investigated the postinjury infection rate or microbial patterns in this patient population. The

purpose of this study was to answer the following clinical question: "Among patients with SIGW to the maxillofacial region, what is the prevalence of postinjury infection, and are there any microbial patterns that can guide empiric antibiotic selection?", STUDY DESIGN: We designed retrospective cohort study at a level I trauma center in Portland, Oregon. Data on 17 patients who had sustained a SIGSW involving the maxilla or the mandible and survived their initial injury were collected from 2010 to 2017., RESULTS: Patients who had a culture-positive infection within 30 days of their injury were defined to have a postinjury infection. Six of the 17 patients (35%) developed a postinjury infection, with an average time to infection of 11 days from initial injury (range 3-19 days). Of the 17 subjects, 15 (88%) received a course of prophylactic antibiotics, on average, for 14 days (range 3-24 days). Of the 6 cases of postinjury infection, culture grew gram-negative bacteria in 4 cases-anaerobic bacteria in 2 and polymicrobial organisms in 2. There was no clear pattern or prevalence of any specific bacterium, but cultures notably included Staphylococcus aureus, Enterobacter species, Bacteroides species, and Escherichia coli., CONCLUSIONS: SIGSWs are associated with a high rate of postinjury infection (35%) despite prophylactic antibiotic usage in 88% of these cases. Given the antimicrobial patterns observed in this study, prophylactic antibiotics in this patient population should include empiric coverage for gram-negative and anaerobic bacteria.

1645. Fahde, Y., et al. (2017). "Penetrating head trauma: 03 rare cases and literature review." The Pan African medical journal **28**: 305.

Penetrating head trauma (PHT) include all open head injuries with foreign object in the brain. Although less common than closed head trauma, penetrating head trauma carry a worse prognosis. We received three unusual cases of penetrating head injuries whose prognosis was different according to clinical presentation and initial management of the patient. Treatment of penetrating head trauma aims at controlling bleeding, controlling intracranial pressure and preventing infections. Despite the efforts made by national authorities as well as the adequate management in hospitals, penetrating head injuries are still frequent with significant mortality and morbidity.

1646. Faheem, M., et al. (2019). "Mosaic Pattern Foreign Bodies in Computed Tomography of the Head: A Specific Sign to Detect Tempered Glass-Related Head Injury." Indian Journal of Neurosurgery **8**(3): 193-195.

A 40-year-old male patient presented to us with a history of road traffic accident, followed by loss of consciousness and vomiting. Noncontrast computed tomography (NCCT) scan revealed frontal bone defect along with multiple mosaic pattern homogenously hyperdense foreign bodies of nearly similar size in the right frontoparietal region within the extradural space. Debridement craniectomy was done, and multiple pieces of glass were retrieved. The extremely unique radiologic finding and probably first in the English literature prompted us to report this interesting case. Unfortunately, the patient died of myocardial infarction 3â€»days after the injury. Further, this new mosaic pattern radiologic finding on NCCT of the head may help in determining the mechanism of injury due to tempered glass-related head trauma. Window glass may not be always safe as it is thought by commuters.

1647. Fahling, J. M. and L. K. McKenzie (2017). "Oculocardiac Reflex as a Result of Intraorbital Trauma." The Journal of emergency medicine **52**(4): 557-558.

BACKGROUND: The oculocardiac reflex is a decrease in heart rate caused by ocular compression or traction upon the extraocular musculature. Multiple instances of this phenomenon have been described in anesthesia, trauma, craniofacial, and ophthalmology literature, but there is a sparsity of documentation in the emergency medicine literature., CASE REPORT: We describe the observation and management of the oculocardiac reflex in a 26-year-old man with retrobulbar hematoma and intraocular trauma caused by a self-inflicted gunshot wound. WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?: Prompt recognition of the oculocardiac reflex is important for the emergency physician given the common occurrence of craniofacial trauma and the potentially devastating consequences if not recognized and addressed.

1648. Fakhry, S. and B. Tortella (2007). "Discussion." Journal of Trauma - Injury, Infection and Critical Care **62**(3): 629-630.

1649. Fallon, M. J., et al. (1992). "Wooden transnasal intracranial penetration: an unusual presentation." The Journal of emergency medicine **10**(4): 439-443.

A 2 1/2-year-old child presented to the emergency department with a wooden stick lodged firmly in her right nares. No nasal discharge or neurological abnormalities were noted at presentation. After plain radiographs failed to demonstrate any evidence of a foreign body, computed tomography (CT scan) was obtained that revealed a hypodense region in the right frontal lobe corresponding to the projected tract of the branch. The patient underwent a right frontal craniotomy with debridement of her contused right frontal lobe. She was discharged 8 days postoperatively without evidence of neurologic sequelae. This case illustrates an unusual presentation of intracranial penetration, with only six similar cases found in the literature. It also highlights the need for the emergency physician to be concerned about intracranial penetration when treating intranasal foreign bodies, particularly those of the nonmetallic type. The literature is reviewed regarding transnasal intracranial penetration by wooden foreign bodies.

1650. Famery, N., et al. (2015). "Perforating wounds observed healthy corneas: A one year observatory report." Investigative Ophthalmology and Visual Science **56**(7): 6048.

Purpose: Ophthalmic emergencies are numerous pathologies. Some of them impact visual prognosis immediately and need an emergency surgery. Ocular perforating trauma is a part of those emergencies in witch we can found perforating wounds on healthy corneas. There management and there visual outcomes are not well known. We observed this item on a one year period in the ophthalmologic emergency department of Assitance Publique Hôpitaux de Paris (APHP) in Paris (France). Methods: It was a retrospective chart review with all cases of perforating wounds observed on healthy corneas operated between April 1st 2013 and March 31st 2014 in the ophthalmologic emergency department of APHP in Paris (France). Results: On the observed period, 27562 patients underwent an ophthalmologic examination, 40 eyes had a perforating wound, 29 concerned healthy corneas, 1 Lle was not available for evaluation. Median age was 33 years old (15 to 96). Sex-ratio was 3/1 (21mens/7womens). There was no predominant side of trauma (14 right eyes/14 left eyes). Eight patients had an ophthalmologic preliminary event. Median size of wound was 4.5mm (±3.8mm). Wound was in the central 3mm of the cornea above 8 corneas (29%), linear for 14 corneas (50%), with extraophthamologic involvement for 27 patients (96%). Average initial visual acuity was 0.32 LogMAR, not countable for 16 patients (57%), in witch 3 no light perception (NLP) (19%). Average follow-up was 138 days (±104.8d). Average Lnal visual acuity was 0.24 LogMAR, not countable for 6 patients (21,4%), in witch the half with NLP. Wounds were sutured with an average of 5.4 stiches (1 to 12), needing of 1.6 surgery per patient, average of 5 appointments in the department. Associated trauma were iris trauma (n=17, 17%), traumatic cataract (n=6, 21%), vitreous issue (n=5, 18%), retinal detachment (n=2, 7%), intravitreous hemorrhage (n=2, 7%), retinal or choroidal bleeding (n=2, 7%), scleral wound (n=8, 29%), intraocular foreign body (n=7, 25%), lid or orbit trauma (n=7, 25%). Endophthalmy was not observed. One evisceration was performed during follow-up. Conclusions: When the cornea is healthy before traumatism, a perforating wound allow to obtain an average Lnal acuity better than 0.30 LogMAR but can also be responsible for the loss of visual function in 1 case out of 5. This accident is one emergency examination out of 950.

1651. Fan Gaskin, J. C. and B. J. Gaskin (2015). "An unusual complication of crawford tube insertion." Ophthalmic plastic and reconstructive surgery **31**(1): e11-13.

The authors describe an unusual and challenging complication of bicanalicular (Crawford) stent insertion that has previously never been reported. A 27-year-old man sustained multiple lacerations to the left (L) periocular and facial areas with a glass bottle. He was admitted under the care of the Plastic Surgical team at another institution and underwent repair of the facial, eyelid, and canalicular lacerations in the operating room. During the surgery, a Crawford stylet was guided in the L inferior canaliculus but was not retrieved nasally. Neuroimaging revealed that the metallic stylet of the Crawford tube was within the orbit, extending via the superior orbital fissure into the middle cranial fossa. The patient was then transferred under the care of the neurosurgical team and underwent a combined orbital/neurosurgical procedure to retrieve the stylet.

1652. Fan, L., et al. (2021). "Discriminating mild traumatic brain injury using sparse dictionary learning of functional network dynamics." Brain and behavior **11**(12): e2414.

Mild traumatic brain injury (mTBI) is usually caused by a bump, blow, or jolt to the head or penetrating head injury, and carries the risk of inducing cognitive disorders. However, identifying the biomarkers for the diagnosis of mTBI

is challenging as evident abnormalities in brain anatomy are rarely found in patients with mTBI. In this study, we tested whether the alteration of functional network dynamics could be used as potential biomarkers to better diagnose mTBI. We propose a sparse dictionary learning framework to delineate spontaneous fluctuation of functional connectivity into the subject-specific time-varying evolution of a set of overlapping group-level sparse connectivity components (SCCs) based on the resting-state functional magnetic resonance imaging (fMRI) data from 31 mTBI patients in the early acute phase (<3 days postinjury) and 31 healthy controls (HCs). The identified SCCs were consistently distributed in the cohort of subjects without significant inter-group differences in connectivity patterns. Nevertheless, subject-specific temporal expression of these SCCs could be used to discriminate patients with mTBI from HCs with a classification accuracy of 74.2% (specificity 64.5% and sensitivity 83.9%) using leave-one-out cross-validation. Taken together, our findings indicate neuroimaging biomarkers for mTBI individual diagnosis based on the temporal expression of SCCs underlying time-resolved functional connectivity.

1653. Fanarjyan, R. V., et al. (2013). "Stage management of severe craniocerebral and cervical spine injuries." New Armenian Medical Journal **7**(1): 104-106.

Associated craniocerebral and spinal traumas are devastating pathologies, which mostly affect young males; these injuries result in a high degree of disability and mortality; the treatment outcomes are frequently dissapointing medical doctors. The case presents our experience on stage management of severe craniocerebral and cervical spine injury in a 17-year-old male suffering from a severe traumatic brain injury and C.7 cervical spine fracture with associated spinal cord injury and tetraplegia. Considering the degree of spinal cord damage and the early time of hospitalization (2 hours after trauma) the decision was made to manage the patient immediately with high doses of intravenous steroid Dexamethazone at 55 mg dose level followed by the urgent surgical intervention: decompressive craniotomy with removal of depressed bone fragments, metallic foreign body and epidural hematoma, C.7 corpectomy and decompression of the cervical spinal cord, C.6 -Th.1 spondylodesis with replacement of vertebral body by a bone graft taken from the iliac crest. The graft was stabilized by anterior fixation with a titanium plate and screws. However, due to inadequate behaviour of the patient, after an abrupt head turning the repeated computed tomography displayed anteposition of the metallic construct and bone graft. The patient was again operated and C.6 -Th.1 anterior fixation, as well as posterior lateral mass fixation with metallic rods and screws, was performed. There were no complications in postoperative period. The patient was discharged from the hospital in good condition, with clear consciousness and full recovery of movements and sensory functions. Two-year follow-up examinations revealed the excellent outcome and complete recovery of spinal cord functions.

1654. Fandl, W., et al. (1994). "[Up-to-date reconstruction of gunshot wounds of the face]." Az arc lott serulesenek korszeru helyreallitasa. **87**(6): 173-177.

The extensive damage after gunshot injuries needs excellent primary closure, secondary reconstruction and functional rehabilitation. The huge bone defect can best be reconstructed with vascularized iliac bone graft. An additional advantage of vital bone transplant is the possibility of its support with endosseal implants, which leads to a very good chance for longtime restauration of the masticatory function with a low rate of complications.

1655. Fang, W., et al. (2017). "First identification of Gordonia sputi in a post-traumatic endophthalmitis patient - a case report and literatures review." BMC ophthalmology **17**(1): 190.

BACKGROUND: We present a case of post-traumatic endophthalmitis with relatively good prognosis caused by Gordonia sputi, which, to our knowledge is the first case in the literature., CASE PRESENTATION: A 24 year old man, who underwent an intraocular foreign body extraction half a month before presentation in the left eye, was referred to us complaining of blurred vision and slight pain for 5 days. His first presentation showed moderate intracameral and intravitreous purulent inflammation with a best corrected vision of counting fingers. After gram staining of the intravitreous samples revealed a gram-positive bacilli infection, a combination of amikacin and vancomycin was initially injected intravitreously. The left eye kept stable for three days but deteriorated on the 4th day. On the 5th day after presentation conventional culture characterized the bacterium as an Actinomyces sp. while 16S ribosomal RNA gene sequencing confirmed it as Gordonia sputi. Thereby a complete pars plana vitrectomy combined with lensectomy and silicone oil tamponade was performed. During the surgery an intraocular irrigation with penicillin G was adopted,

followed by administration of intravenous penicillin G twice one day for a week. A relatively normal fundus with slight intracameral inflammation was observed a week after the operation, and the best corrected vision recovered to 0.15. One year later his vision remained 0.1., CONCLUSION: Gordonia sputi should be taken into consideration in patients with post-traumatic endophthalmitis especially due to foreign body penetration. Compared to conventional laboratories, molecular methods are recommended for an accurate diagnosis. A comprehensive strategy of antimicrobial agents and vitrectomy may render a satisfactory result.

1656. Fanning, W. L., et al. (1976). "Puncture wound of the eyelid causing brain abscess." The Journal of trauma **16**(11): 919-920.

A case of brain abscess following an apparently trivial puncture wound to the eyelid is presented to emphasize the importance of meticulous examination of eye wounds in children to look for penetration into the cranial vault. Any suggestion of such penetrating injury either by history, examination, or X-ray should dictate neurosurgical consultation, and immediate local culture and debridement of the wound. If nonoperative management is elected, a careful watch must be kept for signs of infection, which dictate early exploration, and broad-spectrum antibiotic coverage of Gram-positive and Gram-negative organisms common to penetrating skull trauma.

1657. Fanton, L. and B. Karger (2012). "Suicide with two shots to the head inflicted by a captive-bolt gun." Journal of forensic and legal medicine **19**(2): 90-93.

An exceptional case of suicide with two shots to the head inflicted by a captive-bolt gun is reported here. The pathophysiology observed, and related literature, indicate that the capacity of the victim to fire a second shot depended on the depth of skull penetration by the first shot and the extent of damage to nerve structures. In this case, an ante mortem multi-detector computed tomography was possible. From discussion with the radiologist and a 3D reconstruction, the two-shot suicide scenario could be confirmed.

1658. Faraji, M. and F. Ashrafzadeh (2005). "Penetrating head injuries in children." Neurosurgery Quarterly **15**(3): 160-163.

Head trauma is exceedingly common in children but rarely presents as a penetrating injury to the skull. Early recognition and correct management of the possible complications of penetrating head injuries (PHIs) is important and may prevent a poor outcome. The authors' experience with 14 cases of PHIs in children referred to the Department of Neurosurgery during the last 20 years is presented. The characteristic findings on physical examination and imaging studies performed in these cases are described. All cases occurred in children in the first decade of life. There were 10 boys and 4 girls. A damaged globe that had to be exenterated was the earliest complication (1 case), followed by cerebrospinal fluid leakage (3 cases) and diabetes insipidus (1 case). Objects were removed in 11 cases. In addition to plain radiographs, computed tomography scanning and angiography were used as diagnostic procedures. The present series of patients is one of the largest collections of PHIs in children younger than 10 years of age reported in the literature. The need for prompt extrication of these objects and the possible complications of such injuries have been reviewed.

1659. Farhadi, M. R., et al. (2009). "Transorbital penetrating head injury by a toilet brush handle." Acta neurochirurgica **151**(6): 685-687.

BACKGROUND: Transorbital penetrating brain injuries are rare lesions without defined therapy standards., CLINICAL PRESENTATION AND INTERVENTION: A male patient presented at our institution with a toilet brush handle in the right cerebral hemisphere. CT imaging identified the object entering the right orbit and having crossed the right hemisphere in the ventricular plane. After performing a medium-sized craniotomy, the object was removed step-by-step under monitoring with an intraoperative CT scan to ensure no involving major hemorrhage., CONCLUSION: Transorbital penetrating brain injuries are treated best by utilizing all up-to-date technical developments such as intraoperative CT-scanning to increase the safety in the management of such exceptional lesions with increased risk of immediate life-threatening intracranial bleeding.

1660. Farhat, H. I., et al. (2012). "A tangential gunshot wound to the head: case report and review of the literature." The Journal of emergency medicine **43**(2): e111-114.

BACKGROUND: Patients with tangential gunshot wounds (TGSWs) commonly present with a good Glasgow Coma Scale score and without a history of loss of consciousness. Typically, the bullet does not breach the skull, however, there is a considerable force directed into the brain, and these patients are best treated as sustaining a moderate-to-severe blunt head injury. These patients require observation and repeat imaging. Physicians should be aware of this entity as these patients can deteriorate in a delayed fashion., OBJECTIVES: The authors present a case of a TGSW to the head in a neurologically intact patient. The initial post-injury computed tomography (CT) scan showed a very small subdural hematoma (SDH) with no overlying fracture of the skull. A delayed CT scan performed 4 h after arrival to the Emergency Department and 6 h after injury demonstrated an increase in size of the SDH, new traumatic subarachnoid hemorrhage, and bilateral cerebral contusions. Clinically, the patient showed worsening of her neurological examination. She underwent aggressive non-surgical treatment for increased intracranial pressure with almost complete recovery., CONCLUSION: Although patients with TGSWs are typically in good condition upon presentation, these injuries are not always trivial, and these patients should have, at minimum, a non-contrast brain CT scan to evaluate underlying damage to the brain and skull. In addition, a delayed CT scan and close observation on a neurosurgical service are indicated. Copyright Published by Elsevier Inc.

1661. Faridi, S. H., et al. (2012). "Accidental penetrating brain injury through anterior fontanelle: a rare phenomenon." Journal of forensic and legal medicine **19**(2): 109-110.

Penetrating injuries of the anterior fontanelle are exceedingly uncommon and are most often associated with inflictedinjury. This report of a 7-month-old male infant, whose father was working with a knife which accidentally slipped from his hand and penetrated the infants anterior fontanelle and frontal lobe, demonstrates that accidental injuries may also occur rarely.

1662. Farinde, A. (2014). "An examination of co-occurring conditions and management of psychotropic medication use in soldiers with traumatic brain injury." Journal of trauma nursing : the official journal of the Society of Trauma Nurses **21**(4): 153-159.

There are approximately 1.4 million cases of traumatic brain injury (TBI) per year in the United States, with about 23 000 survivors requiring hospitalization. The incidence of TBI has increased in the patient population of the Department of Defense and Veterans Healthcare Administration as a result of injuries suffered during recent military and combat operations. Within the past few years, TBI has emerged as a common form of injury in service members with a subset of patients experiencing postinjury symptoms that greatly affect their quality of life. Traumatic brain injury can occur when sudden trauma (ie, penetration blast or blunt) causes damage to the brain. Traumatic brain injury produces a cascade of potentially injurious processes that include focal contusions and cytotoxic damage. The results of TBI can include impaired physical, cognitive, emotional, and behavioral functioning, which may or may not require the initiation of pharmacological and nonpharmacological interventions when deemed appropriate. Associated outcomes of TBI include alterations in mental state at the time of injury (confusion, disorientation, slowed thinking, and alteration of consciousness). Neurological deficits include loss of balance, praxis, aphasia, change in vision that may or may not be transient. Individuals who sustain a TBI are more likely to have or developed co-occurring conditions (ie, sleep problems, headaches, depression, anxiety, and posttraumatic stress disorder) that may require the administration of multiple medications. It has been identified that veterans being discharged on central nervous system and muscular skeletal drug classes can develop addiction and experience medication misadventures. With the severity of TBI being highly variable but typically categorized as either mild, moderate, or severe, it can assist health care providers in determining which patients are more susceptible to medication misadventures compared with others. The unique development of cognitive and emotional symptoms of TBI can lead to significant impairments, so it is important for all health care providers, including pharmacists, to promote proper use of high-risk psychotropic medications among this patient population by providing effective medication education.

1663. Farley, H. H. (2013). "A handgun in the home. Is the protection afforded worth the risk?" Minnesota medicine **96**(2): 56.

1664. Farley, M. K. and T. H. Pettit (1987). "Traumatic wound dehiscence after penetrating keratoplasty." American journal of ophthalmology **104**(1): 44-49.

Between 1980 and 1986, 14 of our patients had traumatic globe ruptures three days to 13 years after penetrating keratoplasty. There were eight men and six women, ranging in age from 29 to 82 years (average, 62 years). All ruptures occurred at the corneal donor-host interface. Eleven wound separations occurred with corneal sutures in place. Three of five patients who wore protective eyewear at the time of injury had final visual acuity of 20/200 or less. Final visual acuity was better than 20/200 in only seven patients. The force of the blunt trauma was the most significant factor in visual outcome. Ultimate causes of visual failure included posterior segment damage and intractable glaucoma.

1665. Farokhfar, A., et al. (2016). "Common causes of red eye presenting in northern Iran." Romanian journal of ophthalmology **60**(2): 71-78.

AIM: This study aimed to determine the causes of red eye disease among patients of Mazandaran-Northern Iran., METHODS: This cross sectional study included 840 patients who referred to eye clinics with ocular complaints. A detailed history of patients was recorded and their eyes were examined. Then, pre designed checklists were completed by the researcher., RESULTS: The most common cause of red eye was conjunctivitis - 30% (252/ 840), foreign bodies 23.2%, trauma including penetrating or blunt 8.6%, respectively. There was a significant relationship between the red eye trauma, with acute onset and duration of less than a week (P=<0.0001). Diagnoses of red eye were conjunctivitis in 31.3% of the cases separately, viral causes (19.5%), allergic (7%) and bacterial (4%), foreign bodies 22.9%, pterygium 7%, and trauma 6.5%, respectively., CONCLUSION: In the current study, the most common causes of red eyes were conjunctivitis, foreign bodies, and trauma respectively. Red eye was more common in males than in females. An appropriate and proper training of risky factors of red eyes in the future could reduce the risk of serious visual problems.

1666. Farr, A. C., et al. (2010). "Wooden, metallic, hair, bone, and plant foreign bodies in horses: 37 cases (1990-2005)." Journal of the American Veterinary Medical Association **237**(10): 1173-1179.

OBJECTIVE: To characterize features of diagnosis, treatment, and outcome in horses with foreign bodies, exclusive of enteric, inhaled, and foot-penetrating foreign bodies., DESIGN: Retrospective case series., ANIMALS: 37 horses with foreign bodies., PROCEDURES: The incidence of equine foreign bodies from 1990 through 2005 was determined by review of data from veterinary schools participating in the Veterinary Medical Database (VMDB). Medical records of horses with foreign bodies at Purdue University were reviewed, and the following information was retrieved: clinical history; signalment; results of physical, radiographic, and ultrasonographic examinations; results of microbial culture of the draining tract or foreign body material; surgical findings; antimicrobial and anti-inflammatory treatments; and complications of the surgical procedure. Long-term follow-up information was obtained from owners or referring veterinarians., RESULTS: The incidence of foreign bodies in horses with records in the VMDB was 1730/10,000 horse admissions. A preoperative diagnosis of foreign bodies was confirmed via ultrasonography in most horses examined (15/17 horses) and with plain film radiography in a quarter of horses examined (7/24 horses). Wood foreign bodies were the most common (59%; 22/37), followed by metal (24%; 9/37), hair (8%; 3/37), nonsequestrum bone (5%; 2/37), and plant material (3%; 1/37). Postoperative complications associated with the foreign body were more likely to develop with wood foreign bodies (3/22) than with other types of foreign bodies (1/15)., CONCLUSIONS AND CLINICAL RELEVANCE: Wood was the most common penetrating foreign body in the horses in our study and was the type associated with the highest incidence of complications. Ultrasonography was more effective in locating foreign bodies than was radiography (plain and contrast) and should be performed in all horses with suspected foreign bodies.

1667. Farrow, C. S. (1999). "Radiology of pharyngeal balling gun injuries." The Veterinary clinics of North America. Food animal practice **15**(2): 391-vii.

Pharyngeal puncture caused by a balling gun can lead to severe infection and abscessation. Dysphagia and dyspnea soon follow if the injury goes undetected. Radiographically, pharyngeal compression, laryngeal and tracheal

displacement, and extensive gas accumulation throughout the throat and cranial neck regions characterize these injuries. This article describes the typical radiographic appearance of this unique form of trauma.

1668. Farrugia, A., et al. (2009). "Destabilization and intracranial fragmentation of a full metal jacket bullet." Journal of forensic and legal medicine **16**(7): 400-402.

We report a case with an atypical entrance wound as a result of a destabilized full metal jacket bullet penetration. The destabilized bullet by an impact with the dorsal hand experiences a yawing to tumbling motion in flight. The large angle of yaw induces a larger presenting profile upon impact that contributes, associated to a rapid deceleration, to a greater mechanical force on the projectile structure and a fragmentation into core and jacket. Forensic pathologists have to be aware that the metal jacket bullet could tend to break up outside or inside the body particularly after a shooting through a target. This phenomenon induces atypical entrance wounds and atypical X-ray presentation. Copyright 2009 Elsevier Ltd and Faculty of Forensic and Legal Medicine.

1669. Fasina, O. (2013). "BILATERAL ORBITO-OCULAR GUNSHOT INJURY IN A NIGERIAN MALE: CASE REPORT AND REVIEW OF LITERATURE." East African medical journal **90**(1): 33-36.

Orbito-ocular injuries with retained intra-orbital foreign bodies affecting both orbits are uncommon in civilian practice. This case report aims to highlight an unusual presentation of bilateral orbito-ocularinjury with retained intra-orbital foreignbodies following accidental explosion of a locally fabricated dane gun. A 30-year-old male presented with a five day history of bilateral orbito-ocular injury sustained following an explosion of a dane gun he was fabricating. There was immediate loss of vision in both eyes, and initial treatment was sought at a nearby private general medical clinic. Visual acuity at presentation was no perception of light and light perception with inaccurate projection in the right and left eye respectively, and he had an open wound over the left cheek with retained intra-orbital foreign bodies on plain radiographs. He subsequently underwent wound exploration and closure with removal of the foreign bodies. Vision however remained poor and he was lost to follow-up after being referred for vitreo-retinal consultation. The attendant socio-economic impact on the individual and family following severe bilateral orbito-ocular injury could be enormous when it results in bilateral loss of vision in a young adult. Measures should thus be put in place to regulate the handling of firearms so as to possibly reduce the resultant morbidity from such injuries.

1670. Fassio, E., et al. (1999). "Reconstruction of a mandibular and maxillary defect with a biscapular bifascial flap as a single transplant." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **57**(9): 1134-1137.

1671. Fatemi, P. and G. Grant (2017). "Comments." Neurosurgery **81**(3): 480.

1672. Fathalla, H., et al. (2018). "Managing military penetrating brain injuries in the war zone: lessons learned." Neurosurgical focus **45**(6): E6.

OBJECTIVE Managing penetrating military brain injuries in a war zone setting is different than managing common civilian penetrating brain injuries. Triage, i.e., deciding on which patients to treat or not treat, and which to be flown back home, is essential to avoid wasting valuable limited resources. In this study the authors aim to identify reliable predictors of mortality and poor outcome to help develop a protocol for treating their patients in the battlefield. They also demonstrate all the lessons learned from their collective experience regarding some of the controversial management issues. METHODS This study was a retrospective review of 102 patients with penetrating military missile head injuries treated by the authors in various facilities in northern Sinai between 2011 and 2018. Patient demographics, clinical characteristics, imaging characteristics, postoperative complications, and Glasgow Outcome Scale (GOS) scores were recorded for each patient. Several variables associated with mortality and poor outcome that were derived from the literature were analyzed, in addition to variables obtained by direct observation by the authors over time. RESULTS There were 50 patients (49%) with GOS score of 1 (death), 12 patients (11.8%) with GOS score of 2 (survivors in persistent vegetative state), and 40 survivors (39.2%) with varying degrees of disability on the last follow-up evaluation. The authors identified an anatomical danger zone that was found to predict mortality when traversed. Bilateral dilated

fixed pupils and low Glasgow Coma Scale score on admission were also found to be independent predictors of mortality and poor outcome. Based on these findings, a protocol was developed for managing these patients in the war zone. CONCLUSIONS Managing military penetrating head injuries in the war zone is different than civilian gunshot head injuries encountered by most neurosurgeons in urban cities. The authors developed a simple protocol for managing military penetrating injuries in the war zone. They also describe important lessons learned from this experience.

1673. Faulkner, J. A. and E. E. Ferguson (2009). "Innovations in military handling of facial trauma." The Journal of craniofacial surgery **20**(1): 62-67.

As the military medical treatment facilities of Operation Iraqi Freedom have transitioned from make-shift tent facilities to more formal fixed facilities, the capability to deliver more complex care has markedly improved. Using case presentations, the authors illustrate the integration of advances in surgical technology in managing complex and devastating craniofacial trauma at the 332nd Air Force Theater Hospital in Balad Iraq during Operation Iraqi Freedom 2006.

1674. Faulkner, J. R., et al. (2004). "Reactive astrocytes protect tissue and preserve function after spinal cord injury." The Journal of neuroscience : the official journal of the Society for Neuroscience **24**(9): 2143-2155.

Reactive astrocytes are prominent in the cellular response to spinal cord injury (SCI), but their roles are not well understood. We used a transgenic mouse model to study the consequences of selective and conditional ablation of reactive astrocytes after stab or crush SCI. Mice expressing a glial fibrillary acid protein-herpes simplex virus-thymidine kinase transgene were given mild or moderate SCI and treated with the antiviral agent ganciclovir (GCV) to ablate dividing, reactive, transgene-expressing astrocytes in the immediate vicinity of the SCI. Small stab injuries in control mice caused little tissue disruption, little demyelination, no obvious neuronal death, and mild, reversible functional impairments. Equivalent small stab injuries in transgenic mice given GCV to ablate reactive astrocytes caused failure of blood-brain barrier repair, leukocyte infiltration, local tissue disruption, severe demyelination, neuronal and oligodendrocyte death, and pronounced motor deficits. Moderate crush injuries in control mice caused focal tissue disruption and cellular degeneration, with moderate, primarily reversible motor impairments. Equivalent moderate crush injuries combined with ablation of reactive astrocytes caused widespread tissue disruption, pronounced cellular degeneration, and failure of wound contraction, with severe persisting motor deficits. These findings show that reactive astrocytes provide essential activities that protect tissue and preserve function after mild or moderate SCI. In nontransgenic animals, crush or contusion SCIs routinely exhibit regions of degenerated tissue that are devoid of astrocytes. Our findings suggest that identifying ways to preserve reactive astrocytes, to augment their protective functions, or both, may lead to novel approaches to reducing secondary tissue degeneration and improving functional outcome after SCI.

1675. Faverani, L. P., et al. (2011). "Ocular reconstruction after zygomatic complex fracture with retention of a foreign body." The Journal of craniofacial surgery **22**(4): 1394-1397.

Facial injuries with the retention of foreign bodies inside the tissues, both in soft and hard ones, can cause major functional and aesthetic damage. Among the different etiological agents, cutting tools, fragments of a firearm, the splinter of wood, steel, or iron, launched by misuse, or even caused by defects in equipment, are the main cause of these injuries. The aim of this study was to discuss the peculiarity of the multidisciplinary approach in caring of a 33-year-old man, victim of an accident at work, by the rupture of an emery disc and consequent penetration of the fragments in violation of the tissues in the orbital and zygomatic region of the left side, with perforation of the eyeball and orbital-zygomatic fracture. Urgent treatment consisted of debridement of wounds, bleeding control, removal of foreign bodies, fracture reduction with rigid internal fixation, and suture, performed by the oral and maxillofacial surgical team. Reconstruction of orbital tissues by the ophthalmology team consisted of suture of the injuries. About 1 month after the trauma, phthisis bulbi was noted, and the patient underwent a new procedure under general anesthesia for eye evisceration and installation of an alloplastic prosthesis associated with the homogenous sclera. Facial harmony was restored, especially in aesthetics and function of the zygomatic-orbital complex.

1676. Fechner, F. P. and D. G. Deschler (2002). "Microvascular free flap reconstruction after craniofacial trauma." Operative Techniques in Otolaryngology - Head and Neck Surgery **13**(4): 309-315.

Treatment approaches to injuries of the craniofacial skeleton and soft tissues have seen significant advances over the last 20 years. The techniques of open reduction and internal fixation with modern plate and screw fixation systems replaced interosseous wiring of facial fractures. Nevertheless, severe trauma with tissue loss continues to pose a significant challenge to the reconstructive head and neck surgeon. Facial gunshot wounds, for instance, self-inflicted in suicide attempts, cause the most destructive injuries. In the past, conservative treatment of these craniofacial defects included packing and repeated debridement, which commonly resulted in multiple surgical procedures, prolonged hospitalization, and soft tissue contracture. Delayed reconstruction of the resulting tissue voids of the mid- and lower face was difficult and sometimes impossible. The introduction of free, vascularized soft tissue transfer in the reconstructive armamentarium revolutionized the approach to these major injuries. Today, aggressive debridement and early free flap reconstruction can result in improved functional and cosmetic outcome for the trauma patient. A large number of different free flaps are available, ranging from soft tissue (ie fasciocutaneous) or osseous to osteocutaneous and composite flaps. Decisions on the choice of free flap are primarily governed by the specific requirements of the defect, although potential donor site morbidity, the patient's preference, and the personal experience of the surgeon play a role. We review the modern management of severely destructive craniofacial injuries with a special emphasis on the role of free flaps for the reconstructive effort.

1677. Fedorina, T. A. and T. V. Brailovskaia (2009). "[Morbid anatomy of porcine preoral gunshot wound in an experiment]." Stomatologiia **88**(2): 16-19.

In experimental pathological-anatomic study of gunshot wounds of pig upper and lower lips produced by bullet weapon there were received microscopic tissue pictures in 3 wound duct zones according to the disrance from the duct - in the injury zone, tissue zone adjacent to the injury and tissue zone remote from the injury. The zone widths were different depending upon the ditance from the bullet entrance hole; the injury width of reversible and irreversible characters was bigger in the wound duct depth. The data about the morphological changes characrer in the edges of the most heavy degree of gunshot wounds were necessary for receiving objective numeric criterions of the volume of the tissue excision at the moment of primary surgical wounds treatment.

1678. Fehlberg, C. R. and J. K. Lee (2022). "Fibrosis in the central nervous system: from the meninges to the vasculature." Cell and tissue research **387**(3): 351-360.

Formation of a collagenous connective tissue scar after penetrating injuries to the brain or spinal cord has been described and investigated for well over 100 years. However, it was studied almost exclusively in the context of penetrating injuries that resulted in infiltration of meningeal fibroblasts, which raised doubts about translational applicability to most CNS injuries where the meninges remain intact. Recent studies demonstrating the perivascular niche as a source of fibroblasts have debunked the traditional view that a fibrotic scar only forms after penetrating lesions that tear the meninges. These studies have led to a renewed interest in CNS fibrosis not only in the context of axon regeneration after spinal cord injury, but also across a spectrum of CNS disorders. Arising with this renewed interest is some discrepancy about which perivascular cell gives rise to the fibrotic scar, but additional studies are beginning to provide some clarity. Although mechanistic studies on CNS fibrosis are still lacking, the similarities to fibrosis of other organs should provide important insight into how CNS fibrosis can be therapeutically targeted to promote functional recovery.

1679. Fei, J., et al. (2011). "Foreign body embolus to ophthalmic artery following penetrating trauma of the neck." Chinese medical journal **124**(5): 790-792.

Migration of metallic foreign body into the cerebral circulation is rarely seen. Most of the cases reported were due to gunshot wounds and shotgun wounds to the neck and face. When the foreign body is near the great vessel, it must be removed immediately or will cause complications. This study reported a case of delayed metallic foreign body embolus to the ophthalmic artery resulting from an injury to the right neck, which arose from the presence of metallic emboli to the cerebral circulation.

1680. Feichtinger, M., et al. (2007). "Removal of a pellet from the left orbital cavity by image-guided endoscopic navigation." International journal of oral and maxillofacial surgery **36**(4): 358-361.

In the cranio-maxillofacial field, computer-aided surgery based on computed tomography data is becoming increasingly important. Complex surgical procedures can be performed utilizing preoperative imaging to provide real-time localization of surgical instruments in the surgical field. Image-data-based navigation plays an ever-increasing role in cases of minimal invasive surgery. The case is presented here of a 58-year-old male patient referred after a hunting accident with a pellet in the left orbit. After transferring the preoperatively acquired computed tomography data to a commercially available navigation system, the bullet was removed through the original wound canal using an intraoperatively calibrated high-resolution endoscope.

1681. Feinsod, M., et al. (2022). "Baron Larrey at the Dawn of Correlative Neuroanatomy." European neurology: 1-5.

In 1820, a young soldier was accidentally injured by a splinter of a fencing sword that penetrated through the right orbit into the brain. Examination by the French military surgeon Baron D.-J. Larrey revealed nominal aphasia, right hemiplegia, and monocular temporal hemianopia with an altitudinal component in the right eye only. In this paper, we aimed to reconstruct Larrey's contribution to neurology in the eve of correlative neuroanatomy. Larrey predicted that the blade passed from the roof of the right orbit to graze the root of the right optic nerve at the chiasm and from there, into the vicinity of the left Sylvian fissure. This course was verified posthumously 3 months later. Larrey's previous experience with galvanic currents enabled the adoption of Samuel von Sommering's idea of regarding the brain as a telegraphing system made of a multitude of galvanic piles sending and receiving messages from distant points. Larrey's description is a very early diligent study of the tracks of penetrating head injuries. It correlates the symptoms with the injured cerebral tissues together with autopsy verification. Here are the beginnings of the construction of human correlative neuroanatomy, which lingered until flourishing in the first decades of the 20th century.

1682. Fekih, O., et al. (2019). "[Intraocular foreign body and endophthalmitis: risk factors and management]." Corps etranger intraoculaire et endophtalmie: facteurs de risque et prise en charge. **33**: 258.

This study aims to identify the risk factors for post-traumatic endophthalmitis (PTE) due to intraocular foreign body (IFB) in patients with penetrating injuries of the globe and to assess treatment outcomes. We conducted a descriptive, retrospective study of 60 patients hospitalized for penetrating wound due to intraocular foreign body at the Hedi Rais Institute of Ophthalmology, Tunis, over a period of 10 years. Our study involved the patients with penetrating ocular trauma due to intraocular foreign body associated with post-traumatic endophthalmitis. We also determined the clinical risk factors for endophthalmitis in these patients. We collected data from the medical records of 60 patients with penetrating injury due to intraocular foreign body. Clinical symptoms of endophthalmitis were reported in ten of these patients (16.66%). All IFBs were located in the posterior segment. Mean LogMAR visual acuity (VA) at baseline was 2.26. Final Mean LogMAR VA was 2.18. We found a statically significant correlation between the occurrence of endophthalmitis and the following factors: rural origin p=0.021, delays in removing IFB p=0.01, posterior location IFB p=0.012, capsule rupture p=0.022, associated retinal detachment p<0.0001. The identification of risk factors for post-traumatic endophthalmitis allow for better treatment adaptation and preventive measures of this complication to improve prognosis and quality of life.

1683. Feliciano, D. V. (2009). "Surgeon- and system-based influences on trauma mortality - Invited critique." Archives of Surgery **144**(8): 764-765.

1684. Felman, A. H. (1971). "Neurogenic pulmonary edema. Observations in 6 patients." The American journal of roentgenology, radium therapy, and nuclear medicine **112**(2): 393-396.

1685. Felsenstein, S., et al. (2013). "Clinical and microbiologic features guiding treatment recommendations for brain abscesses in children." The Pediatric infectious disease journal **32**(2): 129-135.

BACKGROUND: There are no guidelines for the management of brain abscesses in children, and there is a paucity of recent data describing clinical and microbiologic features. We aimed to identify factors affecting outcome to inform antibiotic recommendations., METHODS: From 1999 to 2009, 118 children presented with brain abscesses to 4 neurosurgical centers in the United Kingdom. Clinical, microbiologic and treatment data were collected., RESULTS: The commonest preceding infection was sinusitis, with 59% of all children receiving antibiotics before diagnosis. Nonspecific symptoms were common, with only 13% having the triad of fever, headache and focal neurological deficit. Time between symptom onset and diagnosis varied widely (median, 10 days; range, 0-44). Magnetic resonance imaging was more frequently diagnostic than computed tomography. The most frequent organisms were Streptococcus milleri (38%), except after penetrating head injury or neurosurgery, for which Staphylococcus aureus was most common. The commonest empiric antibiotics were ceftriaxone/cefotaxime and metronidazole, which offered effective antimicrobial therapy in up to 83% of cases. Metronidazole added benefit in a maximum of 7% of cases, with ceftriaxone/cefotaxime alone sufficient in at least 76% and in all cases with cyanotic congenital heart disease or meningitis. A carbapenem would have been effective in 90%. The case fatality rate was 6% (33% in the immunocompromised). Long-term neurological sequelae affected 35%. Age younger than 5 years and a Glasgow Coma Scale score <=8 were associated with poor outcome at 6 months., CONCLUSIONS: We recommend ceftriaxone/cefotaxime and metronidazole as empiric treatment, although metronidazole may be unnecessary in many cases, with antistaphylococcal cover in cases of head trauma. Meropenem potentially would be a better choice in the immunocompromised. A prospective study of intravenous and oral treatment guided by clinical improvement is required beause 1-2 weeks of intravenous antibiotics during a total of 6 weeks may be sufficient in children.

1686. Feng, K., et al. (2015). "Clinical features and prognosis of eyeball rupture: eye injury vitrectomy study." Clinical & experimental ophthalmology **43**(7): 629-636.

BACKGROUND: The objective of the study was to delineate clinical characteristics, surgical interventions, anatomic and visual outcomes of ruptured eye balls after trauma, and establish the prognostic indicators, which can assist clinicians in making correct surgical decisions during globe exploration for ruptured eyes., DESIGN: The study design used was a multicentre prospective cohort study, including six university-affiliated tertiary hospitals., PARTICIPANTS: We selected 242 cases of ruptured globe from the Eye Injury Vitrectomy Study database, until 31 December 2012., METHODS: All selected cases underwent vitreoretinal surgery, enucleation or evisceration, and were followed up for at least 6 months. Age, visual acuity (VA) after injury, ocular trauma zone, time to surgery, corneal laceration, scleral wound, extrusion of iris or lens, ciliary body damage, intraocular haemorrhage, retinal detachment or defect, proliferative vitreoretinopathy (PVR) and choroidal damage were the predisposing factors evaluated by logistic regression models., MAIN OUTCOME MEASURES: We compared the pre-surgical indicators between cases of anatomically restored eyes with VA of 4/200 or better, or eyes with initial no light perception restored light perception or better, and cases of VA worse than 4/200, silicone oil-sustained eyes, phthisis or enucleation., RESULTS: Nearly 40% of cases with ruptured globe were anatomically restored through vitreoretinal surgery. The closed-funnel retinal detachment or extensive retinal loss (odds ratio [OR] = 3.38, P = 0.026), PVR-C (OR = 3.45, P = 0.008), and choroidal damage (OR = 4.20, P = 0.004) were correlated with poor outcomes., CONCLUSION: The closed-funnel retinal detachment or extensive retinal loss, PVR-C, and choroidal damage are the risk factors for unfavourable outcomes in globe ruptures.

1687. Feng, L., et al. (2018). "Complications in transorbital penetrating injury by bamboo branch: A case report." Medicine **97**(19): e0706.

RATIONALE: Wooden transorbital penetrating injury is an uncommon and serious trauma that may cause multiply complications., PATIENT CONCERNS: Here we describe a 62-year-old Chinese woman with a transorbital penetrating injury caused by a long bamboo branch., DIAGNOSIS: Computed tomography scan and magnetic resonance imaging showed the presence of a wooden foreign body., INTERVENTIONS: Cerebrovascular digital subtraction angiography and temporary balloon occlusion were performed with general anesthesia. Anti-inflammatory therapy was subsequently administered., OUTCOMES: Retention of wooden foreign body, orbital cellulitis, and traumatic aneurysm at the right internal carotid artery were diagnosed 1 month later. Coil embolization of the right internal carotid artery aneurysm and endoscopic sinus surgery were then performed, and postoperative condition was monitored and recorded., LESSONS: Penetrating transorbital injury complications may occur because of retained wooden foreign bodies

near the intracranial arteries. Reasonable surgical intervention and special attention should be performed in this kind of trauma.

1688. Feng, Y. P., et al. (2004). "Effect of early apnea period on survival period in canines after craniocerebral gunshot wounds." Chinese Journal of Clinical Rehabilitation **8**(4): 652-653.

Aim: To study the pathophysiological changes in canines after craniocerebral gunshot wounds. Methods: The canines were shot with small-bore musket made in Germany to establish animal models of penetrating craniocerebral injury(PCI) and tangent brain injury(TBI). The following measures were recorded, including respiratory frequency, heart rate(HR), electrocardiogram (ECG), mean arterial pressure(MAP), cerebral blood flow, electroencephalogram (EEG) and so on. Results: After injury, the mean time of apnea was 5.3 min in the PCI group, significantly longer than in the TBI group(1.7 min) (P =0.011 8). Decrease occurred in HR, MAP, artery blood flow as a result of brainstem inhibition, while intracranial pressure had a tendency to increase gradually. A transient flat electroencephalogram was seen immediately after the craniocerebral gunshot wounds. The average survival time of the canines in the TBI group was 568 min longer than that of the PCI group(106 min) (P = 0.0013). Conclusion: 1 Apnea, decreased HR and hypotension are effective in decreasing the mortality of canines caused by gunshot wounds. 2 Intracranial high pressure appeared early and obviously. 3 The animal model, especially TBI model, survived for a long time.

1689. Fenton, T. W., et al. (2005). "Symmetrical fracturing of the skull from midline contact gunshot wounds: reconstruction of individual death histories from skeletonized human remains." Journal of forensic sciences **50**(2): 274-285.

This paper reports a bilaterally symmetrical cranio-facial fracture pattern that is observed in self-inflicted, midline gunshot wounds. Five cases of self-inflicted gunshots wounds are presented as follows: two high-powered rifle cases, two shotgun cases, and one handgun case. In all five cases the remains were either decomposing or skeletonized and submitted to forensic anthropologists. Following identification, the main focus of the anthropological examination was the analysis of perimortem trauma to the skeleton. In each case, the skull was submitted in a highly fragmented state. Nevertheless, by focusing on the pattern of perimortem cranio-facial fractures, the anthropologists contributed key information regarding the circumstances of death. The observed symmetrical cranio-facial fracture patterns in the above cases are described in detail and interpreted. The specific location of the linear fractures is discussed, as well as the theoretical rationale behind the location in terms of skeletal architecture, such as buttresses, struts, and sutures. The interpretive framework provided by this paper may prove helpful to others who are faced with similar cases of cranio-facial fracturing.

1690. Ferguson, L. P., et al. (2020). "Shot in the dark: three patients successfully treated with onabotulinumtoxin A injections for relief of post-traumatic chronic headaches and dystonia induced by gunshot wounds." BMJ case reports **13**(12).

Three patients ranging from 49 to 61 years-old presented to our pain clinic after failing multiple treatment attempts for debilitating, chronic post-traumatic headaches, neck pain and involuntary muscle spasm following gunshot wounds to the head, neck and face. Concurrent cervical dystonia was noted in each patient on presentation. All patients were treated with onabotulinumtoxin A (ONA) injections in the head and neck. Each patient reported between 70% and 100% improvement of their headache pain, neck pain and spasm with a significant reduction in the frequency, duration and intensity of their headaches. This level of improvement has been successfully maintained in all three patients with regular ONA injections at 90-day intervals. Two patients experienced a single relapse in symptoms when scheduling conflicts caused them to miss their regularly scheduled ONA injections by several weeks. These symptoms resolved when their ONA injections resumed, suggesting that ONA is the causative agent alleviating their symptoms.

1691. Fernandes, B. D. R., et al. (2019). "Strategy of Mandibular Central Arch Reconstruction After Firearm Injury." The Journal of craniofacial surgery **30**(7): e629-e630.

Gunshot wounds can cause extensive destruction of soft tissue and bone, and the maxillofacial region is often affected. The reconstructive treatment is complex due to the difficulty to reestablish the central arch mandibular

contour and volume. Moreover, the goal is to avoid postoperative infections and obtain bone graft neovascularization. Therefore, this report shows a clinical case of a patient presenting mandibular deformity with a mandibular central arch discontinuity caused by a firearm injury. The strategy to the reconstructive treatment as performed with a condensed and stabilized particulate autogenous bone graft was essential and effectiveness. After 1 year, it was obtained a satisfactory result to the patient.

1692. Fernandes, R. (2006). "The anterolateral thigh flap in mandibular reconstruction." Atlas of the oral and maxillofacial surgery clinics of North America **14**(2): 185-189.

1693. Fernandes, R. and M. A. Miller (2011). "Patterns of craniofacial injury secondary to gunshots in an urban trauma center." Journal of oral and maxillofacial surgery **69**(9): e-99.

Statement of the Problem: Interpersonal armed violence continues to be one of the greatest problems facing our society. The incidence of gun violence continues to rise and its effects are seen on a daily basis in trauma centers. Injury patterns to the craniofacial region due to GSW have not been reported in the literature for the past 15 years. Given the societal changes as well as the technological advance in firearms, we sought to review recent patterns of craniofacial gunshot injuries in our urban trauma center. Our hypothesis was that there is a change in pattern and extent of injury within this subset of patients. Materials and Methods: This was a retrospective review of the trauma registry database at the University of Florida Jacksonville. Inclusion criteria were patients with a documented gunshot injury to our trauma center during the period of August 2008 to August 2010. We excluded all patients who did not initially present at our trauma center and those whose injuries were not surgically treated. Demographics of gender, age, location of injury, initial management, and outcomes were included in the study. Results of Investigation: We identified 35 patients who met the inclusion criteria for our study. There were 29 (83%) males and 6 (17%) females. The patterns of distribution of the injury were: 11 (31%) to upper face; 13 (37%) midface, and 20 (57%) lower face/neck. 9 (26%) patients had combined injuries to 2 or more regions. The most common combination of involved regions was the lower and midface 4 (11%); the second most common presentation was the midface/upper-face combination accounting for 3 (9%). Two patients had injuries affecting all 3 regions. All of the patients underwent a phased approach to treatment consisting of multiple incisions and drainage, followed by definitive surgery. Eleven of the 35 patients (31%) required tracheostomies at the time of presentation or shortly thereafter. Of the 35 patients, only 3 (9%) patients had significant soft tissue avulsion requiring free tissue transfer during the initial hospitalization. Conclusion: The patterns of facial injuries secondary to gunshot in our case series were roughly equally distributed to each facial third. This pattern has not changed since the last report in the literature over 15 years ago. The majority of the patients in this series did not present with significant soft or hard tissue injuries requiring free tissue transfer. Our experience shows that although the pattern of injury has remained constant, the instance of soft tissue or hard tissue avulsion has decreased significantly.

1694. Fernandez, J. P., et al. (2017). "Applied ultrasonography during the initial assessment of trauma patients." Critical Ultrasound Journal **9**.

Introduction: Ultrasonography is regarded as an indispensable element for physicians who work in trauma care and emergency. The training of professionals working in this field is considered as a determinant for the correct decision making in trauma and emergency. Objective: Demonstrate the importance of the use of ultrasonography for the evaluation of the polytraumatized patient Materials and methods: 824 ultrasound exams were performed in a period between June and November of 2016 in which it was evaluated its use in the care of the polytraumatized patient Results: Airway: 135 US. 89 intubation guides (65%). 14 (10.37%) guides for surgical access. Ventilation: closed thoracic trauma. 183 US. Pleural fluid 117 (63.9%) pneumothorax. 53 (28.9%). Trauma open. 97 US. Penetrating wound without pleural lesion: 25 (25.7%)-confirmed by surgery: 11. Pneumothorax: 67 (69.07%). Pneumothorax and pleural fluid: 5 (5.15%). Abdomen: trauma closed: 239 US FAST-: 127 (53.13%) FAST+: 95 (39.7%). FAST- and Vena CAVA Rating: 17 (7.11%). Penetrating trauma: 67 US. FAST- and peritoneal indemnity: 47. Laparoscopic confirmation: 39 (82.9%). FAST+ and peritoneal indemnity: 20 (29.8%) neurological deficit: 83 US. Altered pupil reflex 13 (15.66%) optic nerve altered: 7 (8.4%) deviation cerebral mediated line: 3 (3.6%). Assessment of vascular axes, compartmental syndrome: 145 US. Decreased pulses: 53 (36.5%). Vascular commitment: 17 (11.7%) Conclusion: The incorporation of anatomical and ultrasonographic knowledge favors the quality of care of physicians who perform in extreme situations. The correct use

of ultrasonography as a diagnostic tool allows to improve the response times and decision making of surgical procedures.

1695. Fernández, L. M. G., et al. (2019). "Management and perioperative outcomes of traumatic brain injury: retrospective study." Colombian Journal of Anesthesiology **47**(2): 100-106.

Introduction: Cranioencephalic traumatism (CET) is a cause of mortality and morbidity in the surgical patient. However, the perioperative management of this entity has not been evaluated in the country's health institutions, despite its high disease burden and potential adverse clinical outcomes.Objective: To evaluate the clinical characteristics of surgical TBI and perioperative outcomes.Methods: Descriptive study of historical review conducted at the Hospital San Vicente Fundación, Medellín, Colombia. Data were collected from the medical records of patients over 13 years of age diagnosed with moderate-severe TBI between 2011 and 2014. Clinical variables, perioperative management, and clinical outcomes up to discharge were analyzed. An exploratory analysis was performed between perioperative management and postoperative mortality or neurological dysfunction.Results: CET was most common in the young male population (89.3%). Severe trauma occurred in 71.1% of patients. Perioperative mortality was 16%, and 54% presented neurological disability at discharge. A strong association was found between mortality or neurological dysfunction and severity of injury and perioperative hypotension.Conclusion: The study found that surgical CET was a high morbidity and perioperative mortality event, highly related to the severity of the injury and the hemodynamic stability of the patient. Despite this, intraoperative hemodynamic and metabolic monitoring remains limited in more than 50% of these patients' surgical procedures.

1696. Fernandez, M., et al. (2022). "Epidemiology and characteristics of firearm injuries in a French level I trauma centre, 2009-2019." Injury prevention : journal of the International Society for Child and Adolescent Injury Prevention **28**(1): 3-8.

BACKGROUND: Firearm injuries (FI) are an increasing problem in Europe but there have been few European epidemiological studies on civilian FI, particularly in France. This study investigated the epidemiology of FI at a French level I trauma centre., METHODS: A retrospective cohort study was conducted of all patients admitted to our centre with an FI between January 2009 and December 2019. We investigated the epidemiological trends of FI during the study period, and characterised the FI., RESULTS: A total of 162 patients were victims of FI. Prevalence was 0.11% and the mean annual incidence was 10.4 per 100 000 habs. A significant increase has been observed over the last 10 years, from 5 cases in 2009 (3.1%) to 30 in 2019 (18.5%). Of the 162 victims, 85 (52.5%) died as a direct result of the FI: 72 suicides (88.9%) and 9 victims of urban violence (11.1%) (armed public environment disorder). 95.3% of the patients died before reaching at the hospital. There were 95 cases (58.7%) of suicide and 33 cases (20.4%) of urban violence. The head was shot in 87 cases (48.9%), the thorax in 32 cases (18.5%) and the lower limbs in 24 cases (13.5%). A total of 106 surgeries were performed on 54 patients (33.3%)., CONCLUSIONS: We identified 162 cases of FI with a mean annual incidence of 10.4 per 100 000 habs. A significant increase in FI was observed over the last 10 years. 52.2% of patients died, and the main context was suicide or attempted suicide.

1697. Fernandez-Melo, R., et al. (2002). "[Penetrating head injury from harpoon. Case report]." Trauma craneoencefalico perforante por arpon. Precentacion de un caso y revision de la literatura. **13**(5): 397-400.

The harpoon presence as aggressor weapon is unusual in the neurosurgical practice. Most cases are associated with diving or sport activities as result of imprudence. A 31 year old patient who sustained a penetrating craniocerebral injury with a fishing harpoon is presented and complementary exams, neurosurgical procedure and postoperative evolution are detailed. We discuss the management of this unusual injury and review the current literature on craniocerebral injuries caused by similar objects.

1698. Fernando, D. M. G., et al. (2015). "Penetrative Injury to the Face Resulting in Delayed Death After Rupture of a Cavernous Sinus Aneurysm on the Contralateral Side." The American journal of forensic medicine and pathology **36**(4): 271-273.

Delayed deaths after assault give rise to medicolegal issues such as whether the assault was directly responsible, did it contribute or was it totally unrelated to the death. We present the case of a patient who sustained penetrative

trauma to the face resulting in the formation of a contralateral, carotid-cavernous fistula, which resulted in aneurysm formation, delayed rupture, and death. A literature search failed to find a similar case.

1699. Fernando, D. M. G. and E. M. K. B. Ekanayake (2021). "Nail Gun Suicide: An Atypical Case Report and Review of the Literature." The American journal of forensic medicine and pathology **42**(3): 267-274.

ABSTRACT: Nail guns are pneumatically driven or powder-actuated tools, which are used to drive nails into wood or concrete. A 42-year-old man, who was a builder by profession and history of antidepressant use, was found dead in his vehicle, holding a "Ramset" nail gun in his right hand. A straight metal nail and a book with a small hole were recovered from the scene.At autopsy, an irregularly circular puncture wound was seen on the forehead and a cruciate laceration was seen on the posterior aspect of the scalp. No burning, blackening, or tattooing was present around either injury. Both internal and external beveling was present with the latter being relatively larger. Toxicological analysis revealed alcohol and methamphetamine in blood. Psychiatric history and substance abuse must also be considered when individuals in construction industry are given access to tools like nail guns. Several unique features not previously reported were observed in this case. The deceased had overcome the built-in safety mechanism of the nail gun, by placing a book in between his forehead and muzzle. Another unique feature is that the nail had exited the cranium. Beveling, a feature commonly found in firearm injuries, was also seen in this case.

1700. Ferrada, P., et al. (2016). "Secondary injury after multiple gunshot wounds." The journal of trauma and acute care surgery **80**(6): 884-885.

1701. Ferrão, A. C. M., et al. (2020). "Reversible Endoscopic Medial Maxillectomy: Endonasal Approach to Diseases of the Maxillary Sinus." International Archives of Otorhinolaryngology **24**(2): 247-252.

Introduction The endoscopic access has reduced the morbidity associated with external approaches in diseases of the maxillary sinus. A reversible endoscopic medial maxillectomy (REMM) is presented as an alternative for treatment of benign maxillary diseases. Objective To describe the REMM technique and report four cases of patients with benign maxillary sinus conditions treated through this approach. Methods The present study was divided into two parts: anatomical and case series. Two cadaveric dissections confirmed the feasibility of the REMM approach. The same technique was performed on four consecutive patients with benign maxillary sinus disease. Results The cadaveric dissections confirmed wide exposure to the maxillary cavity, preserving the anatomy of the maxillary sinus. In the patient series, one patient presented with an antrochoanal polyp, one had a silent sinus syndrome, one had a chronic maxillary sinusitis secondary to a gunshot, and the last one had an inverted papilloma in the maxillary sinus. In all of the cases, the REMM approach provided excellent access and adequate resection, as well as preservation of the inferior turbinate, nasolacrimal duct, and lateral wall of the nose (including its osteomucosal component). Finally, all of the patients had an uneventful postoperative course. Conclusion The REMM technique is an excellent surgical approach to benign conditions of the maxillary sinus. It has few limitations and appears to be associated with less morbidity than conventional techniques.

1702. Ferrara, V. L. (1985). "Acute traumatic mutism." Surgical neurology **23**(6): 573-574.

A patient who had suffered acute trauma to the head is reported. The patient was observed immediately upon admission to the hospital, and he was noted from the outset to have wakeful speechlessness. The evolution and resolution of neurological deficits were also observed. A review of the literature and a discussion of the possible causes of acute traumatic mutism are presented.

1703. Ferri, J., et al. (1993). "[Our experience using free vascularized bone flaps in mandibular reconstruction. The external brachial flap, the fibular flap, the para-scapular flap]." Notre experience des lambeaux libres vascularises osseux dans les reconstructions mandibulaires. Le lambeau brachial externe, le lambeau fibulaire, le lambeau parascapulaire. **94**(2): 74-81.

New techniques developed over the last decade use vascularized bone flaps for maxillofacial reconstructive surgery. Indications for use of three recently described flaps (external brachial, fibular, parascapular) are discussed as a function of the regions to be reconstructed. Three clinical cases are presented, each patient having received one type of flap.

1704. Ferry, D. J., Jr. and L. G. Kempe (1972). "False aneurysm secondary to penetration of the brain through orbitofacial wounds. Report of two cases." Journal of neurosurgery **36**(4): 503-506.

1705. Feugier, P., et al. (2007). "Urgent endovascular covered-stent treatment of internal carotid artery injury caused by a gunshot." European journal of vascular and endovascular surgery : the official journal of the European Society for Vascular Surgery **34**(6): 663-665.

Penetrating non-lethal injuries to the distal extra-cranial internal carotid artery are often a surgical challenge, because of the difficulty of direct exposure and repair of the internal carotid artery at the skull base. We describe a case of a successful emergency treatment, with an endovascular procedure using a PTFE covered-stent, of an internal carotid artery haemorrhagic pseudoaneurysm following penetrating trauma to the neck by single gunshot.

1706. Fezza, J. and R. Wesley (1999). "The importance of CT scans in planning the removal of orbital-frontal lobe foreign bodies." Ophthalmic plastic and reconstructive surgery **15**(5): 366-368.

PURPOSE: To describe the management of foreign bodies in the orbit and frontal lobe., METHODS: Reports of two cases., RESULTS: Both patients underwent successful removal of an orbital-cerebral foreign body by anterior orbitotomy., CONCLUSION: Computed tomography was useful to confirm preoperatively that the foreign body was not adjacent to cerebral blood vessels and to monitor postoperatively for cerebral hemorrhage. A team approach is necessary in the management of orbital-frontal lobe foreign bodies.

1707. Fialkov, J. A., et al. (2001). "Postoperative infections in craniofacial reconstructive procedures." The Journal of craniofacial surgery **12**(4): 362-368.

The rate of, and possible risk factors for, postoperative craniofacial infection is unclear. To investigate this problem, we reviewed 349 cases of craniofacial skeletal procedures performed from 1996 to 1999 at our institution. Infection rate was determined and correlated with the use of implants, operative site, and cause of deformity. The inclusion criteria consisted of all procedures requiring autologous or prosthetic implantation in craniofacial skeletal sites, as well as all procedures involving bone or cartilage resection, osteotomies, debridement, reduction and/or fixation. Procedures that did not involve bone or cartilage surgery were excluded. The criteria for diagnosis of infection included clinical confirmation and one or more of 1) intravenous or oral antibiotic treatment outside of the prophylactic surgical regimen; 2) surgical intervention for drainage, irrigation, and or debridement; and 3) microbiological confirmation. Among the 280 surgical cases that fit the inclusion criteria and had complete records, there were 23 cases of postoperative infection (8.2%). The most common site for postoperative infection was the mandible (infection rate = 16.7%). Multiple logistic regression analysis revealed gunshot wound to be the most significant predictor of postoperative infection. Additionally, porous polyethylene implantation through a transoral route was correlated with a significant risk of postoperative infection.

1708. Fichtner, J., et al. (2015). "The Nelaton Catheter Guard for Safe and Effective Placement of Subdural Drain for Two-Burr-Hole Trephination in Chronic Subdural Hematoma: A Technical Note." Journal of neurological surgery. Part A, Central European neurosurgery **76**(5): 415-417.

BACKGROUND: For chronic subdural hematoma, placement of a Blake drain with a two-burr-hole craniotomy is often preferred. However, the placement of such drains carries the risk of penetrating the brain surface or damaging superficial venous structures., OBJECTIVE: To describe the use of a Nelaton catheter for the placement of a subdural drain in two-burr-hole trephination for chronic subdural hematoma., METHOD: A Nelaton catheter was used to guide placement of a Blake drain into the subdural hematoma cavity and provide irrigation of the hematoma cavity. With the two-burr-hole method, the Nelaton catheter could be removed easily via the frontal burr hole after the Blake drain was

in place., RESULTS: We used the Nelaton catheters in many surgical procedures and found it a safe and easy technique. This method allows the surgeon to safely direct the catheter into the correct position in the subdural space., CONCLUSIONS: This tool has two advantages. First, the use of a small and flexible Nelaton catheter is a safe method for irrigation of a chronic subdural hematoma cavity. Second, in comparison with insertion of subdural drainage alone through a burr hole, the placement of the Nelaton catheter in subdural space is easier and the risk of damaging relevant structures such as cortical tissue or bridging veins is lower. Thus this technique may help to avoid complications when placing a subdural drain. Copyright Georg Thieme Verlag KG Stuttgart . New York.

1709. Figueroa, J., et al. (2017). "Prehospital intubation is associated with favorable outcomes in protect III." Academic emergency medicine **24**: S196.

Background: Traumatic brain injury (TBI) causes more than 2.5 million emergency department visits, hospitalizations, or deaths annually. Prehospital endotracheal intubation has been associated with poor outcomes in patients with TBI in several retrospective observational studies. Objective: To evaluate the relationship between prehospital intubation, functional outcomes, and mortality using high quality data on clinical practice collected prospectively during a randomized clinical trial. Methods: ProTECT III was a multi-center randomized, double-blind, placebo-controlled trial of early administration of progesterone in 882 patients with acute moderate to severe non-penetrating TBI. Prehospital intubation was performed as per local clinical protocol in each participating EMS system. Models for favorable outcome and mortality included prehospital intubation, method of transport, index GCS, age, race, and ethnicity as independent variables. Favorable outcome was defined by a stratified dichotomy of the GOS-E scores in which the definition of favorable outcome depended on the severity of the initial injury. Results: Favorable outcome was more frequent in the 349 subjects with prehospital intubation (57.3%) than in the other 533 (46.0%, p=0.003). Mortality was also lower in the prehospital intubation group (13.8% v. 19.5%, p=0.03). Logistic regression analysis of prehospital intubation and mortality, adjusted for index GCS, showed that odds of dying for those who with prehospital intubation were 47% lower than for those that were not intubated (OR=0.53, 95% CI = 0.36- 0.78). 279 patients with prehospital intubation were transported by air. Modeling transport method and mortality, adjusted for index GCS, showed increased odds of dying in those transported by ground compared to those transported by air (OR=2.10, 95% CI = 1.40-3.15). Decreased odds of dying trended among those with prehospital intubation adjusted for transport method, index GCS score at randomization, age, and race/ethnicity (OR=0.70, 95% CI=0.37-1.31). Conclusions: In this study that excluded moribund patients, prehospital intubation was performed primarily in patients transported by air. Prehospital intubation and air medical transport were associated with favorable outcome and lower mortality, but the effects of each could not be isolated.

1710. Filley, C. M. (2000). "Clinical neurology and executive dysfunction." Seminars in speech and language **21**(2): 95-108.

Executive function is a uniquely human ability that permits an individual to plan, carry out, and monitor a sequence of actions that is intended to accomplish a goal. This crucial neurobehavioral capacity depends on the integrity of the frontal lobes, most importantly the dorsolateral prefrontal cortices and their connections. Executive dysfunction is associated with a wide range of neurologic disorders that affect these regions. In this paper, executive dysfunction is considered from the perspective of behavioral neurology, and the lesion method is employed to illustrate this impairment in a diverse group of disorders. Frontal system damage leading to disturbed executive function is common and clinically significant. Recognition of this syndrome is critical for ensuring the correct diagnosis, accurate prognosis, and appropriate treatment of affected patients. Executive dysfunction also represents an intriguing aspect of brain-behavior relationships and offers important insights into one of the highest cerebral functions.

1711. Filocamo, M. T., et al. (2015). "Urodynamic evaluation before and after continuous intrathecal baclofen infusion (CIBI) in patients on vegetative/minimally conscious state." Neurourology and Urodynamics **34**: S324-S325.

Hypothesis/aims of study Spasticity of either spinal or supraspinal origin may compromise patients severely and is associated with the development of pain, limb contractures and immobility. Baclofen is a structural GABA analogue substance acting on the GABA-B receptor subtype. It is assumed to act at the spinal level attenuating mono and polysynaptic conduction, primarily by inhibiting the release of excitatory transmitters. Baclofen hardly penetrates the blood-brain barrier; therefore, penetration into the cerebrospinal fluid is poor with oral administration. Penn and Kroin

were the first to report good results with continuous intrathecal baclofen infusion (CIBI) in patients with severe spinal spasticity. A dramatic clinical improvement was reported. Spasticity of supraspinal origin is much more common than spinal spasticity, but treatment with CIBI has been evaluated far less frequently in this condition. Reports of successful treatment of patients with supraspinal spasticity are limited. Especially patients with severe traumatic and/or hypoxic brain injury often suffer from severe tetraspasticity that is unresponsive to oral medication, physiotherapy or other antispastic therapies. More limited are the reports on CIBI use in patients in vegetative or minimally conscious state. Moreover CIBI has been demonstrated to be effective to improve bladder capacity or to decrease sphincter dyssynergia in patients affected by spinal cord spasticity. Only a few reports have been published on Traumatic Brain Injury (TBI), especially on the correlation of urodynamic findings, because injured patients commonly have behavioral, cognitive, or communication problems. The injury to the brain itself, impairment of cognitive and behavioral function, may induce voiding problems, such as incontinence. The most commonly expected urodynamic abnormality after TBI is involuntary detrusor contraction, which can be induced by the loss of cortical inhibition caused by suprapontine lesions. Coordinated relaxation of the distal sphincter during detrusor contraction is usually maintained. The incidence of urinary retention after TBI is lower than that after cerebrovascular accident (CVA). Very little is known about changes in urodynamic pattern in patients in Vegetative (VS) or Minimally Conscious State (MCS) after TBI or CVA treated with CIBI. The aim of this study is to urodinamically assess bladder function in patients on VC or MCS before and after CIBI. Study design, materials and methods We enrolled for this study 16 patients (13 males and 3 females), all patients were in VS or MCS for CVA (9 extensive brain hemorrhage) or TBI (7 patients). All patients were urodinamically evaluated before and one month after Baclofen pump implantation. During urodynamic study were evaluated Bladder Compliance (BC), presence and amplitude of Detrusor Overactivity (DO), Maximum Cystometric Capacity (MCC), detrusor pressure at opening bladder neck (detrusor leak point pressure, DLPP) that coincide to detrusor pressure required to void. In all patients were applied the Ashworth scale, separately for upper and lower limbs, and the spasm score, before and after implant, to evaluate changes in spasticity. In all patients were evaluated Post Void Residual (PVR) pre and post CIBI. In 12 patients we performed a second urodynamic evaluation 6 months after implant, evaluating the same urodynamic findings (BC, DO, MCC, DLPP). Statistical analysis were performed using paired t-test and/or paired Wilcoxon test when appropriated to evaluate the difference in Ashworth and spasm scale, and to evaluate the urodynamic results at baseline and 1 and 6 months after CIBI. We used Fisher's exact test to evaluate the number of patients in Clean Intermittent Catheterization (CIC), and the conscious state at baseline and after CIBI. We considered statistical significant when p<0,05. Results Mean age of patients included in the study was 41.3 ± 13.5 years, coma days were 17.4 ± 5.9, elapsed time between cerebral injury and our centre's admission was 149.5 ± 41.5 days. At admission 3 patients were in MCS and 13 in a VS. Time of catheterization was 117,9 ± 98.4 days. At baseline all patients were in spontaneous micturition (reflex urinary incontinence), in 4 out of 16 patients CIC was necessary because high PVR. In all patients we observed an improvement of spasticity, especially of lower limbs after CIBI. The mean Ashworth scale pre-implantation was 2.8 ± 0.4 for upper limbs and 3.5 ± 0.5 for lower limbs, spasm score was 1.8 ± 0.7. After CIBI Ashworth scale was reduced, 2.4 ± 0.5 for upper limbs and 2.2 ± 0.4 for lower limbs with a statistical significant difference (p<0.01). Also spasm score was improved, after CIBI measuring 1.5 ± 0.5 with a significant statistical difference respect baseline (p<0.03). One month After CIBI in 8 out of 16 patients was necessary CIC for high PVR (Fisher's exact test p=0.27). Six months after implantation CIC was necessary in 3 out of 12 patients (Fisher's exact test p=0.3) At urodynamic evaluation mean baseline MCC was 364,6 ± 150.1 ml, one month after CIBI was 391.9 ± 40.8 ml (p<0.03). Mean MCC 6 months after implant (12 patients) was 368.1 ± 146.2 ml (p=0.11) DLPP was 98.3 ± 7.4 cmH2O at baseline and 83.8 ± 11.5 cmH2O 1 month after CIBI, with a significant statistical difference (p=0.04). in the 12 patients evaluated 6 months after CIBI mean DLPP was 85,7 ± 12.8 cmH2O (p=0.05 respect baseline). Mean PVR at baseline was 57.5 ± 21.7 ml, and 100.4 ± 50.9 ml one month after CIBI (p=0.01), although 6 months after CIBI mean PVR was 56.8 ± 24.5 (p=0.58 respect baseline). At baseline in 10 out of 16 patients a DO was identified, after CIBI DO was present in 3 out of 16 patients (p=0.02), and in two patients 6 months after implant. We observed an improvement in conscious state, at hospital admission 13 out of 16 patients were in VS and 3 out of 16 in MCS, at discharge 7 out 16 were in SV and 9 in MCS (Fisher's exact test p=0.14). Interpretation of results The possibility to administer baclofen intrathecally, through a system of programmable infusion pump, has enabled the effective control of spasticity after severe brain injury with fewer side effects compared to oral treatment and with a significant improvement in overall function. At the level of the urinary system, the γ-aminobutyric acid has an inhibitory action on the detrusor contractility, the origin of this mechanism is both in spinal cord and supraspinal. The GABA receptors are involved in the regulation of detrusor contractility through the action carried out on the pelvic ganglia, the sacral parasympathetic nucleus and supraspinal centers. Baclofen has therefore indications for use in the treatment of Lower Urinary Tract Dysfunctions (LUTD) with two main way of action: inhibition of hypertone involving the external urethral sphincter and the increase of detrusor compliance with the consequent increase in the

filling capacity of the bladder. The use of intrathecal baclofen in the patients suffering from disorder of consciousness is spreading more and more, and not only for the treatment of spasticity and neurovegetative crisis but also for the possibility to induce a change in positive of the state of consciousness, many are today reporting in this sense. Another element to be reckoned with in clinical practice is the indication, suggested by some authors, to use early implant in order to prevent the impairment linked with spasticity before it is structured, thus making almost vain the only pharmacological or rehabilitative intervention. This study, even considering the modest numerosity of the sample, allowed to verify that after the implantation of CIBI a significant increase of MCC and a reduction of DLPP. Also the presence of DO is detected with a significantly reduced frequency respect baseline. Accordingly an increase in PVR in the first month was identified. While this data may seem a positive result of the therapy must be related to the type of patient treated, indeed the reduction of a detrusor contraction that it is not supported by supraspinal centers can create an increase of the PVR However, this discrepancy was filled out 6 months after implantation, and the PVR returns comparable to the baseline. Instead, positive results on the reduction of DO were maintained in the long term. The data therefore indicate the need to monitor PVR closely, in the first weeks after implantation, to avoid the risk of bladder supradistension in these patients with disturbance of consciousness. Concluding message This is a preliminary pilot study that needs further validation to determine which is the best management of the dynamics of micturition in patients in vegetative stete/minimally conscios state after continous intrathecal baclofen infusion.

1712. Finck, P. A. and E. F. Donnelly (1970). "Prolonged survival with retention of bullet in orbit, lung, or spleen. Report of three cases. The identification of bullets. The relationship between trauma and malignancy." Journal of forensic sciences **15**(4): 565-580.

1713. Findler, G., et al. (1979). "Cranioplasty with pre-formed methyl methacrylate onlay plates." Neurochirurgia **22**(3): 99-101.

The available manufactured plates for cranioplasty of large skull defects are not always satisfactory. Recently we have used preformed methyl methacrylate plates, in combination with Proplast. This plate prepared adjusted and sterilized before the operation is both cosmetically and mechanically satisfactory.

1714. Fink, S. C., et al. (1997). "Transnasal canthoplasty." The Journal of cranio-maxillofacial trauma **3**(2): 43-48.

The reconstruction of a traumatic telecanthus, particularly the repositioning and securing of the medial canthal tendon, presents a challenge to the reconstructive surgeon. The adequate positioning of the medial canthal tendon for proper intercanthal distance, and apposition of the lid to the globe, is the cornerstone of a successful reconstruction. The authors have developed a technique for transnasal canthoplasty that is fast, relatively easy, and safe. Transnasally, a 16-gauge spinal needle is introduced over a preplaced K-wire using a 4-0 Bunnell stainless wire suture (Ethicon, Somerville, NJ). The medial canthal tendon is lassoed, secured, and then fixed to the contralateral nasal bone. Six patients have undergone this technique to date. The authors believe this procedure offers an improvement to existing methods.

1715. Finkel, M. F. (2006). "The neurological consequences of explosives." Journal of the neurological sciences **249**(1): 63-67.

Neurological injuries produced by explosive blasts are the result of a cascade of events that begin with the initial explosion and evolve from the secondary, tertiary, and quaternary effects that the explosion engenders [Lavonis EJ. Blast Injuries. EMedicine.htm]. Only the results of the primary blast are predictable, and subsequent actions ripple outward in an increasingly random and chance sequence. This article reviews and explains how the ensuing chain of circumstances injures the nervous system, and what examining physicians should anticipate when they treat these patients.

1716. Finkelstein, M., et al. (1997). "Projectile metallic foreign bodies in the orbit: a retrospective study of epidemiologic factors, management, and outcomes." Ophthalmology **104**(1): 96-103.

PURPOSE: Intraorbital projectile metallic foreign bodies are associated with significant ocular and orbital injuries. The authors sought to evaluate epidemiologic factors, the incidence of associated ocular and orbital injury, and

the nature and necessity of surgical intervention in these cases., METHODS: Charts of all patients with projectile intraorbital metallic foreign bodies seen at our institution (27) over the preceding 7 years were evaluated with respect to age, sex, type of injury, associated ocular and orbital injuries, location of the projectile (anterior, epibulbar, or posterior), postinjury visual acuity, and surgical intervention., RESULTS: The majority of patients were male, between the ages of 11 and 30, and had BB pellet injuries. Thirteen projectiles were lodged anteriorly, 4 were in an epibulbar position, and the remaining 10 were posterior to the equator. Twelve of 13 anterior, and 4 of 4 epibulbar foreign bodies were removed surgically, whereas only 2 of 10 posterior foreign bodies required surgery. No case of surgical intervention resulted in a decrease of visual acuity. Associated ocular injuries were both more common and severe in patients with posteriorly located foreign bodies. Final visual acuity was better at presentation and at discharge in patients with anteriorly located foreign bodies., CONCLUSION: Intraorbital projectile metallic foreign bodies can be a source of significant ocular morbidity. Management of these cases is dependent on the location of the projectile. Ancillary radiographic studies can be helpful. Surgery to remove the projectile should be considered in each case, but foreign bodies that are not readily accessible often may be left safely in place. Closer regulation of the pellet gun industry, with an emphasis on education and protective eyewear use, would be helpful in reducing these injuries.

1717. Firat, C., et al. (2012). "Surgical modalities in maxillo-facial fractures: Retrospective analysis of 110 patients." European Journal of General Medicine **9**(4): 258-264.

The objective of this study is to carry out a retrospective analysis of patients in our clinic who underwent surgery for maxillofacial trauma. The retrospective analysis was carried out on data of 110 inpatients with maxillofacial trauma that were treated. The distribution of maxillofacial traumas according to facial bones (maxilla, zygoma, orbita, mandibular, and nasal) was examined. Multi-fragmented fractures of the maxilla anterior wall, orbital base fractures and isolated zygomatic arch fractures were treated with a balloon treatment method by Foley catheter. A total of 161 fracture were treated that 82 (74.54%) were male and 28 (25.45%) were female. Of these patients, 11 (10%) were in the pediatric age group (0-16). The etiology of maxillofacial traumas was examined, as 45 cases were traffic accidents, 32 cases were blows, 30 cases were falling, and 3 were firearm injuries respectively. The anatomic localizations of the maxillofacial fracture were 68 (42.23%) mandibula, 36 (22.36%) maxilla fractures, 21 (13.04%) zygoma fractures, and 26 (16.14%) orbita fractures (naso-orbital or naso-orbito-etmoidal fractures were included). Maxilla fractures were most frequently observed with other facial fractures. Zygoma fractures were also generally observed together with multi-fragmented fractures. The balloon treatment was found very effective to stabilize of multi-fragmented fractures of the maxilla anterior wall, orbita base fractures and zygomatic arch fractures. Since maxillofacial fractures may be seen in many patients who apply to hospitals due to traumas, sufficient experience of doctors working in this field is an important factor in decreasing mortality and morbidity. The most frequent patients are males aged 30 to 40 with maxillofacial trauma caused by a traffic accident, a sports accident, or a blow. Retrospective or epidemiological studies similar to our study are very beneficial for the determination of risk groups, specific precautions, and practical and effective treatment methods.

1718. Firat, C. and Y. Geyik (2013). "Surgical modalities in gunshot wounds of the face." The Journal of craniofacial surgery **24**(4): 1322-1326.

Maxillofacial traumas caused by gunshot wounds may cause quite varied defects. The objective of this study was to evaluate the reconstruction methods in 12 patients with gunshot wound-related mandibular and maxillofacial bony and soft tissue defects. Twelve patients who were operated on for maxillofacial gunshot wounds at our clinic between 2002 and 2012 were included in the study. Seven patients were wounded in a suicide attempt, and 5 were wounded as a result of an accident or in assaults. Two patients underwent reconstruction using free fibula osteocutaneous flap, 4 patients received the free radial forearm osteocutaneous flap, 2 patients received costal bone graft, and 3 patients received iliac bone grafts. Satisfactory functional and aesthetic outcomes were achieved in cases where staged secondary reconstruction, balloon treatment, and consecutive fat and steroid injections into the depressed scar areas were applied. In conclusion, the basic goal in maxillofacial reconstruction is the functional and aesthetic reconstruction of the contours. Because it is not easy to get perfect results with only 1 clinical approach or 1 method, the proper timing and reconstruction method should be selected.

1719. Fischer, H. (1971). "[Trauma and tumor]." Trauma und Tumor. **26**(2): 107-111.

1720. Fischer, H. (1979). "[Gunshot wounds by military weapons]." Schussverletzungen durch Militarwaffen. **97**(7): 284-288.

The review is based on 34 recent publications. Bullet-wounds by military weapons either in drill or war are to be regarded as special kinds of wounds, needing profound knowledge of wound ballistic. However, the therapy of late developing complications may lead to problems.

1721. Fischer, H. (1979). "[Gunshot wounds in peace and their treatment. Review of the literature]." Schussverletzungen im Frieden und ihre Behandlung Literaturubersicht. **97**(2): 49-52.

For therapy of bullet-wounds in peace profound knowledge of their pathogenesis is necessary. This may be especially true for wounds evoked by new developed weapons. It may be assumed that often therapists are not familiar with the effects of these modern weapons. This review of 27 international publications therefore represents particularities of wounds of the body cavities and the extremities. Furthermore the problem of bulletembolies is represented.

1722. Fischer, H., et al. (1970). "[Postmortem radiography with the aid of a field x-ray machine]." Postmortale Rontgenaufnahmen mit Hilfe eines Feldrontgengerates. **113**(4): 535-537.

1723. Fischer, N. J. (2021). "Mortality following severe liver trauma is declining at Auckland City Hospital: a 14-year experience, 2006-2020." The New Zealand medical journal **134**(1540): 16-24.

INTRODUCTION: Liver injuries sustained in blunt and penetrating abdominal trauma may cause serious patient morbidity and even mortality., AIM: To review the recent experience of liver trauma at Auckland City Hospital, describing the mechanism of injury, patient management, outcomes and complications., METHODS: A retrospective cohort study was performed, including all patients admitted to Auckland City Hospital with liver trauma identified from the trauma registry. Patient clinical records and radiology were systematically examined., RESULTS: Between 2006-2020, 450 patients were admitted with liver trauma, of whom 92 patients (20%) were transferred from other hospitals. Blunt injury mechanisms, most commonly motor-vehicle crashes, predominated (87%). Stabbings were the most common penetrating mechanism. Over half of liver injuries were low risk American Association for the Surgery of Trauma (AAST) grade I and II (56%), whereas 20% were severe grade IV and V. Non-operative management was undertaken in 72% of patients with blunt liver trauma and 92% of patients with penetrating liver trauma underwent surgery. Liver complications occurred in 11% of patients, most commonly bile leaks (7%), followed by delayed haemorrhage (2%). Thirty-two patients died (7%), with co-existing severe traumatic brain injury as the leading cause of death. There was a significant reduction in death from haemorrhage in patients with grade IV and V liver trauma between the first and second half of the study period (p=0.0091)., CONCLUSION: Although the incidence and severity of liver trauma at Auckland City Hospital remained stable, there was a reduction in mortality, particularly death as a result of haemorrhage.

1724. Fischer, S., et al. (2017). "First Lower Two-Thirds Osteomyocutaneous Facial Allograft Perfused by a Unilateral Facial Artery: Outcomes and Vascularization at 1 Year after Transplantation." Plastic and reconstructive surgery **139**(5): 1175e-1183e.

BACKGROUND: Facial allotransplantation provides a unique opportunity to restore facial form and function in severely disfigured patients. Using a single unilateral facial artery for vascularization can significantly reduce surgical duration and thus facilitate the practice of face transplantation., METHODS: A 33-year-old man with a history of high-energy ballistic trauma received a facial allograft comprising the lower two-thirds of the face, including maxilla and mandible. Vascular anastomoses involved one unilateral facial artery and two veins. Vascularization patterns, airway volume, and facial functions were assessed before and 1 year after transplantation. In addition, immunosuppressive therapy and rejection episodes were recorded., RESULTS: One year after transplantation, the facial allograft is well perfused and gradually improving in function. Unilateral facial artery anastomosis remains patent and collateralization with the contralateral side is taking place through collaterals of the submental arteries. Bony perfusion of the maxilla

and mandible is provided periosteally. Bilateral venous outflow is evident. Airway volume is significantly increased compared with before transplantation, and gastrostomy and tracheostomy tubes have been securely removed. The recipient has gained the abilities to smell, speak, feel, and grimace 1 year after transplantation. Steroids were successfully weaned after 9 months, leaving the patient on dual immunosuppressive therapy with tacrolimus and mycophenolate mofetil. Two rejection episodes occurred, of which one was treated by steroid pulse and the other by adjusting the maintenance therapy., CONCLUSIONS: In this patient, a facial allograft comprising the lower two-thirds of the face including the maxilla and mandible is sufficiently perfused by one unilateral facial artery. Bilateral venous outflow, however, seems to be necessary. Facial allotransplantation can significantly and securely improve facial form and function., CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, V.

1725. Fishbain, D. A., et al. (1987). "Relationship between Russian roulette deaths and risk-taking behavior: a controlled study." The American journal of psychiatry **144**(5): 563-567.

A review of medical examiner records yielded data on 19 men and one woman who died playing Russian roulette. The men differed significantly from 95 male suicide victims who died of gunshot wounds to the head on several variables including age, race, ethnicity, religion, citizenship, marital status, living situation, health, and the likelihood of the death being witnessed. The Russian roulette victims were significantly less likely to die in the bedroom, die in the morning, leave a suicide note, and be depressed but were significantly more likely to have alcohol or drugs in their body fluids and to have a previous history of drug and alcohol abuse.

1726. Fisher, B. and M. Worthen (1999). "Cardiac arrest induced by blunt trauma in children." Pediatric emergency care **15**(4): 274-276.

BACKGROUND: There is incomplete knowledge regarding the outcome of children who suffer a cardiac arrest after blunt trauma. We sought to determine mechanisms of injury, mortality, and rate of organ donation in this population of children., METHODS: Since 1984, all traumatically injured children in San Diego County, California, have been treated at San Diego Children's Hospital. This review encompasses 10,979 pediatric trauma patients evaluated from August 1, 1984 through September 30, 1996. All patients who did not meet the following two criteria were eliminated from the review: 1) a mechanism of blunt trauma, and 2) cardiopulmonary resuscitation performed by a trained medical provider prior to arriving or on arrival to the hospital. A chart review of this set of patients was undertaken to determine mechanism of injury, severity of injury, mortality, and rate of organ donation., RESULTS: In this large metropolitan county, 65 children suffered cardiac arrest following blunt trauma. Accidents involving motor vehicles were the mechanisms responsible for 80% of these injuries. The average Injury Severity Score was 50.3. Mortality was largely related to severe head injury as manifested by a mean Abbreviated Injury Score for head and neck equal to 5.9. All but one of these patients died despite resuscitation. Ninety-four percent of these children died within the first 24 hours of injury. The single survivor was discharged in a vegetative state. Solid organs were obtained from 9% of the patients., CONCLUSION: The outcome from blunt cardiac arrest in children is rapidly and nearly uniformly fatal despite resuscitation. Because severe head injuries resulting in brain death are the leading cause of mortality, a significant percentage of organ donations are obtained from these patients.

1727. Fisher, S. B., et al. (2011). "Pencils and pens: an under-recognized source of penetrating injuries in children." The American surgeon **77**(8): 1076-1080.

Unlike other sharp objects, pens and pencils are readily available to children both at home and school. Although case reports are published, no series of pen or pencil injuries have been reported in the recent literature. We therefore reviewed the incidence and injury profiles of writing instruments as compared with other sources of penetrating trauma. The trauma registry from a large urban pediatric hospital system was queried for nonmissile, nonbite penetrating injuries from 2005 through 2009. Retrospective data was collected on demographics, injuries, operations, admissions, and mortalities. Additionally, data regarding pen and pencil injuries from 2009 to 2010 were collected prospectively, and one case from 2003 was included retrospectively. Fourteen injuries from writing instruments were seen and involved the head and neck (9), chest (1), bladder/perineum (2), and extremities (2). Eleven children were admitted and eight required surgical intervention. One child died from a transhemispheric brain injury after intraorbital penetration by a pencil. Penetrating trauma from writing instruments is not an uncommon source of injury and often requires surgical

intervention to remove the object. Injuries from pens and pencils can be severe or even fatal. Appropriate parent and teacher education regarding the potential risks may help to prevent such injuries.

1728. Fitzgerald, D. B., et al. (2011). "Delayed diagnosis of intracerebral foreign body from the Vietnam War." Military medicine **176**(2): 228-231.

We report on a 22-year-old infantryman who sustained a right frontal wound to his head. He was treated and returned to duty immediately. During a computed tomography scan, 38 years after the incident, a metallic foreign body and disruption of the brain consistent with a projectile track were discovered in his brain. In this report, we review similar cases of delayed discovery of unsuspected foreign bodies and the probable nature of the wound.

1729. Fitzpatrick, T., et al. (2018). "One-and-a-half syndrome secondary to transorbital penetrating injury." Neurology **90**(2): 91-92.

1730. Fitzpatrick-Swallow, V. L., et al. (2012). "Lung injury similar to blast lung in a case of shotgun wound of the head." The American journal of forensic medicine and pathology **33**(3): 286-288.

Primary blast lung injury after explosions has been well described in the literature. A case of injury to the lung, after a shotgun wound to the head, similar to primary blast lung, is presented. Histological appearances of the lung revealed alveolar over distension, rupture and intra-alveolar hemorrhage. Primary blast lung injury is considered the reserve of high-order explosives; however, this case reveals similar injuries from a shotgun (low-order explosive), which has not been reported before to the best of our knowledge.

1731. Flament, J. and A. Moraine (2021). "Tree branch through the orbit into the skull: A case report." Radiology Case Reports **16**(4): 795-797.

A 78-year-old woman presented to the Emergency Department with a tree branch through the orbit. Her condition was rated 15/15 on the Glasgow coma scale. Computed tomography showed that the distal extremity of the branch was located between the intracavernous segment of the internal carotid artery and the temporal lobe. The foreign body pushed aside without penetrating the medial rectus, the optic nerve, the internal carotid artery, and the temporal lobe. No intracranial bleeding or pneumencephaly was observed. The chirurgical option was confirmed and the patient transferred for extraction of the foreign body by traction in the axis.

1732. Fleischer, A. S., et al. (1975). "Cerebral aneurysms of traumatic origin." Surgical neurology **4**(2): 233-239.

This report reviews 41 cases of traumatic cerebral aneurysms, including four cases of our own which are presented in detail. They may follow penetrating or closed head injury, and are usually associated with significant additional intracranial damage. Almost half of the patients presented with a delayed subarachnoid hemorrhage within three weeks of the initial head injury, defining an important neurological syndrome. Those patients whose post-traumatic aneurysms have been surgically obliterated have an associated mortality which is half that of patients treated by nonsurgical methods.

1733. Fleming, W. H. and J. C. Bowen (1972). "Early complications of long-term respiratory support." The Journal of thoracic and cardiovascular surgery **64**(5): 729-738.

1734. Flesche, C. W., et al. (2004). "[Telemedicine in the maritime environment--hightech with a fine tradition]." Telemedizin in der Hochseeschifffahrt--Hightech aus Tradition. **99**(3): 163-168.

Access to health care always has been one of the most critical issues for offshore crews. Therefore, telemedicine has a long and outstanding tradition in the maritime environment. Since 1931 Cuxhaven medical center (Medico Cuxhaven) operates as a hospital-based radio medical advice center (RMA) for ships worldwide providing one of the first routine telemedical services worldwide. For a long time this task was performed on a honorary basis by the hospital's

physicians. In 1994 Germany accepted the IMO/ILO (International Maritime Organisation and International Labour Organisation) solution 164. Therefore, in 1998 a formal contract of the German Ministry of Transport officially installed Medico Cuxhaven as the TMAS Center for Germany. According to IMO/ILO solution 164, the RMA provides an expert level of care 24 h/day, 365 days/year. Cuxhaven hospital is a busy general hospital with departments of anesthesia and intensive care, internal medicine, surgery, gynecology and obstetrics, urology, pediatrics, ENT, radiology, and pain medicine. All physicians directly responding to TMAS calls have practical experience in maritime routine and emergency medicine. All incoming emergency calls are primarily handled by board-certified anesthesiologists, experienced in martime emergency medicine (e. g., staffing coastal SAR helicopters, working on rescue boats, carrying out repatriation services for sailors worldwide). If needed, other medical specialists are included. Today, Medico Cuxhaven takes an average workload of one to two emergency calls (response time < 20 s), two to three follow-up calls and approximately one informative call per day. Since 2000 transmission of digital photos has been used for routine RMA. Recently, a system for online and trenddata telemetry of twelve-lead ECG, NIBP (noninvasive blood pressure measurement), CO(2), SaO(2), pulse and respiration rates including the transmission of video images was developed. This system allows worldwide communications as it is capable of all possible means of telecommunication such as GSM, Inmarsat-ISDN or Iridium-Satellite-Transmission. So far, this system has been installed on board several German SAR rescue boats.However, radio telephone and the simple transmission of digital photography remain the basis of maritime radio medical advice service.

1735. Fleuridas, G., et al. (1998). "[Gunshot wounds and injuries of the face in civilian practice]." Plaies et traumatismes balistiques de la face en pratique civile. **99**(2): 75-79.

Firearm wounds are relatively frequent in civilian practice. Due to the variable power of the weapons involved, a wide range of maxillofacial lesions are encountered and classification is a difficult task. In order to predict the gravity of the lesions, we have drawn a classification scheme from our experience with maxillofacial injuries. The scheme was based on the kind of ammunition which gives a better classification than the type of weapon. Three main categories have been identified.

1736. Flint, A. C., et al. (2008). "Post-operative expansion of hemorrhagic contusions after unilateral decompressive hemicraniectomy in severe traumatic brain injury." Journal of neurotrauma **25**(5): 503-512.

Decompressive hemicraniectomy is commonly performed in patients with traumatic brain injury (TBI) with diffuse brain swelling or refractory raised intracranial pressure. Expansion of hemorrhagic contusions in TBI patients is common, but its frequency following decompressive hemicraniectomy has not been well established. The aim of this retrospective study was to determine the rate of hemorrhagic contusion expansion following unilateral hemicraniectomy in severe TBI, to identify factors associated with contusion expansion, and to examine whether contusion expansion is associated with worsened clinical outcomes. Computed tomography (CT) scans of 40 consecutive patients with non-penetrating TBI who underwent decompressive hemicraniectomy were analyzed. Hemorrhagic contusion volumes were measured on initial, last pre-operative, and first post-operative CT scans. Mortality and 6-month Glasgow Outcome Scale (GOS) score were recorded. Hemorrhagic contusions of any size were present on the initial head CT scan in 48% of patients, but hemorrhagic contusions with a total volume of >5 cc were present in only 10%. New or expanded hemorrhagic contusions of >or=5 cc were observed after hemicraniectomy in 58% of patients. The mean volume of increased hemorrhage among these patients was 37.1+/-36.3 cc. The Rotterdam CT score on the initial head CT was strongly associated with the occurrence and the total volume of expanded hemorrhagic contusions following decompressive hemicraniectomy. Expanded hemorrhagic contusion volume greater than 20 cc after hemicraniectomy was strongly associated with mortality and poor 6-month GOS even after controlling for age and initial Glasgow Coma Scale (GCS) score. Expansion of hemorrhagic contusions is common after decompressive hemicraniectomy following severe TBI. The volume of hemorrhagic contusion expansion following hemicraniectomy is strongly associated with mortality and poor outcome. Severity of initial CT findings may predict the risk of contusion expansion following hemicraniectomy, thereby identifying a subgroup of patients who might benefit from therapies aimed at augmenting the coagulation system.

1737. Flint, G. (1999). "Head injuries." The British journal of theatre nursing : NATNews : the official journal of the National Association of Theatre Nurses **9**(1): 15-21.

1738. Flint, L. M., et al. (1984). "Approaches to the management of shotgun injuries." The Journal of trauma **24**(5): 415-419.

Shotgun wounds present specific challenges for the surgeon. Multiple penetrating wounds frequently involve large anatomic areas with potential multi-system injury. Experience with 121 patients sustaining shotgun wounds over the 5-year period ending 31 December 1981 was reviewed to assess results and evaluate treatment protocols. Sixty-six patients had chest wounds with pleural penetration. Twenty-four wounds were minor and were observed. Each had less than five pellets penetrating the pleura. Twenty-two patients had close-range injuries. Fourteen of these required chest tube drainage alone and eight patients required thoracotomy for control of bleeding. Eleven patients died, six as a direct result of the chest injury. In 55 patients with abdominal-retroperitoneal wounds exploratory operations were done if more than four pellets were thought to be lodged intraperitoneally or if signs of peritonitis were present, while lesser wounds without peritoneal findings were observed. In the 15 patients who did not have exploratory operations, there were no deaths or major complications. Thirty-five patients had exploratory operations. Two patients had five intraperitoneal missiles and no clinical evidence of peritonitis but were found to have significant intestinal perforations. Four patients died. Eighty-three patients with extremity wounds were classified according to location of injury. Forty-five had upper extremity wounds, with nine vascular injuries. Two patients died and one limb was amputated because of soft tissue infection. Thirty-eight patients had lower extremity wounds. Five had major vascular injuries. Preoperative arteriography was obtained in 13 patients with extremity injuries; the results of one of these were falsely negative. There were no deaths or amputations.(ABSTRACT TRUNCATED AT 250 WORDS)

1739. Flora, A. S. and R. E. Kose (2018). "Symptoms of posterior glottic stenosis presenting three decades after initial endotracheal trauma." American Journal of Respiratory and Critical Care Medicine **197**(MeetingAbstracts).

Introduction: Five to fourteen percent of patients intubated for more than 10 days are susceptible to stenosis. As the arytenoids fuse in the midline, significant dyspnea typically occurs early in the development of stenosis as a result of forced cord adduction and glottic closure. Interestingly, we present a case of a man who developed dyspnea from posterior glottic stenosis 31 years after a prolonged intubation of 19 days for a self-inflicted gunshot wound to the head. Case Summary: He presented with complaints of persistent cough and increased dyspnea following a severe upper respiratory tract infection a year prior and was subsequently diagnosed as intermittent asthma by his primary care physician. He had no improvement with inhaled corticosteroids and long and short acting beta agonists. Pulmonary function testing demonstrated a moderate degree of fixed central airway obstruction with flattening of both the inspiratory and expiratory phases of the flow volume loop. Airway inspection with bronchoscopy found the vocal cords fixed in a median position with minimal movement of the right cord and questionable complete paralysis of the left vocal cord. A fibrous band was found in the posterior aspect between the arytenoids creating a 4mm opening in the posterior commissure. He underwent microsuspension direct laryngoscopy using a Dedo scope and jet vent with a Lewy suspension apparatus by an otolaryngologist. A sickle knife was used to divide the fibrous scarring between the two arytenoids and the larynx was subsequently dilated without difficulty. The patient returned to his normal baseline on follow up, and spirometry 4 months later found much improvement in his flow volume loop. (Figure presented) Discussion: The most vulnerable area to stenosis of the glottis from prolonged endotracheal intubation is the posterior commissure. Tracheal angulation increases pressure on the fulcrum of the endotracheal tube, causing trauma to the respiratory epithelium overlying the posterior glottis. Prospective studies have shown that this process becomes evident 3-4 weeks after extubation and developing stenosis typically is complete by 16 weeks, even if the patient had a trachestomy. Our case is interesting in that symptoms did not manifest in our patient for three decades, thus highlighting the importance in long-term follow up in patients with prolonged endotracheal intubation, even for years.

1740. Flores, H. A. and R. M. Stewart (2008). "The multiply injured patient." Seminars in thoracic and cardiovascular surgery **20**(1): 64-68.

The multiply injured patient with significant thoracic and extra-thoracic injuries poses a number of challenges. Pericardial tamponade, tension pneumothorax and massive hemothorax can and should be diagnosed clinically. In more stable patients, chest computed tomography (CT) scan is an excellent screening test. The concept of damage control resuscitation and damage control surgery have shown promise in patients with multiple, critical injuries. Beta-blockade of patients with blunt thoracic aortic injuries can be used as a temporizing damage control measure when the risks of

operation or intervention are very high (traumatic brain injury, severe right or bilateral pulmonary contusion, unstable pelvic fractures). Patients with multiple penetrating wounds require the surgical team to be expeditious and flexible, and damage control is a helpful strategy in these patients.

1741. Floro, K., et al. (1973). "[Posttraumatic brain abscess with an unusually long period of latency]." Posttraumas agytalyog szokatlanul hosszu lappangasi kdovel. **114**(2): 89-91.

1742. Flynn, S. B., et al. (2004). "Orbital foreign body." Archives of ophthalmology (Chicago, Ill. : 1960) **122**(2): 296-297.

1743. Foley, B. D., et al. (2013). "Mandibular reconstruction using computer-aided design and computer-aided manufacturing: an analysis of surgical results." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **71**(2): e111-119.

PURPOSE: The purpose of this study was to analyze the accuracy of virtual surgical planning in mandibular reconstruction., MATERIALS AND METHODS: This is a retrospective study involving 8 consecutive patients reconstructed with nonvascularized iliac crest bone grafts and free fibula osteomyocutaneous flaps. DICOM data from a maxillofacial skeleton computed tomography (CT) scan were sent to a medical modeling company and used to map the mandibular resection, anatomically place the mandibular reconstruction plate, and create surgical guides. After surgery a postoperative CT compared the virtual plan to the surgical result. Linear measurements [2 transverse and 1 anterior-posterior (A-P)] were performed to determine if the virtual surgical result was achieved. The transverse measurements were made from the condylar head to condylar head and from the gonial angle to gonial angle. The A-P analysis was made by measuring a perpendicular line drawn from the anterior inferior mandibular border to the center point on the condylar head to condylar head measurement., RESULTS: The average surgical error in the A-P dimension for the iliac crest bone grafts and free fibula flap was 0.2 mm (range 0.0 mm to 0.7 mm) and 0.9 mm (range 0.2 mm to 1.9 mm), respectively. In the transverse dimension the average surgical error was 1.6 mm (range 0.7 mm to 2.4 mm) and 2.7 mm (range 1.9 mm to 4.5 mm) from condyle to condyle, and 1.7 mm (range 0.7 mm to 2.7 mm) and 2.5 mm (range 0.4 to 4.8 mm) from gonial angle to gonial angle., CONCLUSION: The use of CAD-CAM (Medical Modeling, Golden, Colorado) technology for the fabrication of surgical resection guides and mandibular reconstruction plates resulted in an accurate surgical result.

1744. Folio, L., et al. (2013). "Semi-automated trajectory analysis of deep ballistic penetrating brain injury." Military medicine **178**(3): 338-345.

BACKGROUND: Penetrating head injuries (PHIs) are common in combat operations and most have visible wound paths on computed tomography (CT)., OBJECTIVE: We assess agreement between an automated trajectory analysis-based assessment of brain injury and manual tracings of encephalomalacia on CT., METHODS: We analyzed 80 head CTs with ballistic PHI from the Institutional Review Board approved Vietnam head injury registry. Anatomic reports were generated from spatial coordinates of projectile entrance and terminal fragment location. These were compared to manual tracings of the regions of encephalomalacia. Dice's similarity coefficients, kappa, sensitivities, and specificities were calculated to assess agreement. Times required for case analysis were also compared., RESULTS: Results show high specificity of anatomic regions identified on CT with semiautomated anatomical estimates and manual tracings of tissue damage. Radiologist's and medical students' anatomic region reports were similar (Kappa 0.8, t-test $p < 0.001$). Region of probable injury modeling of involved brain structures was sensitive (0.7) and specific (0.9) compared with manually traced structures. Semiautomated analysis was 9-fold faster than manual tracings., CONCLUSION: Our region of probable injury spatial model approximates anatomical regions of encephalomalacia from ballistic PHI with time-saving over manual methods. Results show potential for automated anatomical reporting as an adjunct to current practice of radiologist/neurosurgical review of brain injury by penetrating projectiles.

1745. Folkerson, L. E., et al. (2018). "Coagulopathy as a predictor of mortality after penetrating traumatic brain injury." The American journal of emergency medicine **36**(1): 38-42.

STUDY HYPOTHESIS: Traumatic brain injury (TBI) is a leading cause of mortality with penetrating TBI (p-TBI) patients having worse outcomes. These patients are more likely to be coagulopathic than blunt TBI (b-TBI) patients, thus we hypothesize that coagulopathy would be an early predictor of mortality., METHODS: We identified highest-level trauma activation patients who underwent an admission head CT and had ICU admission orders from August 2009-May 2013, excluding those with polytrauma and anticoagulant use. Rapid thrombelastography (rTEG) was obtained after emergency department (ED) arrival and coagulopathy was defined as follows: ACT>=128s, KT>=2.5s, angle<=56degree, MA<=55mm, LY-30>=3.0% or platelet count<=150,000/muL. Regression modeling was used to assess the association of coagulopathy on mortality., RESULTS: 1086 patients with head CT scans performed and ICU admission orders were reviewed. After exclusion criteria were met, 347 patients with isolated TBI were analyzed-99 (29%) with p-TBI and 248 (71%) with b-TBI. Patients with p-TBI had a higher mortality (41% vs. 10%, p<0.0001) and a greater incidence of coagulopathy (64% vs. 51%, p<0.003). After dichotomizing p-TBI patients by mortality, patients who died were younger and were more coagulopathic. When adjusting for factors available on ED arrival, coagulopathy was found to be an early predictor of mortality (OR 3.99, 95% CI 1.37, 11.72, p-value=0.012)., CONCLUSIONS: This study demonstrates that p-TBI patients with significant coagulopathy have a poor prognosis. Coagulopathy, in conjunction with other factors, can be used to earlier identify p-TBI patients with worse outcomes and represents a possible area for intervention.

1746. Forcht Dagi, T. (1983). "Penetrating missile injuries of the brain." Critical Care Quarterly **6**(1): 67-81.

It is apparent that penetrating injuries of the head, though invariably serious, need not be invariably fatal. Of the patients who are alert, slightly drowsy, or have only a focal deficit, almost all who have been carefully resuscitated, examined, and searched for operable lesions, and who have undergone careful surgical debridement of bone and meticulous closure, and intensive antibiotic therapy will survive. The practice of careful nursing care, the support of respiration and vital functions, and the prevention of systemic infection will ensure a satisfying functional recovery in most patients who survive the initial injury.

1747. Ford, E. G., et al. (1990). "It may be more significant than you think: BB air rifle injury to a child's head." Pediatric emergency care **6**(4): 278-279.

BB guns of 20 years ago were constructed of coils and springs which generated relatively little force, so that a projectile posed little threat of serious injury. Today, the coil and spring construction has been replaced by pump action pneumatic chambers which allow generation of muzzle velocities near 350 ft/sec. Speeds of 150 ft/sec and 200 ft/sec are required for skin penetration and bone penetration, respectively. We present a seven-year-old boy who suffered intracranial parenchymal injury from an air-powered BB gun projectile while playing with friends. We discuss literature which suggests these once-innocent toys are now harbingers of severe, if not fatal, injury.

1748. Ford, J. R., et al. (2017). "BB pellet extraction from the anterior orbit using manual expression." Canadian journal of ophthalmology. Journal canadien d'ophtalmologie **52**(4): e128-e130.

1749. Foreman, B., et al. (2016). "Bedside detection of spreading depolarizations using cortical depth electrodes in severe non-surgical traumatic brain injury: Preliminary experience." Neurocritical care **25**(1): S64.

Introduction: Spreading depolarizations (SDs) are pathological waves of neuronal depolarization that occur in 56% of patients with traumatic brain injury (TBI) who require surgical treatment of focal lesions. The incidence of SDs in non-surgical TBI is unknown, but in theory SDs can be detected using cortical depth electrodes (dEEG) placed at bedside via burrhole. We hypothesized that the incidence of SDs recorded using dEEG in non-surgical patients would be similar to that documented in surgical TBI. Methods: For the study period starting 4/2015, we included severe, non-penetrating TBI who did not require urgent neurosurgery on admission. All patients underwent bedside burrhole placement of intracranial pressure, tissue oxygen, regional blood flow and dEEG monitors via a single quad-lumen bolt per institutional protocol. Data were recorded on Moberg CNS with DC-coupled amplifiers. Results: Over a 12-month period, 15 patients (age 44+/-19; 80% male; GCS range 3-7) underwent monitoring for a mean duration of 97.7+/-43.5 hours,

beginning 11.0 hours (median, quartiles: 8.1-18.9) after injury. 12/15 (80%) monitoring devices were placed in non-dominantfrontal lobe, targeting cerebral cortex. 5/15 patients had focal pathology in the monitored lobe, while 4/15 had contralateral frontal lesions and 6/15 had diffuse injury or involvement of other lobes. Overall, 2/15 (13%) exhibited SDs. 7/15 (47%) patients died, including those with SDs. There were no significant hematomas or infections related to invasive neuromonitoring. Conclusions: The incidence of SDs detected with dEEG placed in non-dominant frontal lobe was lower than previously reported with injury-targeted placement of subdural strips in surgical TBI patients. This may be due to more restricted spatial sampling of dEEG, lack of targeting to injured peri-lesional tissue, and/or lower innate incidence of SD in patients with non-surgical or more diffuse injuries. Targeted placement of subdural electrodes through burr holes may be warranted in non-surgical TBI patients.

1750. Forget, A. P., et al. (2002). "[Evaluation of verification of brain death and coordination with hospital organ procurement at the University Hospital at Lille]." Evaluation du recensement des morts encephaliques par la coordination hospitaliere de prelevement au CHU de Lille. **21**(7): 550-557.

OBJECTIVES: To determine the incidence of brain death (BD) and to evaluate the registration of potential organ donors (PD) by the organ procurement team (OPT)., STUDY DESIGN: Two-year prospective audit in the French university hospital of Lille., PATIENTS AND METHODS: All deaths occurring in the intensive care units or the emergency department were studied. If death was consecutive to brain damage, on-site review of medical records and charts was performed. Death cause, presence of criteria for brain death and reference to the OPT were recorded for each death. A medical expert staff evaluated the incidence of and reasons for unsuitability for organ donation. After 12 months of observation, a protocol for "systematic alert of the OPT when brain death is suspected" was broadcast and evaluated during the next 12 months., RESULTS: During the first period, 277 BD occurred and 119 PD were suitable for organ donation. The OPT recorded 80 PD (67.2% of all PD) and 45 multi-organ procurements (MOP) were performed. Physicians opposed two major reasons for not calling OPT: anticipation of a non-validated medical contraindication in 18 cases and approach of the family without the OPT team in 21 cases. After broadcast of the protocol, 110 PD were identified and the OPT was called in 93 cases (84.5% of all PD, $p < 0.004$ versus first period). Fifty-three MOP were performed., CONCLUSION: The OPT was not called to manage one-third of the PD. The protocol for "systematic alert of the OPT when brain death is suspected" improves the call of the OPT and increases MOP.

1751. Forsyth, R. J., et al. (2005). "Non-linear mixed effects modelling of recovery trajectories after paediatric traumatic brain injury." Developmental Neurorehabilitation **10**(4): 288-289.

Purpose: Improved understanding of the recovery trajectories seen after TBI would improve service planning and delivery for individual children. It is also a potentially powerful research tool since it may be easier to detect treatment effects in smaller studies when expected recovery in the control group is better defined. We used non-linear mixed effects modelling of recovery trajectories to improve understanding of outcome. Methods: Longitudinal recovery profiles comprising sequential total WeeFIM® scores (as often as every 14 days) were collated for 107 children with closed TBI sequentially admitted to a rehabilitation service. Inflicted, open or penetrating injuries were excluded, as were children with prior neurological morbidity or TBI. Data were available for age at injury (AgeInj) and proxies of injury severity including GCS, duration of PTA (defined by the COAT) and time to follow commands (TFC, defined as time in days until command-following observed twice within a 24 hour period). Modelling was performed using the nlme library in the R statistical environment. Results: Inspection of recovery trajectories suggested a logistic function of the form $y(t) = MaxWeeFIM/[1 +exp(\{T50 - t\}/scale)]$, defined by three parameters: MaxWeeFIM (the asymptotic final WeeFIM), T50 (time to 50% MaxWeeFIM) and scale (rate of recovery). There were strong relationships between TFC and both scale and T50. No covariates for MaxWeeFIM were identified. A simple expression for the expected recovery trajectory uses values for MaxWeeFIM of 112; for T50 of 4.4+(TFC x 2.1) and for scale of 7.7 + (TFC x 0.5). Other predictor functions improve accuracy at a slight cost in terms of complexity. Conclusions: Knowledge of an individual child's TFC enables prediction of the form of the remainder of their recovery trajectory. The range of individual children's T50 and scale scores from these predicted values was ~20 days (scale) and 30 days (T50) with interquartile ranges for both of ~7 days. This information can inform individual service planning and inform clinical trial design.

1752. Fournier, D., et al. (1981). "[Intra-orbital phlegmon due to trauma from a dental prosthesis (author's transl)]." Dent pour oeil. Ou a propos d'un cas de phlegmon intra-orbitaire par traumatisme du a une prothese dentaire. **82**(3): 196-200.

1753. Fox, C. J., et al. (2006). "Delayed evaluation of combat-related penetrating neck trauma." Journal of vascular surgery **44**(1): 86-93.

OBJECTIVE: The approach to penetrating trauma of the head and neck has undergone significant evolution and offers unique challenges during wartime. Military munitions produce complex injury patterns that challenge conventional diagnosis and management. Mass casualties may not allow for routine exploration of all stable cervical blast injuries. The objective of this study was to review the delayed evaluation of combat-related penetrating neck trauma in patients after evacuation to the United States., METHOD: From February 2003 through April 2005, a series of patients with military-associated penetrating cervical trauma were evacuated to a single institution, prospectively entered into a database, and retrospectively reviewed., RESULTS: Suspected vascular injury from penetrating neck trauma occurred in 63 patients. Injuries were to zone II in 33%, zone III in 33%, and zone I in 11%. The remaining injuries involved multiple zones, including the lower face or posterior neck. Explosive devices wounded 50 patients (79%), 13 (21%) had high-velocity gunshot wounds, and 19 (30%) had associated intracranial or cervical spine injury. Of the 39 patients (62%) who underwent emergent neck exploration in Iraq or Afghanistan, 21 had 24 injuries requiring ligation (18), vein interposition or primary repair (4), polytetrafluoroethylene (PTFE) graft interposition (1), or patch angioplasty (1). Injuries occurred to the carotid, vertebral, or innominate arteries, or the jugular vein. After evacuation to the United States, all patients underwent radiologic evaluation of the head and neck vasculature. Computed tomography angiography was performed in 45 patients (71%), including six zone II injuries without prior exploration. Forty (63%) underwent diagnostic arteriography that detected pseudoaneurysms (5) or occlusions (8) of the carotid and vertebral arteries. No occult venous injuries were noted. Delayed evaluation resulted in the detection of 12 additional occult injuries and one graft thrombosis in 11 patients. Management included observation (5), vein or PTFE graft repair (3), coil embolization (2), or ligation (1)., CONCLUSIONS: Penetrating multiple fragment injury to the head and neck is common during wartime. Computed tomography angiography is useful in the delayed evaluation of stable patients, but retained fragments produce suboptimal imaging in the zone of injury. Arteriography remains the imaging study of choice to evaluate for cervical vascular trauma, and its use should be liberalized for combat injuries. Stable injuries may not require immediate neck exploration; however, the high prevalence of occult injuries discovered in this review underscores the need for a complete re-evaluation upon return to the United States.

1754. Fraga-Manteiga, E., et al. (2014). "An optimized computed tomography protocol for metallic gunshot head trauma in a seal model." Veterinary radiology & ultrasound : the official journal of the American College of Veterinary Radiology and the International Veterinary Radiology Association **55**(4): 393-398.

Computed tomography (CT) is commonly used to assess animals with head trauma. However, strongly attenuating objects such as metallic gunshot cause artifacts that may make accurate localization of shrapnel pieces difficult. The purpose of this study was to develop an optimized CT protocol for minimizing metal artifacts in an animal model of gunshot head trauma. A cadaver head of a stranded Gray seal (Halichoerus grypus) was shot post-mortem with a 0.223-inch caliber rifle. The head was frozen, thawed, and scanned using a multislice CT scanner and protocols with varying acquisition and reconstruction parameters. Scans were acquired with and without use of the scanner's proprietary Extended CT Scale (ECTS) mode and beam hardening reduction (Posterior Fossa Optimization [PFO]) filter. Window/level display settings were also varied. For each protocol and each of five selected metallic shrapnel pieces, a single observer measured combined metal halo artifact and shrapnel area using a hand-traced region of interest. The number of hypo- and hyper-attenuating streak artifacts was also recorded. Measurements were repeated for three different reading sessions. Metal CT artifacts were minimized with a high-frequency image reconstruction algorithm and a wide window setting. Further artifact reduction was achieved with a proprietary ECTS raw data reconstruction technique and a very wide window. This enabled a more confident evaluation of surrounding bone. On the other hand, these techniques are unfortunately not effective under conditions of soft tissue evaluation. Increasing tube voltage and use of a proprietary PFO filter did not yield a significant reduction in metal artifacts.

1755. Franchebois, P., et al. (1964). "[ORBITO-SINUSAL INJURIES BY A RIFLE BOLT]." TRAUMATISMES ORBITO-SINUSIENS PAR CULASSE DE CARABINE. **72**: 2023-2024.

1756. Franco, A., et al. (2018). "Forensic thanatology and the pink tooth phenomenon: From the lack of relation with the cause of death to a potential evidence of cadaveric decomposition in dental autopsies - Case series." Forensic science international **291**: e8-e12.

Forensic thanatology comprises the investigation of every phenomenon related to death performed through cadaveric exams. The pink tooth phenomenon (PTP) emerges as a thanatological finding registered during medical or dental autopsy. The PTP consists of a reddish or pink coloration caused in the teeth by the penetration of pulpal hemoglobin in the dentinal tubules. Initially, the PTP was associated with specific violent deaths, such as drowning, hanging and poisoning. However, scientific reports have pointed towards the occurrence of PTP as an expression of cadaveric decomposition regardless of the cause of death. The present study aims to report eight dental autopsies of victims of violent death that presented the PTP. The autopsies were conducted by forensic pathologists and dentists between 2013 and 2018. Seven victims were males and one was female. The age ranged above 6years old. Cranio-encephalic trauma, firearm shooting and asphyxia figured as the causes of death. All the victims were in advanced decomposition. The PTP was detected in deciduous and permanent, anterior and posterior and maxillary and mandibular teeth. Forensic experts, especially dentists, must be aware of the PTP for more detailed registration of postmortem findings and more accurate cadaveric exams.

1757. Franco Rodriguez, N. E., et al. (2013). "Tamoxifen favoured the rat sensorial cortex regeneration after a penetrating brain injury." Brain research bulletin **98**: 64-75.

A penetrating brain injury produces a glial scar formed by astrocytes, oligodendrocytes, microglia and NG2 cells. Glial scar is a barrier preventing the extent of damage but it has deleterious effects in the regeneration of the axons. Estradiol and tamoxifen reduce gliosis and have neuroprotective effects in the hippocampus and the spinal cord. We evaluated the proliferation of glia and the electrocorticogram in the sensorial cortex in a brain injury model. At seven days post-injury, estradiol, tamoxifen and estradiol plus tamoxifen reduced the number of resident and proliferative NG2 and reactive astrocyte vimentin+ cells. Estradiol and tamoxifen effects on NG2 cells could be produced by the classical oestrogen receptors found in these cells. The glial scar was also reduced by tamoxifen. At thirty days post-injury, the amount of resident and proliferative astrocytes increased significantly, except in the estradiol plus tamoxifen group, whilst the oligodendrocytes proliferation in the glial scar was reduced in treated animals. Tamoxifen promotes the survival of FOX-3+ neurons in the injured area and a recovery in the amplitude of electrocorticogram waves. At thirty days, estradiol did not favour the survival of neurons but produced a greater number of reactive astrocytes. In contrast, the number of oligodendrocytes was reduced. Tamoxifen could favour brain repair promoting neuron survival and adjusting glial cell number. It seems to recover adequate neural communication.

1758. Frank, M., et al. (2013). "Nail projectiles propelled by a mason's lacing cord: an experimental approach." International journal of legal medicine **127**(1): 153-158.

The recent clinical observation of two unintentional penetrating ocular and cerebral injuries due to 90-mm construction nails gave occasion to an experimental study to check the alleged trauma mechanism for plausibility. Both casualties reported that they had attached a mason's lacing cord to the masonry using a nail as anchoring when suddenly the nail was yanked from its moorings and propelled like a missile by the overstretched lacing cord. As to the best of the authors' knowledge, this mechanism of injury has not yet been reported in any of the literature; it was the aim to find an experimental approach to review the plausibility of the alleged sequence of events leading to the accidents. The tensile strength at break and strain at break of different mason's lacing cords (diameter of 1 and 2 mm) were measured according to DIN EN ISO 2062 by using a tensile testing machine. Based on the maximum spring energy of the lacing cords, which was determined 174.9 J for the 1-mm cord (length 10 m) and 747.4 J for the 2-mm cord (length 10 m), the maximum possible velocity of the nails as projectiles was calculated to be 243.5 m/s for the 1-mm cord and 503.4 m/s for the 2-mm cord. The critical elongation a cord of a certain length has to be stretched to deliver enough kinetic energy to a 90-mm nail to surpass the threshold velocity for skin penetration, which was investigated by Sellier (1977) to be approximately 18 m/s, was also calculated. To conclude, the energy delivered by the cords is high

enough to surpass the rather low threshold velocity of nails. The details of how these accidents occurred, which seemed questionable at first, can be reasonably explained by trauma biomechanics.

1759. Frankl, Z. (1968). "The place of oblique osteotomy in the treatment of malunited fractures of the body of the mandible." The British journal of oral surgery **5**(3): 245-250.

1760. Franklin, G. A. and J. K. Lukan (2002). "Self-inflicted crossbow injury to the head." The Journal of trauma **52**(5): 1009.

1761. Frasca, D., et al. (2011). "Microdialysis study of metronidazole cerebral distribution in patients with acute brain injury." Clinical Microbiology and Infection **17**: S195.

Objectives: Metronidazole is part of the standard therapy of bacterial brain abscess and considered to penetrate well blood-brain barrier (BBB) [1]. However dosing regimens are based on plasma and few cerebral spinal fluid (CSF) pharmacokinetic (PK) studies [2,3]. As infections mainly occur in tissue extracellular fluid (ECF), corresponding unbound ECF antibiotic concentrations are responsible for the antimicrobial effect. This study aims to explore metronidazole distribution in patients with acute brain injury, by comparing their unbound concentrations in brain and plasma. Methods: After local ethic approval and written informed consent, four brain injured patients, sedated, mechanically ventilated, monitored by cerebral microdialysis (CMA 71, membrane lenght 10 mm, membrane diameter 0.6 mm, molecular cut-off 100 kDa; CMA, Stockholm, Sweden) and receiving metronidazole for an infection or prophylaxis, were enrolled. PK study succeeded to 500 mg of metronidazole over 30 minutes and brain dialysates and blood samples were collected over 400 minutes. In vivo probes recoveries were evaluated individually by retrodialysis. Metronidazole was assayed by HPLC. Results: Mean metronidazole brain to plasma AUC ratio was 0.86±0.14 (range from 0.74 to 1.06). All patients had metronidazole concentrations versus time curves in brain delayed (mean time-to-peak = 69±30 min) and peaks were smoother than corresponding curves in plasma with mean Cmax in brain and plasma of 14.5±1.2 and 19.1±2.4 mg/µL, respectively. Mean half-lives was 379±131 min in plasma; Cmin were 7.2±4.0 mg/µL in plasma and 5.5±1.3 mg/µL in brain. Mean probe recovery was 78.8±1.3%. Conclusion: Our findings confirm previous studies in CSF, metronidazole penetrates well BBB. Indeed, in acute brain injury patients, unbound metronidazole AUCs in brain and plasma are close. Therefore unbound metronidazole concentration in plasma could be a good surrogate of metronidazole active concentration in brain for PK monitoring in routine.

1762. Fraser, L. and S. Thomas (2016). "Temporal bone trauma - A review." Otorhinolaryngologist **9**(2): 45-51.

The total number of temporal bone fractures is decreasing, however more casualties are surviving their injuries and require otolaryngological input. Due to often multi-system injury, patients should be initially managed according to Advanced Trauma Life Support principles. Common sequelae include conductive or sensorineural hearing loss, facial nerve injury, cerebrospinal fluid leak, vertigo and tinnitus. High resolution CT is the investigation of choice, using 1-1.5 mm slices in the coronal and axial planes. Immediate, delayed and late complications of temporal bone trauma are discussed, including the controversy surrounding management of facial nerve weakness. 7-10 % of temporal bone fractures are complicated by facial nerve weakness. A framework for patient evaluation is suggested.

1763. Frautschi, R. S., et al. (2019). "Reconstruction of Secondary Calvarial Defects with Ex Situ Split Calvarial Bone Grafts: Long-Term Evaluation of Outcomes." Plastic and reconstructive surgery **143**(1): 223-233.

BACKGROUND: Autologous bone continues to represent the first choice for reconstruction of calvarial defects. However, unanswered questions remain on the natural history of the graft and the influence of patient-related risk factors. This study investigated the outcomes of skull reconstruction with split calvarial bone graft, examining the natural history and stratifying the risk of unfavorable results., METHODS: Patients who underwent cranioplasty with split calvarial bone graft between 1982 and 2016 at the Cleveland Clinic were analyzed, recording demographics, comorbidities, indications, size and location of defect, and outcomes including complications and reoperations. Changes in graft thickness were analyzed using computed tomographic and magnetic resonance imaging scans., RESULTS: Forty-one patients with an average age of 33.2 years, cranial defect size of 68 cm, and mean follow-up of 28 months were

included. The majority of patients (85 percent) had significant risk factors, with 43 percent suffering prior infection. Seventy-three percent of patients experienced successful restoration. A major complication was recorded in 26.8 percent; resorption occurred in 19.5 percent of patients (in 75 percent only at the recipient site), with 9.8 percent requiring reoperation. Patients with one or more risk factors or a smoking history were more likely to experience a complication. The mean ratio of the graft to the bicortical donor bone thickness was 0.48 +/- 0.17 for the recipient site and 0.57 +/- 0.10 for the donor site at an average radiographic follow-up of 11.9 +/- 10.9 years., CONCLUSIONS: This study demonstrated a 73.2 percent first-attempt success rate in a high-risk population. The grafts maintain thickness over time, with no evidence of bone hypertrophy. Defect characteristics and patient systemic factors appear to be important variables influencing success., CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

1764. Fredericks, C., et al. (2017). "Delayed cerebrospinal fluid leak after penetrating cervical trauma." Trauma (United Kingdom) **19**(1): 63-65.

Stab wound injury to the cervical spinal cord is a rare occurrence and usually presents with immediate, disastrous, and permanent neurological consequences. Rarer, and potentially as severe, is the complication of a delayed cerebrospinal fluid leak following a stab wound to the cervical spine. In this case, magnetic resonance imaging demonstrates a cerebrospinal fluid leak that extends to the skin with injury to the posterior dura at the C1/C2 level. Epidemiology and management of penetrating cervical spinal cord injury and delayed cerebrospinal fluid leaks are discussed.

1765. Freeman, K., et al. (2019). "Traumatic brain injury impairs cerebral blood flow regulation through disruption of inside-out signaling between capillaries and upstream arterioles." Shock **51**(6): 104.

Introduction: Traumatic brain injury (TBI) impairs neurovascular coupling, the process of cerebral blood flow regulation that delivers blood when demanded by metabolically active neurons (functional hyperemia). The pathophysiologic mechanisms of this impairment are not fully understood. It was recently discovered that functional hyperemia depends upon capillary endothelial cells responding to neuronal activity through inward-rectifier potassium channels. These vascular ion channels generate a regenerative, hyperpolarizing electrical signal that propagates from the capillaries along the vascular wall to dilate the upstream arteriole. We hypothesized that signaling from capillaries to penetrating arterioles (inside-out signaling) is disrupted in TBI. Methods: Mice were randomized to either fluid percussive brain injury or control treatment. TBI mice were recovered for 3-5 days prior to imaging. Cerebral blood flow was visualized through a cranial window under anesthesia, utilizing fluorescence of intravascular FITCdextran measured by multiphoton microscopy. Penetrating arterioles were identified by observing direction of RBCs flowing into the brain, and downstream capillaries were selected for study. The vascular response to capillary stimulation was measured by picospritzing 10 mM potassium directly on the capillary bed. Diameter and blood flow through the penetrating arterioles was measured at baseline, in the absence of calcium, and in response to elevated potassium. Results: We obtained in vivo images of cerebral capillaries and their penetrating arterioles in in TBI and control animals. Myogenic tone, measured as the difference in arteriolar diameter between baseline and calcium free conditions, was increased after TBI. In controls, capillary stimulation with high potassium caused vasodilation of the upstream arteriole and an increase in local blood flow. After TBI, the response to potassium was abrogated, with the same stimulus resulting in a transient constriction and decrease in local blood flow. Conclusions: In vivo cerebral hemodynamics are altered after TBI. We observed increased myogenic tone in the penetrating arterioles, and a paradoxical arteriolar response to stimulation of the downstream capillary bed. These results provide a novel mechanism that explains altered neurovascular coupling after brain injury.

1766. Freitas, M. B., et al. (2022). "LUNG CANCER METASTASES IN THE BRAIN: MAJOR RESPONSE WITH AFATINIB." Chest **161**(6): A570.

TYPE: Late Breaking Abstract TOPIC: Lung Cancer INTRODUCTION: Lung cancer (LC) is the leading cause of cancer-related death worldwide and it is responsible for nearly 50% of brain metastasis (BM) cases. Afatinib is a second-generation irreversible EGFR tyrosine kinase inhibitor, indicated in the treatment of metastatic LC with activating EGFR mutations. CASE PRESENTATION: A 71-year-old woman, ECOG PS 1, was diagnosed with stage IVb LC (T3N0M1b), EGFR mutated (exon 18: Glu790Lys, Lys744Asn, Gly719Ser). Staging brain MRI showed 2 left brain lesions, suggestive of BM, not surgically approachable: one in the parietal region (20x16mm) and another (3mm) in the temporo-occipital

transition. In the Multidisciplinary Tumor Board was decided treatment with afatinib and stereotactic brain surgery (SBS). To plan SBS another brain MRI was performed showing a significant reduction of the left parietal lesion (10x8mm; figure 1) and complete disappearance of the other lesion, after 8 days of treatment, and SBS was canceled. Reevaluation after 3 months revealed partial imaging response on the lung and brain (BM with 9mm, major axis). Due to grade 2-3 skin rash and paronychia, the treatment dose was reduced until 20mg/day, with good tolerance. DISCUSSION: Despite having incomplete blood-brain barrier penetration, afatinib has the potential to treat LC BM, with a reported intracranial response rate ranging from 35%-72.9%. This efficacy was demonstrated in this case report, allowing brain radiation sparing strategy. CONCLUSIONS: This case report shows the effectiveness of afatinib in BM from EGFR mutated lung adenocarcinoma. DISCLOSURE: No significant relationships. KEYWORD: Brain metastases

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1767. Fremont, R., et al. (2022). "P457. Damage to Elements of the Cortico-Striatal-Thalamo-Cortical Circuit are Associated With Repetitive Behaviors in Patients With Penetrating Brain Injury." Biological Psychiatry **91**(9): S272-S273.

Background: Damage to cortico-striato-thalamo-cortical (CSTC) circuits is associated with the development of repetitive behaviors in animals and humans. However, the types of repetitive behaviors that are developed after injury to these structures are poorly defined. Methods: We compared the effects of damage to separate elements of CSTC circuits sustained by veterans of the Vietnam War on the later point prevalence of repetitive thoughts and behaviors. We performed partial correlations (correcting for cognition, age, education, and global brain damage) between volume loss from TBI in specific elements of CSTC circuits (lateral and medial orbitofrontal and dorsolateral prefrontal cortices, anterior cingulate cortex, thalamus, and basal ganglia) and current scores on the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) Symptom Checklist, the Yale Global Tic Severity Scale (YGTSS), and the Hamilton Anxiety Rating Scale (HAM-A) in 126 Vietnam war veterans with penetrating brain injuries and 36 matched control subjects. Results: We found that volume loss in the left dorsolateral prefrontal cortex was associated with the development of compulsive behaviors, whereas volume loss in the basal ganglia was associated with the development of tics. No regions of interest were associated with anxiety or obsessions. Conclusions: Our findings suggest that traumatic brain injury resulting in damage to specific CSTC elements can be associated with the development of repetitive behaviors and tics that are not necessarily accompanied by obsessions or anxiety. Supported By: NIH Keywords: Dorsolateral Prefrontal Cortex, Basal Ganglia, Compulsive Behaviors, Lateral Orbitofrontal Gyrus, Obsessive Compulsive Disorder (OCD)

1768. Frenette, A. J., et al. (2019). "A Pilot Randomized Controlled Trial Comparing Levothyroxine to Placebo in Neurologically Deceased Donors." Progress in transplantation (Aliso Viejo, Calif.) **29**(3): 261-268.

BACKGROUND: Although commonly prescribed, the efficacy of levothyroxine to improve heart function in neurologically deceased donors is unclear. We evaluated the feasibility of a randomized controlled trial to compare levothyroxine to placebo on the variation of left ventricular ejection fraction, in hemodynamically unstable donors., METHODS: We conducted a pilot, double-blinded, randomized controlled trial. Deceased donors with reduced left ventricular ejection fraction or needing vasopressors were included. We randomized participants to a 20 mug bolus followed by a 20 mug/h infusion of levothyroxine or an identically appearing placebo. We report the proportion of recruited participants, the time to the administration of the study drug, and protocol violations., RESULTS: Twenty-four participants (N = 24/104; 23.1%) were eligible. Five of them (N = 5/24; 20.8%) were excluded by the attending physician. Four others were not included, due to family refusal for research (n = 2/24;8.3%) and unavailability of research staff (n = 2/24; 8.3%). Fifteen participants were randomized (N = 15/104; 14.4%). Mean time between the echocardiography and the initiation of the drug was 1.73 hours, and14 (93.3%) of 15 of the participants received the drug within 2 hours after the echocardiography. We report no study violation. The study was stopped prematurely because of low recruitment., CONCLUSION: This pilot trial suggests that the success of a definitive randomized control trial to assess the efficacy of levothyroxine in deceased donors could benefit from a multicenter recruitment and education on the evidence surrounding the pharmacological management of organ donors. The need for consent to research interventions in deceased donors should also be clarified.

1769. Friedman, I. B., et al. (2010). "Using principles of motor learning to treat apraxia of speech after traumatic brain injury." Journal of Medical Speech-Language Pathology **18**(1): 13-31.

Background: This study examined the effectiveness of a modified version of the Motor Learning Guided (MLG) approach, a treatment protocol to establish functional speech that incorporates principles of motor learning: blocked

and random practice schedules, delayed and summary knowledge of response (KR) feedback, and specificity of training. Methods: A 29-year-old male survivor of traumatic brain injury diagnosed with moderate-severe apraxia of speech (AOS) participated in this protocol. A time-series ABA design measured the participant's production of two sets of five target items, and his ability to maintain accurate productions several months after treatment. Results: Improvements were seen in the participant's ability to produce both sets of trained items; however, the second set of target items were practiced with more frequency, which may have lead to a greater accuracy of production in less time compared to the first set of five target items. Conclusions: Application of motor learning principles through the modified MLG approach can lead to increased accuracy and automaticity of trained target items, and the ability to maintain accurate phrase production following cessation of treatment. Adherence to a frequent practice schedule and other motor learning principles is influential to success of this treatment for AOS.

1770. Friedman, J., et al. (2022). "Laryngeal keel for management of anterior glottic web in patient with ballistic injury to the glottis." Otolaryngology Case Reports **23**.

Penetrating neck trauma can result in life-threatening injuries to the airway and major vascular structures. Surgeons must also be cognizant that laryngeal injuries also require timely evaluation and management. Traumatic glottic injuries and laryngeal surgery are two possible causes of glottic stenosis which remains a serious clinical concern. Multiple different approaches and surgical techniques exist but there is no clear guidance in determining the optimal procedure. The use of a keel in the treatment of glottic webs was first described in the 1950s, but to our knowledge, this is the first report detailing endoscopic keel placement following penetrating glottic trauma involving the anterior commissure. The endoscopic approach is a useful modality for preventing glottic stenosis and avoids the need for open laryngofissure.

1771. Friedrich, R. E. and F. Schulz (2005). "[Mandibular fracture following stab injury with a knife]." Unterkieferfraktur durch Messerstich. **215**(1-2): 27-33.

Stab injuries of the face accompanied by fractures of the jaws are rare. The report deals with the case of a young man, who suffered a penetrating stab injury to the cheek and fracture of the mandible in an assault. The forensic questions to be answered were if the findings were compatible with a stab and subsequent fracture, if one of the confiscated instruments could have been the causative weapon and if the injury had to be assessed as life-threatening. Both the soft and the hard tissue injury confirmed the assumption that they were caused by a stab. It was not possible, however, to assign the injury to a specific knife from the submitted exhibits on the basis of the clinical findings. In the discussion the serious nature of stab injuries in the facial region is emphasized.

1772. Fries, D., et al. (1984). "[Brain-death unit and renal transplantation. Evaluation of 5 years' experience]." Centre d'accueil de morts cerebrales et transplantation renale. Bilan de cinq annees de fonctionnement. **3**(2): 94-98.

From 1977 to 1982, 170 potential organ donors were referred to "a brain-death unit". A vast majority of these patients were provided by intensive care units of district general hospitals from Ile-de-France. This fact confirms the dispersion of potential organ donors and the usefulness of an organ-procurement structure based in an University Hospital. Its effectiveness is demonstrated by an harvesting rate of 58%, largely over the already published reports in case of absence of such a center. It is concluded that the adoption of this system by other hospitals would significantly increase the number of cadaver kidney grafts available for transplantation whereas actually the number of kidney grafts remains dramatically low in France.

1773. Frimpong, P., et al. (2021). "Incidence and management of mandibular fractures in a low-resource health facility in Ghana." Journal of the Korean Association of Oral and Maxillofacial Surgeons **47**(6): 432-437.

Objectives: The mandible and other parts of the maxillofacial region suffer significant morbid injuries following road traffic accidents. Our study gives epidemiological description of mandibular fractures in Ghana and also evaluates the relevance of closed reduction and indirect fixation for managing mandibular fractures in low-resource health facilities in low-income countries like Ghana. Patients and Methods: This is a retrospective study involving 268 patients who reported to the Department of Oral and Maxillofacial Surgery of the Sunyani Regional Hospital with mandibular fractures from January 2010 to December 2019. Patient medical records were assessed for information on age, sex,

fracture etiology, anatomic location of fracture, time of day of road traffic accident, and other associated injuries. Results: A total of 268 patients were included in this study (males, 216 [80.6%]; females, 52 [19.4%]). Motor vehicular accident (MVA) was the leading cause of mandibular fractures (202 injuries, 75.4%). Other etiologies included assault (39, 14.6%), gunshot (13, 4.9%), falls (12, 4.5%), and industrial accidents (2, 0.7%). Of the 161 male cases caused by MVA, 121 (75.2%) occurred at night and in the evening while the remaining 40 (24.8%) occurred in the morning and afternoon. Among all managed 222 patients, 212 (79.1%) were treated with closed reduction and indirect fixation technique while 10 (3.7%) were treated with open reduction and direct fixation. Conclusion: Closed reduction with indirect fixation could successfully be used to manage mandibular fractures in low resourced health facilities, especially in low-income countries. The poor lightening system on roads in Ghana is a major contributory factor to motor vehicular accidents.

1774. Frisardi, F., et al. (2014). "Decompressive craniectomy may cause diagnostic challenges to assess brain death by computed tomography angiography." Minerva anestesiologica **80**(1): 113-118.

According to Italian legislation to diagnose brain death (BD) after the initial documentation of the clinical signs, repetition of clinical testing and confirmation of the loss of bioelectrical activity of the brain (EEG) is required. However, when EEG is unreliable it is necessary to demonstrate cerebral circulatory arrest (CCA). Accepted imaging techniques to demonstrate CCA include: cerebral angiography, cerebral scintigraphy, transcranial Doppler (TCD) and computed tomography angiography (CTA). This latter technique, due to its large availability, low invasivity and easy and fast acquisition is widely used over the country. Nevertheless its diagnostic reliability is affected by some limitations in patients with decompressive craniectomy. Here we report two cases of brain injury with clinical signs of BD and at the same time, opacification of intracranial arteries on CTA and a pattern consistent with flow arrest on the corresponding insonable arteries on TCD. The discrepancy between CTA and TCD results points out a methodology limitation that could be overcome by updating Italian legislation according to other European Countries legislation.

1775. Fritz, M. A. and T. M. Haffey (2013). "Application of autologous free tissue transfer in the management of massive traumatic tissue loss." Otolaryngologic clinics of North America **46**(5): 903-913.

This review describes a general approach and philosophy in the management of massive facial trauma with extensive tissue loss, with particular highlight on the role of free tissue transfer.

1776. Froind, S., et al. (2013). "Delayed diagnosis of intracranial injury due to a dog bite--a case report and review of the literature." International journal of pediatric otorhinolaryngology **77**(9): 1400-1402.

OBJECTIVES: Dog bite injury of the head and neck is not rare in children although intracranial injury is reported anecdotally. Among the case reports there is a significant number of patients in whom the diagnosis of penetrating cranial injury was delayed. The aim of the study was to describe a patient with a trans mastoid head injury due to a dog bite that was not diagnosed at presentation and review similar cases in the literature., METHODS: A 13-year-old girl was admitted to the emergency room with severe head, neck and breast lacerations. She was transferred to the operating room for debridement and only then was a trans mastoid fracture diagnosed. We searched for case reports in the literature describing children suffering from dog bites in whom the diagnosis of intracranial injury was delayed., RESULTS: We found descriptions of five children, 4 after dog bite and one after tiger bite. Four of them were under two years of age and all had scalp lacerations that were treated at presentation. The time period to diagnosing the brain injury was one day to three weeks. The symptoms that led to the diagnosis were fever in 3 patients, meningitis in two, brain abscess in one child and four of them developed neurological signs. All of the children had surgical intervention after diagnosis., CONCLUSIONS: Intracranial injury after dog bite should be suspected in any child with scalp lacerations. Adequate investigations should be performed at presentation with careful attention to this specific type of trauma.

1777. Frosen, J., et al. (2019). "Outcome and rational management of civilian gunshot injuries to the brain-retrospective analysis of patients treated at the Helsinki University Hospital from 2000 to 2012." Acta neurochirurgica **161**(7): 1285-1295.

BACKGROUND: Treatment of gunshot wounds of the brain (GSWB) remains controversial and there is high variation in reported survival rates (from < 10 to > 90%) depending on the etiology and country. We retrospectively analyzed the outcome of a series of consecutive GSWB patients admitted alive to a level 1 trauma center in a safe high-income welfare country with a low rate of homicidal gun violence., METHODS: Patients admitted due to a GSWB to the HUS Helsinki University Hospital during 2000-2012 were identified from hospital discharge registry and log books of the emergency room and ICU. CT scans and medical records of these patients were reviewed. Univariate analysis and backward logistic regression were performed, and their results compared with that of a systematic literature review of factors related to the outcome of GSWB patients., RESULTS: Sixty-four patients admitted alive after GSWB were identified. Eighty percent had self-inflicted GSWB, 81% were contact shots, and 70% were caused by handguns. In-hospital mortality was 72%. Factors associated with mortality in our series were low GCS (<= 8) at admission, transventricular bullet trajectory, and associated damage to deep brain structures, as reported before in the literature. Of the 64 patients admitted alive, 42% (27/64) were admitted to ICU, 34% (22/64) underwent surgery, and in 25% (16/64), craniotomy and hematoma evacuation was performed. Mortality in the surgically treated group was 32% but near 100% without surgery and ICU treatment. Median GOS in the surgically treated patients was 3 (range 1-5)., CONCLUSIONS: GSWB caused by contact shot from handguns has a high mortality rate, but can be survived with reasonable outcome if limited to lobar injury without significant damage to deep brain structures or brain stem. In such GSWB patients, initial aggressive resuscitation, ICU admission, and surgery seem indicated.

1778. Frugoni, R., et al. (1971). "[Free bullet in the ventricle cavity]." Proyectil libre en cavidad ventricular. **17**(2 Suppl): 337-344.

1779. Fry, R. E. and W. J. Fry (1980). "Extracranial carotid artery injuries." Surgery **88**(4): 581-587.

From December, 1975, to December, 1979, 54 carotid artery injuries have been treated by the Southwestern Medical School Department of Surgery. Seventy-eight percent were due to gunshot wounds, 20% were due to stab wounds, and 2% were secondary to blunt trauma. Thirty-three percent involved the internal carotid artery, and the external carotid artery was involved in 20%. Eighteen percent of the patients presented with a major associated venous injury and 8% with an arteriovenous fistula. Partial or complete disruption accounted for the majority of injuries. There was a 10% mortality rate. Four percent of the deaths were due directly to carotid vascular trauma. Because of our experience we believe, whenever possible, all patients should have the benefit of preoperative arteriography. This allows for a well planned operation and avoids major unnecessary neck dissection. High lesions involving the internal carotid artery may be exposed easily by anterior dislocation of the jaw, thus allowing ready access to the base of the skull. Injuries involving extensive areas of the internal carotid artery (lesions extending intracranially) are best managed by extracranial-intracranial (EC-IC) bypass with internal carotid artery ligation. Severe neurologic deficit is best treated by ligation of the carotid artery. Seven patients have undergone EC-IC bypass and 86% of these returned to or maintained normal neurologic status, while the other 14% remained neurologically stable. It is our impression that the risk of neurologic deficit is lessened by this maneuver without added mortality or morbidity.

1780. Fuesl, H. S. (2017). Das mit dem Knallfrosch ist ins Auge gegangen. **159**(17): 41.

1781. Fujii, T., et al. (1979). "[A case of penetrating cerebellar injury (author's transl)]." No shinkei geka. Neurological surgery **7**(9): 881-887.

1782. Fujimoto, S., et al. (1987). "[Three cases of an intracranial wooden foreign body]." No shinkei geka. Neurological surgery **15**(7): 751-756.

Three cases of intracranial wooden foreign body are reported discussing the diagnostic and therapeutic problems. First case is a 50-year-old man. After drinking, he drove a bike and fell to the ground. On admission the wooden foreign body could not been detected in appearance. CT scan showed low density area similar to air in bilateral anterior horn of lateral ventricle. The patient was treated for traumatic pneumocephalus at first. Later, it proved that he was stabbed with a foreign body penetrating into the contralateral frontal lobe through the left nasal cavity. It was

extracted by endonasal approach by otolaryngologist, fortunately without trouble. The foreign body was a branch of tree. The second case is an 18-year-old man. He was driving a car, and suffered injury. He was stabbed with a wooden stake penetrating into his left eye. Immediately, bifrontal craniotomy was performed and the stake was withdrawn carefully. Moreover bone fragments were removed. The third case is a 61-year-old man. When he cut the timber by chain saw, a piece of wood hit and stabbed his right eye directly. Immediately right front temporal craniotomy was performed. The piece of wood was withdrawn from the right eye, and pieces of glass, wood and bone fragments were evacuated. It is difficult to confirm intracranial foreign body accurately by means of only plain skull film and usual CT scans. It is necessary to utilize various function of CT scanner. For example, it is useful to know CT values or select measure mode with window width and level or make reconstruction image to sagittal or coronal section, and so on.(ABSTRACT TRUNCATED AT 250 WORDS)

1783. Fujimoto, Y., et al. (2001). "Spontaneous migration of a bullet in the cerebellum--case report." Neurologia medico-chirurgica **41**(10): 499-501.

A 15-year-old boy presented with a gunshot wound in the left cerebellar hemisphere. He was confused and left cerebellar signs were noted. The patient underwent the first surgery for debridement of the entry wound in the left parietal region and second surgery to remove the bullet. However, the bullet could not be located via a left unilateral suboccipital craniectomy in the park bench position, because it had migrated to the opposite side due to the effects of gravity in just a few hours. Skull radiography obtained just before the third surgery showed that the bullet had returned to the left side, and it was removed easily via the previous craniectomy in the sitting position. The clinical course suggests that in removing a bullet, skull radiography or computed tomography should be obtained just before surgery, or even intraoperatively, and that those findings should be the basis for the surgical procedure and operative position.

1784. Fujiwara, K., et al. (2017). "[Transoral Penetrating Cranial Injury by a Chopstick:A Case Report]." No shinkei geka. Neurological surgery **45**(8): 685-690.

Intracranial injury resultant from a chopstick penetrating the oral cavity is often fatal in children, and only 5 clinical cases have been reported. If the depth of penetration is indeterminable, due to the chopstick being removed or the remaining piece not being located, then injury management is challenging; here, we report such a case. A 26-month-old girl fell over with a plastic chopstick in her mouth. The chopstick was removed immediately and without breakage by her father. He noted that around 3 cm of the pointed end had pierced the palate. CT revealed air bubbles in the retropharyngeal space but no abnormality in the cranium. Subsequent complications included bacterial meningitis and right hemiparesis but neither MRI nor any alternative imaging modality could aid in locating the intracranial lesion that induced the weakness. Neurological findings suggested injury of the right lateral corticospinal tract at the lower end of the medulla oblongata. An axial T2-weighted MRI showed a 30-mm high signal path of penetration from the posterior nasopharyngeal wall to the dura at the craniocervical junction. When the route is extended 36 mm intracranially from the wound orifice, the path makes superficial contact with the right lateral portion of the medulla oblongata, which corresponds with the lateral corticospinal tract. We therefore hypothesize that this was the lesion location but that it was too small to be detected using MRI.

1785. Fukuda, S., et al. (2015). "A search for protective drugs against diabetic blood-brain barrier dysfunction model in vitro." Journal of pharmacological sciences **128**(3): S235.

The prevalence of diabetes mellitus (DM) is increasing rapidly worldwide. The dysfunction of vascular endothelial cells is considered to be a key initial step in diabetic angiopathy, and to affect the progression and severity of DM. In the brain, DM-associated vascular inflammation may contribute to early breakdown of the functional integrity of the blood-brain barrier. The BBB dysfunction allow blood components penetration into the brain parenchyma, and these insults may link with acceleration of neurological damages. Thus BBB protection against hyperglycemia has a strong influence to prevent cerebral damages. In the present study, we clarified the effects of several compounds on BBB dysfunction model induced by hyperglycemia. We investigated the effect of pitavastatin, candesartan, cilostazol, GLP-1 and GLP-2 on barrier function in rat capillary endothelial cells (RBEC). Barrier functions were estimated by measuring the transendothelial electrical resistance (TEER) and permeability of sodium fluorescein. Pitavastatin, candesartan and GLPs prevented the decrease of barrier function induced by hyperglycemia. Our results suggest that those compounds have a potential to be the BBB-protective drug.

1786. Fukutake, T. and T. Hattori (2004). "Missile injury of the head disclosed by computed tomographic scan 60 years later." The Journal of trauma **56**(2): 453.

1787. Fulcher, T. P., et al. (2002). "Clinical features and management of intraorbital foreign bodies." Ophthalmology **109**(3): 494-500.

PURPOSE: To review the clinical features and management of patients with intraorbital foreign bodies., DESIGN: Noncomparative interventional case series., PATIENTS AND METHOD: Forty patients seen at two regional orbital surgery departments with intraorbital foreign bodies were reviewed., MAIN OUTCOME MEASURES: Visual acuity, surgical interventions, and complications., RESULTS: Seventy-three percent of patients were younger than 30 years old. There were 22 metallic, inorganic; 5 nonmetallic, inorganic; and 13 organic intraorbital foreign bodies (IOrbFb) in this series. Thirty patients were seen at the time of injury, and 10 patients were seen in a delayed setting with orbital complications. Thirty-four patients had surgical removal of their IOrbFb either because of complications or easy surgical access. Six patients had no surgery because of posteriorly located inorganic foreign bodies. Thirteen patients had resultant blind eyes; 12 of these were blind from the initial trauma., CONCLUSIONS: Loss of vision in conjunction with IOrbFbs is usually a result of the initial trauma. All patients should have antibiotic therapy because of the high incidence of secondary orbital infections. Computed tomography is the best initial mode of imaging. Surgical removal is indicated for all organic IOrbFbs. Inorganic IOrbFbs should be removed if causing complications or if located anteriorly after discussion of potential surgical complications with the patient. Posteriorly located inorganic IOrbFbs should be left alone, unless they are causing significant orbital complications.

1788. Fulcher, T. P. and T. J. Sullivan (2003). "Orbital roof fractures: management of ophthalmic complications." Ophthalmic plastic and reconstructive surgery **19**(5): 359-363.

PURPOSE: To review the clinical features and management of patients with orbital roof fractures., METHODS: Non-comparative, retrospective case review of 21 patients presenting with orbital roof fractures., RESULTS: The orbital roof fractures in our series resulted from motor vehicle accidents, blunt trauma, head injuries, and penetrating orbital injuries. Associated orbital and ocular injuries included other ipsilateral orbital fractures (16 cases), traumatic optic neuropathy (3 cases), ptosis (2 cases), perforating eye injuries (2 cases), intraorbital foreign bodies (2 cases), and oculomotor nerve palsy (1 case). Six patients required surgical intervention for ophthalmic sequelae, which included motility problems (4 cases), lagophthalmos (1 case), and a retained intraorbital foreign body with a cerebrospinal fluid leak (one case). The outcome of surgery was favorable in all cases, with complete resolution of symptoms in five of six patients., CONCLUSIONS: Orbital and ocular injuries are common in association with orbital roof fractures. A multidisciplinary approach to management is required because facial and cerebral injuries are also common. Most patients can be managed conservatively. The specific ophthalmic indications for surgical intervention are limited, but the outcome in these cases is gratifying.

1789. Fullarton, G. M., et al. (1987). "An evaluation of open scalp wounds." Archives of emergency medicine **4**(1): 11-16.

A retrospective study of 661 adult patients with open scalp wounds attending the Accident and Emergency Department of Glasgow Royal Infirmary, Glasgow, Scotland, was performed. Detailed information was recorded about history, nature of open wounds ('contused' or 'incised'), wound exploration and radiological findings. The commonest cause of injury was assault (40%), followed by falls (34%). Half of the patients had been drinking alcohol. The majority of scalp wounds were 'contused' (84%) resulting equally from assaults and falls; 'incised' wounds (16%) were more commonly due to assault. Although division of the occipitofrontalis aponeurosis was infrequent (18%), most (78%) of the skull fractures occurred in this group. Wound exploration detected nine fractures not evident on skull X-rays. To maximise fracture detection rate, careful wound exploration should be an important adjunct to skull radiography and, in particular, division of the occipitofrontalis aponeurosis should alert the casualty officer to the likelihood of a skull fracture.

1790. Fullington, R. J. and C. M. Otto (1997). "Characteristics and management of gunshot wounds in dogs and cats: 84 cases (1986-1995)." Journal of the American Veterinary Medical Association **210**(5): 658-662.

OBJECTIVE: To determine history, signalment, physical examination findings, treatment, complications, outcome, and prognostic indicators of dogs and cats treated for gunshot wounds at an urban veterinary referral hospital., DESIGN: Retrospective study., ANIMALS: 82 dogs and 2 cats., RESULTS: Young (< 3 years old) sexually intact males were overrepresented. Of the 122 injuries, 52 were to limbs (23/52 were associated with fractures), 32 involved the thorax, 14 involved the abdomen, 14 involved the head, 6 involved the neck, and 4 involved the vertebral column. Seven animals were euthanatized because of financial concerns. Of the remaining 77, 11 died and 66 were discharged from the hospital. Conservative treatment was adequate for animals with limb injuries not associated with a fracture. However, animals with evidence of peritoneal penetration required an exploratory laparotomy. Animals with thoracic injuries usually could be managed with conservative treatment or thoracocentesis. Only 1 animal underwent thoracotomy. Wound infection developed in 4 animals. Initial treatment of animals with gunshot wounds should include administration of antibiotics effective against gram-positive and -negative bacteria., CLINICAL IMPLICATIONS: Most dogs with gunshot wounds that receive adequate treatment can be expected to survive. However, dogs with vertebral column or abdominal wounds may have a worse prognosis than dogs with thoracic or limb injuries.

1791. Fung, H. S., et al. (2008). "Gunshot injury in Hong Kong: Report of 2 cases." Journal of the Hong Kong College of Radiologists **11**(2): 85-88.

Gunshot injury is a serious but uncommon type of trauma in Hong Kong. This report describes 2 cases of gunshot injury, 1 by a handgun and 1 by a shotgun. The literature is reviewed, with emphasis on important imaging features and associated forensic implications.

1792. Funk, G. F., et al. (1995). "Free-tissue transfer reconstruction of midfacial and cranio-orbito-facial defects." Archives of otolaryngology--head & neck surgery **121**(3): 293-303.

OBJECTIVE: To review our results using free-tissue transfer to reconstruct midfacial and cranio-orbito-facial defects., DESIGN: Case series., SETTING: The University of Iowa Hospitals and Clinics, Iowa City., PATIENTS: Fourteen of 21 patients had defects that resulted from ablative oncologic surgery; six had severe mid-facial trauma; and one had Romberg's disease., INTERVENTIONS: Four latissimus dorsi, 11 rectus abdominis, three scapula, and four forearm free-tissue transfer flaps were used., MAIN OUTCOME MEASURES: Adequate flap separation of vital structures (intracranial contents and carotid artery) from the sinonasal or oropharyngeal cavities; restoration of palatal competence, oral diet, and speech intelligibility; maxillary dental rehabilitation; aesthetic results; complications; and the patient's return to social activities outside the home after surgery., RESULTS: The intracranial contents (six cases) or carotid artery (four cases) were protected from sinonasal or oropharyngeal contamination by the reconstructive flap in all cases in which this was required. Functional closure of the palate with the flap or a prosthesis was possible in 12 of the 13 patients with a palatal defect; seven of these 13 patients have had full maxillary dental rehabilitation. Twenty patients take an oral diet. Sixteen patients have normal or easily understood speech. Fourteen patients engage in social activities outside the home, and eight have returned to full-time employment. No vascular flap failures occurred in this series., CONCLUSIONS: The use of free-tissue transfer flaps is a safe and effective technique for repairing large midfacial and cranio-orbito-facial defects resulting from ablative oncologic surgery or trauma.

1793. Furlow, B. (2006). "Diagnostic imaging of traumatic brain injury." Radiologic technology **78**(2): 145-149.

In this Directed Reading, the history and epidemiology of traumatic brain injury (TBI) will be briefly introduced, the physical and physiological nature of TBI reviewed and the role of imaging in the assessment of TBI patients described. New imaging techniques and recent findings about the neurological correlates of TBI symptoms and outcomes from studies using different imaging modalities and techniques will also be discussed. This directed reading will focus on closed-head TBI; penetrating missile brain injuries, such as those caused by bullet wounds, will not be reviewed.

1794. Fuse, A., et al. (2011). "Current status of preparedness for blast injuries in Japan." Japan Medical Association Journal **54**(5): 310-317.

In recent years, blast injuries worldwide have primarily been caused by explosions of improvised explosive devices detonated in terrorist attacks. The most common mechanism of injury among U.S. soldiers in Iraq and Afghanistan war is explosions. Blast injuries are complicated, being compounded by injuries caused by blast waves in addition to penetrating and blunt trauma. Moreover, maintaining safety and security is a major concern in providing medical care and requires an understanding of blast physics and blast injury pathophysiology, especially in cases of blast lung injury (BLI) and blast-induced traumatic brain injury (bTBI). In this paper, we present our review of the current status of preparedness for blast injuries, which was conducted with the cooperation of the Cabinet Office of the Government of Japan and the Japan Self Defense Force. Based on this review, we created two action card systems and a medical record system in Japanese for blast injuries: "Survival Cards for Explosive Events for the First-on-scene Responder," "Survival Cards for Explosive Events for Medical Staff Providing Prehospital and Hospital Medical Care," and the "Medical Records System for Blast Injuries." These were developed with reference to preparedness guidelines issued by the United States and European countries and are available on the Cabinet Office website. As the next step, guidelines for the treatment of blast injuries should be established and full-scale drills should be conducted as preparedness activities.

1795. Gaal, A., et al. (2016). "Limited antibiotic dosing during the operative management of mandible fractures is not associated with an increased risk for surgical site infections." Journal of oral and maxillofacial surgery **74**(9): e27-e28.

Purpose: The purpose of this study is to answer the research question: Among patients undergoing transoral operative treatment of isolated, open mandible fractures, do those who receive only intraoperative antibiotics when compared to those receiving intraoperative antibiotics and other antibiotics dosing combinations, e.g. preoperative or postoperative antibiotics, have an increased risk of surgical site infections (SSIs). We hypothesize that there is no difference in the frequency of SSIs between patients receiving intraoperative antibiotics and those receiving intraoperative plus additional preoperative or postoperative antibiotics. The aims of this study are to estimate and compare: 1) the frequencies of SSIs and 2) adverse antibiotic effects (AAEs) between patients who receive only intraoperative antibiotics and those who receive intraoperative antibiotics plus additional preoperative or postoperative antibiotics while undergoing operative treatment of open mandible fractures. Methods: STUDY DESIGN/SAMPLE To answer the research question, the investigators designed and implemented a retrospective cohort study that enrolled a sample derived from the patients who presented to Harborview Medical Center (HMC) between June 30th, 2009 and July 31st, 2014 with open mandibular fractures. Inclusion criteria were subjects age 18 years or older with isolated open mandibular fractures treated operatively via transoral approaches. Subjects were excluded if they presented with any other fractures, complex mandibular fractures (e.g. requiring transcervical approach), gunshot wounds, pre-existing concomitant mandibular fractures, fracture site infections present, closed mandibular fractures, immunocompromised (e.g. HIV+, any immunosuppressive medication), or if they received antibiotics for any other indication. The primary predictor variable was antibiotic exposure. The experimental (intraoperative) group received antibiotics administered within 1 hour before surgical incision, with possible intraoperative re-dosing consistent with the Joint Commission's Surgical Care Improvement Project (SCIP) criterion for prophylactic surgical antibiotics1. The control group subjects received antibiotics per the experimental group plus additional preoperative and/or postoperative antibiotics. The primary outcome variable was the presence or absence of SSIs (e.g. the presence of pus, osteomyelitis, or wound dehiscence requiring more intervention than local wound care). The secondary outcome variable was the presence or absence of an AAE. Uni-, bivariate, and multiple logistic regression statistics were used and statistical significance was set at $p<0.05$. Results: The sample was composed of 510 subjects with a mean age of 29 ± 11.4 years. 86% were males. The experimental group had 58 (11%) subjects. The control group had 452 (89%) subjects. The SSI frequencies in the experimental and control groups were 9% and 17% respectively. OR 0.45 (95% CI 0.17-1.15) P=0.13. In the multivariable logistic regression model, only tobacco use was associated with an increased risk for SSI; OR = 2.7 (95% CI 1.5-5.2), p=0.0015∗ ∗ ∗. There were 5 (1%) AAEs reported. All AAEs were isolated to the control group. Conclusion: Limiting antibiotic exposure to only intraoperative antibiotics among patients undergoing transoral operative treatment of isolated open mandible fractures is not associated with an increased risk of SSIs. These results support the assertion that intraoperative antibiotics alone suffice in the management of open mandible fractures.

1796. Gabikian, P., et al. (2012). "Isolated superior orbital fissure syndrome resulting from gunshot wound to the head." Current problems in diagnostic radiology **41**(4): 112-113.

1797. Gaboriau, H. P. and K. L. Kreutziger (1998). "Penetrating injuries of the face." The Journal of the Louisiana State Medical Society : official organ of the Louisiana State Medical Society **150**(1): 6-9.

In dealing with gunshot wounds to the face, the emergency department physician should have a basic knowledge of ballistics. Securing an airway (either intubation or surgical airway) should be the top priority. The location of the wound dictates which patient should be intubated. Plain x-ray films of the face and skull, as well as CT scan in certain situations, allow determination of the extent of damages to the skeleton as well as intracranial injuries. Clinical symptoms suggesting an underlying vascular injury require an angiogram. After thorough debridement of the wounds, fractures are treated either with open-reduction and internal fixation or closed-reduction and intermaxillary fixation.

1798. Gadicherla, S., et al. (2016). "Mandibular fractures and associated factors at a tertiary care hospital." Archives of Trauma Research **5**(4).

Objectives: The aim of this study was to evaluate the distribution, etiology and type of mandibular fractures in subjects referred to our institution. Methods: A retrospective study of 689 subjects, during the period from May 2010 to September 2013 with mandibular fractures was conducted. Information on age, gender, mechanism of injury and sites of trauma was obtained from the trauma registry. Data were tabulated and analyzed statistically. Results: A total of 653 subjects had mandibular fractures, out of which 574 were males. The mean age of the participants was 31.54 ±13.07. The majority of the subjects were between 21-40 years of age, in both males (61.7%) and females (54.4%). The major cause of fractures was road traffic accidents (87.4%) followed by fall (6.9%) and assault (4%), with the least frequent being gunshot injuries (0.3%). Almost half of the patients had parasymphysis fractures (50.2%), followed by angle (24.3%), condyle (20.4%), ramus (2.3%) and coronoid (2%). A total of 115 patients had bilateral fractures out of which 29 had parasymphysis, 12 had body fractures and 74 had bilateral condylar fractures. Double mandibular fractures were reported in 193 subjects; out of which 151 subjects had double contralateral and 42 had double unilateral fractures. Triple unilateral fracture was reported in only one subject. A total of 338 subjects had multiple fractures among the study population. Conclusions: Mandibular fractures can be complicated and demanding, and have a compelling impact on patients' quality of life. Our study reported that parasymphysis was the most common region involved in mandible fractures.

1799. Gadkari, S. S. (2007). "Evaluation of 19 cases of inadvertent globe perforation due to periocular injections." Indian journal of ophthalmology **55**(2): 103-107.

BACKGROUND: Inadvertent globe perforation due to periocular injection is a serious iatrogenic complication., AIM: To study risk factors, management and visual outcome of inadvertent globe perforation during periocular injection, in cases referred to a tertiary eye care center., DESIGN AND SETTING: Retrospective study at a tertiary referral center with a single investigator., MATERIALS AND METHODS: Nineteen consecutive cases with a clinical diagnosis of globe perforation were studied (1998-2004). Clinical setting, risk factors, clinical presentation, management and visual outcome were analyzed., RESULTS: Retrobulbar injections 6 (32%), peribulbar injections 10 (53%) and subconjunctival injections 3 (16%) were responsible for inadvertent globe perforation. Anesthetists accounted for 6 (32%) injections and 13 (69%) were referred from high volume community settings. Anesthetists identified the mishap on the table in 17% (1 out of 6) of cases and the ophthalmologists in 69% (9 out of 13) myopia was present in 10 (53%). Breaks were located inferotemporally in nine eyes. Four underwent laser and cryopexy, 14 (74%) underwent vitreous surgery. Visual acuity greater than 20/200 was achieved in 12 patients., CONCLUSION: Myopia was found to be a significant risk factor. Inferotemporal breaks were common. Anesthetists were more likely to miss this complication when it occurred. In this series, intervention salvaged vision in a significant number of eyes.

1800. Gaidash, A. A., et al. (2014). "[Membranes structure and physical and mechanical erythrocytes properties in the early period of traumatic brain injury caused by less-lethal firearms]." Voenno-meditsinskii zhurnal **335**(4): 14-21.

The dynamics of erythrocytes properties in the acute phase of traumatic brain injury caused by less-lethal firearms has been studied by the methods of atomic force and morphometry. The experiments have been performed on sheep by a Makarych pistol single shot at the parietooccipital area. It has been established that under the influence of the shock waves the erythrocyte disks and transmembrane liquid oscillatory fluctuations (flicker) are increased. The fluctuations are rapidly attenuated and the shock waves energy is accepted by cytoplasmic membranes lipoproteids. As

a result the interface tlipid-protein, phase transitions are hastened. The membranes undergo heterogeneous structural, physical and mechanical transformations the character of which is determined by the phase transitions direction. In the spots of phospolipid liquid clusters accumulation the fluidity is increased and marks caused by membranes lamination and spreading appear. In the spots of phospholipids solid phase the surfaces become hydrophobic and marks caused by membranes local embrittlement and fragility appear. The transmembrane fluid hydrodynamic flows heterogeneity is increased due to deformation processes irregular spreading. The flows acceleration causes the hydrodynamic ruptures-like defects. The flows deceleration results in depressions evolving through the mechanism of creeping erosions.

1801. Gaier, E. D., et al. (2020). "Poor prognoses of open globe injuries with concomitant orbital fractures." Orbit (Amsterdam, Netherlands) **39**(4): 241-250.

PURPOSE: Orbital trauma, particularly with open globe injury, can have a wide range of visual outcomes, which can be difficult to predict at presentation. Clinical features on presentation may provide insight into visual prognosis. We hypothesized that patients with open globe injuries and concomitant orbital fractures have poorer visual outcomes than patients without orbital fractures., METHODS: We reviewed the charts of 77 patients with isolated open globe injuries (OG) and 76 patients with open globe injuries and concomitant orbital fractures (OGOF). Multivariate regression analysis was performed to assess the relative influence of individual presenting historical and clinical features on visual outcome., RESULTS: OGOF patients were more likely to have sustained blunt trauma than a sharp, penetrating injury compared to OG patients. Ocular wound locations were more posterior and likely to involve multiple zones in OGOF compared to OG patients. Among OGOF patients, orbital floor fractures were the most common and roof fractures were the least common, but the latter was associated with presenting NLP vision and multiple zone involvement. The presence of an orbital fracture independently increased the odds of subsequent evisceration/enucleation (OR: 4.6, 95% CI 1.3-20.1, p = .0246) and NLP vision (OR: 6.81, 95% CI 2.42-21.85, p = .0005) when controlling for zone, mechanism of injury, uveal prolapse and demographic variables., CONCLUSIONS: The presence of an orbital fracture independently confers a worse visual and ocular prognosis in patients with open globe injuries. Patients with open globe injuries in this category should be appropriately counseled.

1802. Gajavelli, S., et al. (2015). "Glucose and oxygen metabolism after penetrating ballistic-like brain injury." Journal of cerebral blood flow and metabolism : official journal of the International Society of Cerebral Blood Flow and Metabolism **35**(5): 773-780.

Traumatic brain injury (TBI) is a major cause of death and disability in all age groups. Among TBI, penetrating traumatic brain injuries (PTBI) have the worst prognosis and represent the leading cause of TBI-related morbidity and death. However, there are no specific drugs/interventions due to unclear pathophysiology. To gain insights we looked at cerebral metabolism in a PTBI rat model: penetrating ballistic-like brain injury (PBBI). Early after injury, regional cerebral oxygen tension and consumption significantly decreased in the ipsilateral cortex in the PBBI group compared with the control group. At the same time point, glucose uptake was significantly reduced globally in the PBBI group compared with the control group. Examination of Fluorojade B-stained brain sections at 24 hours after PBBI revealed an incomplete overlap of metabolic impairment and neurodegeneration. As expected, the injury core had the most severe metabolic impairment and highest neurodegeneration. However, in the peri-lesional area, despite similar metabolic impairment, there was lesser neurodegeneration. Given our findings, the data suggest the presence of two distinct zones of primary injury, of which only one recovers. We anticipate the peri-lesional area encompassing the PBBI ischemic penumbra, could be salvaged by acute therapies.

1803. Gajavelli, S., et al. (2019). "Long-term preclinical safety evaluation of clinical-grade human neural stem cells in rodent model of traumatic brain injury." Journal of neurotrauma **36**(13): A77-A78.

Traumatic brain injury (TBI) is a progressive disease, characterized with disability amongst its survivors due to loss of neural tissue. Transplantation of neural stem cells (NSCs) is an option to replace lost cells and restore function. Following robust durable engraftment of clinical trial grade human fetal neural stem cells (hNSC; Neuralstem Inc.), we initiated a safety/tumorigenicity study needed in order to obtain FDA approval for a TBI clinical indication. To evaluate the potential tumorigenicity of hNSCs, cells were transplanted in immune-compromised rats with penetrating ballistic-like brain injury (PBBI). Adult male athymic rats were subjected to unilateral PTBI via rapid inflation of a balloon attached to a perforated probe that was stereotactically inserted through the right frontal cortex. Animals were randomized to

two groups (n = 20 per group). At one-week postinjury, animals received perilesional microinjection of vehicle (Group A) or 3 million green fluorescent protein (GFP) expressing hNSCs (Group B). Animals were euthanized at 6 months post-transplantation. Tumorigenecity potential was assessed by examining brain and peripheral organ sections for oncogenic features such as abnormal mitoses, nuclear atypia, and necrosis in hematoxylin eosin stained section as well as quantitation of Ki67 positive mitotic figures in brains and spinal cords. The transplanted cells within brain sections showed pleomorphic density with seamless boundaries and no signs of tumorigenicity. Neither morphological nor immunohistochemical indicators indicative of preneoplastic or neoplastic growth were evident in transplanted cells. No abnormal masses were detected in peripheral tissues. While some peripheral tissue masses were detected, these were found to be benign neoplasms common to this species of rodents. Collectively, data supports the notion that hNSC can be considered a safe cell therapy option for TBI patients.

1804. Gajavelli, S., et al. (2017). "Human stem cell transplantation in TBI." British journal of neurosurgery **31**(4): 499.

Objectives: Traumatic Brain Injury (TBI) is associated with the worst outcomes with both high mortality and severe disability. While no treatment strategies are available, stem cell transplantations have emerged as putative therapeutic approaches. In this rodent study, we evaluated the survival, differentiation and functional outcome of FDA approved human fetal neural stem cells (hNSC; Neuralstem Inc.) in a rat model. Methods: Adult Sprague-Dawley rats underwent a unilateral penetrating ballistic brain injury (PBBI). Stereotactic injection of control or hNSCs into the PBBI penumbra was performed one week later. Animals were sacrificed and brains histologically assessed for transplant survival, cell maturation and synapse formation. Function was evaluated using the rotatrod and Morris Water Maze. Results: Robust survival and transplant engraftment could be seen by 8 weeks. Processes were extensive and could be observed as far as the hindbrain. The processes emanating from the transplant follow intact white matter tracts. Transplanted cells displayed a neuronal phenotype. Functional recovery, both motor performance and spatial memory, were better compared to injured controls. Conclusion: PBBI is conducive to human fetal neural stem cells engraftment and survival. The transplanted cells are capable of extending processes and differentiate to neurone. Cell transplantation results in improved functional performance. We conclude that hNSC transplants may offer a potential treatment for PTBI.

1805. Gajdos, M. and J. Vyrostko (1997). "[Brain injuries with abattoir guns]." Poranenie mozgu jatocnou pistol'ou. **76**(10): 518-521.

The authors present a report on the treatment of 16 patients with brain injuries caused by a slaughterhouse gun. Nine patients had to be re-operated because of the presence of a foreign body; the primary operations of six patients were made in another surgical department. Two patients were re-operated twice. The reason for the first revision were bone fragments. The reason for the second revision was nasal liquorrhoea and posttraumatic hydrocephalus. Three patients (18.75%) of the investigated group died. The immediate cause of death was cerebral oedema. Eleven patients (68.75%) were referred for after-treatment to other health facilities, their condition had already improved. Two patients (12.5%) were referred in a poor, unaltered condition (coma). The rare incidence of gunshot injuries leads to a certain embarrassment how to treat patients with this type of injury. It was found that in gunshot wounds of the head and brain it is necessary to revise the gunshot canal from a craniotoic approach, remove foreign bodies, bone fragments, brain debris and then close perfectly the aperture in the dura mater, remove the margins of the bone contaminated with the injuring object and suture the skin. The authors draw attention to difficulties associated with localisation of the foreign body in the gunshot canal and possibilities of peroperative application of two-dimensional ultrasonography.

1806. Galanis, D. J., et al. (2018). "Rural Level III centers in an inclusive trauma system reduce the need for interfacility transfer." The journal of trauma and acute care surgery **85**(4): 747-751.

BACKGROUND: Development of Level III trauma centers in a regionalized system facilitates early stabilization and prompt transfer to a higher level center. The resources to care for patients at Level III centers could also reduce the burden of interfacility transfers. We hypothesized that the development and designation of Level III centers in an inclusive trauma system resulted in lower rates of transfer, with no increase in morbidity or mortality among the non-transferred patients., METHODS: State trauma registry data from January 2009 through September 2015 were examined from five rural hospitals that transfer patients to our highest (Level II) trauma center and resource hospital. These five

rural hospitals began receiving state support in 2010 to develop their trauma programs and were subsequently verified and designated Level III centers (three in 2011, two in 2013). Multivariate logistic regression was used to examine the adjusted odds of patient transfers and adverse outcomes, while controlling for age, gender, penetrating mechanism, presence of a traumatic brain injury, arrival by ambulance, and category of Injury Severity Score. The study period was divided into "Before" Level III center designation (2009-2010) and "After" (2011-2015)., RESULTS: 7,481 patient records were reviewed. There was a decrease in the proportion of patients who were transferred After (1,281/5,737) compared to Before (516/1,744) periods (22% vs. 30%, respectively). After controlling for the various covariates, the odds of patient transfer were reduced by 32% ($p < 0.0001$) during the After period. Among non-transferred patients, there were no significant increases in adjusted odds of mortality, or hospitalizations of seven days or more, Before versus After., CONCLUSIONS: Development of rural Level III trauma centers in a regionalized system can significantly reduce the need for transfer to a remote, higher level trauma center. This may benefit the patient, family, and trauma system, with no adverse effect upon patient outcome., LEVEL OF EVIDENCE: Epidemiological, level III.

1807. Galante, J. and J. A. London (2010). "Left ventricular bullet embolus: a case report and review of the literature." The Journal of emergency medicine **39**(1): 25-31.

Missile embolization to the heart occurs infrequently in penetrating trauma. The lack of a concentrated experience at any single institution contributes to the controversies pertaining to diagnostic and therapeutic approaches to management. The objective of this study was to describe a case of a left ventricular bullet embolus and provide a detailed diagnostic and therapeutic framework for management of intracardiac projectiles. Initial management of a patient with suspected intracardiac projectiles is dictated by his or her hemodynamic status. Unstable patients generally require operative intervention. In the stable patient, associated injuries must be sought. Localization of the projectile can be aided by echocardiogram, fluoroscopy, or angiography. Definitive management is individualized, and can range from observation to percutaneous or operative extraction. The decision depends on the cardiac chamber involved, the patients' symptoms, and the projectile's size, shape, and location within the chamber. Missile embolus to the heart is an infrequent occurrence, but when found presents a diagnostic and therapeutic challenge. Management strategies should be individualized. A detailed management algorithm is provided.

1808. Galea, J., et al. (2009). "Intravenous interleukin-1 receptor antagonist achieves experimentally neuroprotective cerebrospinal fluid concentrations within a therapeutic time window." British journal of neurosurgery **23**(5): 478.

Objective: Interleukin-1 (IL-1) is implicated in experimental ischaemic brain injury. Its naturally occurring antagonist (IL-1RA) is highly neuroprotective and can be administered therapeutically, showing few adverse effects and inhibiting the systemic acute phase response. A single dose regime pilot study showed that it penetrates cerebrospinal fluid (CSF) at experimentally-therapeutic concentrations, but this was achieved rather slowly. Determining the optimal protocol for rapid IL-1RA delivery in subarachnoid haemorrhage (SAH) is essential before testing biological efficacy. Design: An open-labelled dose-ranging pharmacokinetic study. Subjects: 25 patients with SAH and external ventricular drains inserted for clinical reasons. Methods: Patients received intravenous (IV) IL-1RA as a bolus followed by a 4 hour infusion. Pharmacometric analysis of pilot data enabled identification of the administration regime that could achieve experimentally-therapeutic CSF IL-1RA levels within 30 min. Patients were allocated to five regimes, using IV boluses of 100 to 500 mg and IV infusions ranging from 1 to 10 mg kg-1 h-1. Plasma and CSF sampling was performed as informed by a D-optimal design. Analysis was done using nonlinear mixed effects modelling. Results: IL-1RA plasma and CSF concentrations fell within predicted intervals. The regime leading to experimentally-therapeutic CSF concentrations of IL-1RA within 40 minutes was 500mg bolus followed by IV infusion at 10 mg kg-1 h-1. Conclusion: Experimentally neuroprotective CSF concentrations in SAH patients was achieved within a reasonable therapeutic time window. Pharmacokinetic analysis suggests IL-1RA transport across the blood-CSF barrier is passive. Identification of this delivery regime allows further efficacy studies of IL-1RA in SAH.

1809. Galea, J. P., et al. (2009). "Intravenous interleukin-1 receptor antagonist achieves experimentally neuroprotective cerebrospinal fluid concentrations within a therapeutic time window." Cerebrovascular Diseases **27**: 187.

Background: The cytokine interleukin-1 (IL-1) has been heavily implicated in experimental ischaemic brain injury. Its naturally occurring antagonist (IL-1RA) is highly neuroprotective. In humans, it shows few adverse effects and inhibits aspects of the systemic acute phase response to stroke. A pilot study showed penetration into cerebrospinal fluid (CSF)

at experimentally-therapeutic concentrations, but this was achieved rather slowly. The optimal protocol for rapid delivery of IL-1RA in acute cerebrovascular disease remains unknown and is essential prior to testing biological efficacy in patients. Methods: 25 patients with subarachnoid haemorrhage (SAH) and external ventricular drains inserted for clinical reasons received intravenous (IV) IL-1RA as a bolus followed by a 4 hour infusion. Pharmacometric analysis (simulation) of pilot study data identified the administration regime that could potentially achieve experimentally-therapeutic CSF IL-1RA levels within 30 min (fig 1). For safety reasons, patients were sequentially allocated to five administration regimes. Each regime reflected a stepwise increase in peak plasma concentration of IL-1RA. Plasma and CSF sampling was performed at specified intervals as informed by a D-optimal design. Results: Plasma and CSF concentrations of IL-1RA in all five regimes fell within predicted intervals (fig 2). The regime leading to experimentally-therapeutic CSF concentrations of IL-1RA within 30 minutes in SAH patients was confirmed as a 500mg bolus followed by an IV infusion at 10 mg/kg/h. No significant adverse events were noted. Conclusion: It is possible to achieve experimentally neuroprotective CSF concentrations in patients with SAH within a reasonable therapeutic time window (30 minutes). Pharmacokinetic analysis suggests that IL-1RA transport across the blood-CSF barrier in SAH is passive. Identification of this delivery regime allows further studies of efficacy of IL-1RA in acute cerebrovascular disease.

1810. Gallina, E., et al. (1990). "[Intracranial post-traumatic aneurysm of the internal carotid artery as cause of epistaxis: considerations on 2 cases]." Aneurisma post-traumatico intracranico della carotide interna come causa di epistassi: considerazioni su due casi. **10**(6): 607-613.

Aneurysm of the internal carotid artery is rarely mentioned as a cause of epistaxis. This condition is quite rare but it is important to consider aneurysms in the etiology of epistaxis because of their high mortality rate and since they require management quite different from that of epistaxis of other origins. After arteriosclerosis the most frequent cause of an aneurysm of the internal carotid artery is a closed or penetrating craniofacial trauma injuring the artery. This leads to subsequent aneurysmal dilation of the cavernous and petrous portions of the artery itself. Aneurysms of the cavernous portion of the artery are more frequent. In this location the aneurysm has a close anatomical relationship with the sphenoid sinus as well as the nasal fossae. In the present paper two cases of traumatic intracavernous carotid aneurysms presenting epistaxis are described. In the first case, reported 25 years ago, the diagnosis was made on an autoptic table in young man who died after two severe episodes of massive nasal hemorrhage. The second case involved a 17-year-old man with a severe epistaxis reported one month after a close craniofacial trauma. An intracranial carotid pathology was suspected because of the recurrence of nose-bleeding and the history of reduced visual activity. Therefore angiography was performed which revealed a small aneurysm of the intracavernous segment of the left internal carotid artery. Subsequently, an endovascular balloon embolization of the aneurysm was successful, preserving the parent artery. The importance of considering aneurysms in the differential diagnosis of massive epistaxis is emphasized.

1811. Gallo, P., et al. (2010). "Intrauterine head stab wound injury resulting in a growing skull fracture: a case report and literature review." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **26**(3): 377-384.

INTRODUCTION: Penetrating injuries of the gravid uterus are rare complications of pregnancy with gunshot wounds most common than stab wounds. Fetal head injury is an unusual sequela of these penetrating traumas., MATERIALS AND METHODS: We describe the case of a 20-year-old pregnant woman stabbed at the lower abdomen at 30th weeks of gestation. She was nonsurgically managed by serial examination and continuous fetal monitoring., RESULTS: Spontaneous vaginal delivery occurred at term with good maternal and fetal outcome. The newborn examination revealed a right temporal swelling interpreted as a subcutaneous hemangioma. At 2 years and 6 months of life, the child was led to our attention with a pulsating bulge in the right temporal region. Clinical examination and imaging were indicative of a typical growing skull fracture. The child underwent neurosurgical procedure for repairing of the dural tear and bone defect according to the senior author's personal technique, described in details, with a good neurological and esthetic outcome., CONCLUSION: Thirty-two cases of stab wounds to the pregnant uterus have been reported to date in medical literature with two cases of fetal head injury.Growing skull fractures are rare complications of head injury and only one case has been described in the perinatal period following blunt trauma to the mother's abdomen 2-3 weeks before birth.

1812. Galvagno Jr, S. M., et al. "Helicopter emergency medical services for adults with major trauma." (12).

Background, Although helicopters are presently an integral part of trauma systems in most developed nations, previous reviews and studies to date have raised questions about which groups of traumatically injured people derive the greatest benefit., Objectives, To determine if helicopter emergency medical services (HEMS) transport, compared with ground emergency medical services (GEMS) transport, is associated with improved morbidity and mortality for adults with major trauma., Search methods, We ran the most recent search on 29 April 2015. We searched the Cochrane Injuries Group's Specialised Register, The Cochrane Library (Cochrane Central Register of Controlled Trials; CENTRAL), MEDLINE (OvidSP), EMBASE Classic + EMBASE (OvidSP), CINAHL Plus (EBSCOhost), four other sources, and clinical trials registers. We screened reference lists., Selection criteria, Eligible trials included randomized controlled trials (RCTs) and nonrandomized intervention studies. We also evaluated nonrandomized studies (NRS), including controlled trials and cohort studies. Each study was required to have a GEMS comparison group. An Injury Severity Score (ISS) of at least 15 or an equivalent marker for injury severity was required. We included adults age 16 years or older., Data collection and analysis, Three review authors independently extracted data and assessed the risk of bias of included studies. We applied the Downs and Black quality assessment tool for NRS. We analyzed the results in a narrative review, and with studies grouped by methodology and injury type. We constructed 'Summary of findings' tables in accordance with the GRADE Working Group criteria., Main results, This review includes 38 studies, of which 34 studies examined survival following transportation by HEMS compared with GEMS for adults with major trauma. Four studies were of inter-facility transfer to a higher level trauma center by HEMS compared with GEMS. All studies were NRS; we found no RCTs. The primary outcome was survival at hospital discharge. We calculated unadjusted mortality using data from 282,258 people from 28 of the 38 studies included in the primary analysis. Overall, there was considerable heterogeneity and we could not determine an accurate estimate of overall effect., Based on the unadjusted mortality data from six trials that focused on traumatic brain injury, there was no decreased risk of death with HEMS. Twenty-one studies used multivariate regression to adjust for confounding. Results varied, some studies found a benefit of HEMS while others did not. Trauma-Related Injury Severity Score (TRISS)-based analysis methods were used in 14 studies; studies showed survival benefits in both the HEMS and GEMS groups as compared with MTOS. We found no studies evaluating the secondary outcome, morbidity, as assessed by quality-adjusted life years (QALYs) and disability-adjusted life years (DALYs). Four studies suggested a small to moderate benefit when HEMS was used to transfer people to higher level trauma centers. Road traffic and helicopter crashes are adverse effects which can occur with either method of transport. Data regarding safety were not available in any of the included studies. Overall, the quality of the included studies was very low as assessed by the GRADE Working Group criteria., Authors' conclusions, Due to the methodological weakness of the available literature, and the considerable heterogeneity of effects and study methodologies, we could not determine an accurate composite estimate of the benefit of HEMS. Although some of the 19 multivariate regression studies indicated improved survival associated with HEMS, others did not. This was also the case for the TRISS-based studies. All were subject to a low quality of evidence as assessed by the GRADE Working Group criteria due to their nonrandomized design. The question of which elements of HEMS may be beneficial has not been fully answered. The results from this review provide motivation for future work in this area. This includes an ongoing need for diligent reporting of research methods, which is imperative for transparency and to maximize the potential utility of results. Large, multicenter studies are warranted as these will help produce more robust estimates of treatment effects. Future work in this area should also examine the costs and safety of HEMS, since multiple contextual determinants must be considered when evaluating the effects of HEMS for adults with major trauma.

1813. Galvin, I. M., et al. "Cooling for cerebral protection during brain surgery." (1).

Background, Patients undergoing neurosurgery are at risk of cerebral ischaemia with resultant cerebral hypoxia and neuronal cell death. This can increase both the risk of mortality and long term neurological disability. Induced hypothermia has been shown to reduce the risk of cerebral ischaemic damage in both animal studies and in humans who have been resuscitated following cardiac arrest. This had lead to an increasing interest in its neuroprotective potential in neurosurgical patients. This review was originally published in 2011 and did not find any evidence of either effectiveness or harm in these patients. This updated review was designed to capture current evidence to readdress these issues., Objectives, To evaluate the effectiveness and safety profile of induced hypothermia versus normothermia for neuroprotection in patients undergoing brain surgery. Effectiveness was to be measured in terms of short and long term mortality and functional neurological outcomes. Safety was to be assessed in terms of the rate of the adverse events infection, myocardial infarction, ischaemic stroke, congestive cardiac failure and any other adverse events reported by the authors of the included studies., Search methods, For the original review, the authors searched the

databases Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE (OvidSP), EMBASE (OvidSP) and LILACS to November 2010. For the updated review all these databases were re-searched from November 2010 to May 2014., Selection criteria, As in the original review, we included randomized controlled trials (RCTs) of induced hypothermia versus normothermia for neuroprotection in patients of any age and gender undergoing brain surgery, which addressed mortality, neurological morbidity or adverse event outcomes., Data collection and analysis, Three review authors independently extracted data and two independently assessed the risk of bias of the included studies. Any discrepancies were resolved by discussion between authors., Main results, In this updated review, one new ongoing study was found but no new eligible completed studies were identified. This update was therefore conducted using the same four studies included in the original review. These studies included a total of 1219 participants, mean age 40 to 54 years. All included studies were reported as RCTs. Two were multicentred, together including a total of 1114 patients who underwent cerebral aneurysm clipping, and were judged to have an overall low risk of bias. The other two studies were single centred. One included 80 patients who had a craniotomy following severe traumatic brain injury and was judged to have an unclear or low risk of bias. The other study included 25 patients who underwent hemicranicectomy to relieve oedema following cerebral infarction and was judged to have an unclear or high risk of bias. All studies assessed hypothermia versus normothermia. Overall 608 participants received hypothermia with target temperatures ranging from 32.5 [degrees]C to 35 [degrees]C, and 611 were assigned to normothermia with the actual temperatures recorded in this group ranging form 36.5 [degrees]C to 38 [degrees]C. For those who were cooled, 556 had cooling commenced immediately after induction of anaesthesia that was continued until the surgical objective of aneurysm clipping was achieved, and 52 had cooling commenced immediately after surgery and continued for 48 to 96 hours., Authors' conclusions, We found no evidence that the use of induced hypothermia was associated with a significant reduction in mortality or severe neurological disability, or an increase in harm in patients undergoing neurosurgery.

1814. Gandhi, C. D., et al. (2012). "The novel use of Onyx for the rapid treatment of a traumatic carotid injury." Journal of neurointerventional surgery **4**(4): e18.

Penetrating neck injury causing internal carotid artery (ICA) transection is nearly always fatal. The novel use of Onyx Liquid Embolic System (Onyx LES) for rapid hemostasis of a traumatic cervical ICA transection is reported. A patient with a gunshot wound to the face and neck underwent emergent catheter angiography which revealed contrast extravasation from the right cervical ICA consistent with traumatic transection. The ipsilateral cerebral hemisphere showed collateral blood supply from the posterior communicating artery, and ipsilateral external carotid artery anastomoses of the facial, ethmoidal and ophthalmic arteries. Rapid endovascular repair of the transected cervical ICA was performed using Onyx LES. Onyx34 was injected at a rapid rate of 1 ml/min into the right ICA. Injection was continued until cast formation completely occluded the proximal cervical ICA but preserved the external carotid artery. This method very rapidly controlled bleeding and should be considered in these cases.

1815. Ganga, A., et al. (2022). "ANTIBIOTIC PROPHYLAXIS IN PENETRATING TRAUMATIC BRAIN INJURY: OUTCOMES FORM A SINGLEINSTITUTIONAL SERIES AND META-ANALYSIS OF THE LITERATURE." Journal of neurotrauma **39**(11-12): A115-A116.

Penetrating traumatic brain injury (pTBI) is a medical emergency with high mortality. Surviving patients face infection risk stemming from foreign body transgression into the CNS. Research regarding the use of antibiotic prophylaxis to pTBI patients is outdated and contradictory. We performed a MEDLINE literature review and analyzed a local series to learn whether prophylactic antibiosis can reduce infection risks among pTBI patients. Our local series contained 21 patients from 2015-2019 (20 male, 1 female; mean age 32 ± 13 years). The most common mechanisms of injury were cranial gunshot wounds. 17 patients received prophylactic antibiotics (regimen range: 1 to >30 days) and 4 did not. Among those receiving antibiotics, 7 received cefazolin alone while 10 received broad spectrum antibiotics. 4 patients (19%) developed CNS infections (3 intraparenchymal brain abscesses, 1 meningitis), with 2 requiring surgical intervention. 2/4 patients (50%) who did not receive prophylactic an-tibiotics developed CNS infections, compared to 2/17 (12%) who received prophylactic antibiotics. Of the 4 patients who developed intracranial infections, all speciated at least one gram-positive organism and 1/3 speciated a gram-negative organism. In the literature, we identified 330 cases. 216/330 (65%) cases received prophylactic antibiotics and 114 did not. Among patients who received antibiotics, 38 (17%) developed an infection. Among patients who did not, 23 (20%) developed an infection (Fisher's exact test, p = .55). While the literature suggests no benefit concerning prophylactic antibiosis, our institutional series indicates that pTBI carries a risk of infection and prophylactic antibiotics may decrease risk of this outcome.

1816. Gannushkina, I. V., et al. (1982). "Increased blood-brain barrier dysfunction around cerebral stab wounds in rats immunized to brain antigens. A quantitative study on endogenous albumin and globulin." Acta neurologica Scandinavica **66**(4): 482-487.

The extravasation of serum albumin and immunoglobulin G (IgG) was assayed by electroimmunoassay in cerebral cortex homogenates of rats subjected to stab wound injury either 2 weeks after immunisation to brain antigens or without prior immunisation. The amount of IgG in the brain was significantly higher in immunised than in non-immunised rats 3 and 24 h after injury. A significantly enhanced extravasation of albumin in immunised rats was found only after 24 h. It is concluded that immunisation to brain antigens enhances the vulnerability of the blood-brain barrier in rats subjected to stab wound injury.

1817. Gant, T. D. and L. I. Epstein (1979). "Low-velocity gunshot wounds to the maxillofacial complex." The Journal of trauma **19**(9): 674-677.

A review of the past literature of gunshot wounds indicates that the clinical material deals mainly with high-velocity missile injuries from military experience. A series of 66 cases of low-velocity gunshot wounds to the maxillofacial complex at San Francisco General Hospital between 1971 and 1978 indicates a clinical difference between injuries caused by low-velocity as compared to previously reported high-velocity missiles. Damage to vital structures resulting from missile injury to the maxillofacial complex are classified in three anatomic areas: 1) supra-orbital (28 cases of which 20 involved neurological damage); 2) mid-face (24 cases of which 8 involved the orbits and/or globe); 3) lower face (14 cases, of which 3 involved laceration of the carotid and 2 involved airway obstruction necessitating tracheostomy). The management of gunshot wounds to the maxillofacial area is outlined, emphasizing: 1) Debridement and prompt closure of intraoral wounds with antibiotic coverage: 2) Early stabilization of mandible fractures: 3) Indications for tracheostomy; 4) Arteriographic studies. In our series there were only four infections, which were treated easily with incision and drainage and appropriate antibiotic selection.

1818. Ganti, L., et al. (2014). "How much does a TBI cost?" Brain injury **28**(5-6): 827-828.

Objective: To determine the predictors of hospital costs associated with traumatic brain injury. Methods: These data are derived from the Florida Brain and Spinal Cord injury prospective registry from the institution, a level I trauma centre. In order to be eligible for the BSCIP, the patient must be a legal resident of the state of Florida, have suffered a moderate-tosevere brain injury, be medically stable and there should be a reasonable expectation that, with the provision of appropriate services and supports, the person can return to a community-based setting, rather than reside in a skilled nursing facility. Data are limited to TBIs from 1 January 2012 to 30 June 2013. Costs information was obtained from total hospital charges vs actual collections. Statistical analyses were performed in JMP 10 for the Macintosh. Results: A total of 170 TBIs were identified during the study period. The median age of the cohort was 42, with an IQR of 24-60 years and a range of 9 months to 93 years. Seventy-eight per cent were male. The mechanism was 31% MVC, 18% fall, 23% recreational vehicles, 11% assault, 14% pedestrian struck, 2% gun shot wound and 1% selfinflicted. The median length of hospitalization was 16 days, with an IQR of 8-25 and a range of 1-60 days. The median hospitalization cost per TBI patient including emergency services was $162 523. Individual factors associated with increased hospitalization cost of TBI included: reduced probability of survival ($p<0.0001$), increased hospital length of days ($p<0.0001$), mechanism of injuries (pedestrian struck by vehicle [$p=0.0001$], recreational vehicle injury [$p=0.005$], motor vehicle accident [$p=0.006$], assault [$p=0.05$]; all compared to fall) and non-transferred patients ($p=0.0003$). On multivariate analysis, the factors that remained predictive for increased cost were a lower probability of survival ($p=0.0006$), a longer hospital length of stay ($p<0.0001$) and patients whose mechanism of injury was not a fall ($p=0.039$), when controlling for GCS score ($p=0.0014$). Conclusion: The cost of hospitalization for TBI is significantly increased by longer hospital stay, lower survival chance and higher GCS score, while cost is significantly lower for patients who sustain a TBI due to fall vs motor vehicle collision.

1819. Ganzoni, N. (1975). "[The gunshot wound in war]." Die Schussverletzung im Krieg **21**: 1-317.

1820. Gao, G., et al. (2019). "Donor Characteristics, Recipient Outcomes, and Histologic Findings of Kidney Allografts With Diffuse Donor-derived Glomerular Fibrin Thrombi." Transplantation **103**(9): 1921-1927.

BACKGROUND: Limited data are available on whether donor kidneys with diffuse glomerular fibrin thrombi (GFT) are safe to use. In this study, the clinicopathologic characteristics of allografts with diffuse donor-derived GFT were examined., METHODS: All deceased donor kidney transplant implantation biopsies from our institution between July 2011 and February 2018 with diffuse GFT were included. A control group for comparison consisted of all cases with implantation biopsies obtained during the study period without diffuse GFT. Clinical data were extracted from electronic medical records for all study patients, including donor information., RESULTS: Twenty-four recipients received kidneys with diffuse GFT from 16 deceased donors. All donors died from severe head trauma. On average, 79% of glomeruli contained fibrin thrombi. Nineteen cases had subsequent biopsy; all revealed resolution of GFT. Compared with the control group, kidneys with diffuse GFT had longer cold ischemia time (34 versus 27 h), were more frequently pumped using machine perfusion (100% versus 81%), and recipients experienced a higher frequency of delayed graft function (58% versus 27%). Only 2 grafts with diffuse GFT failed within the first year. Overall graft survival was similar between the diffuse GFT group and control group., CONCLUSIONS: Deceased donor kidneys with diffuse GFT appear to be safe to use given that nearly 92% of recipients in this cohort who received such allografts experienced good clinical outcomes. Histologically, GFT demonstrated rapid resolution following transplantation. Interestingly, diffuse GFT only occurred in donors who suffered severe head trauma in this cohort, which may be a predisposing factor.

1821. Gao, J., et al. (2000). "[Penetrating wounds of the heart: analysis of 56 patients]." Zhonghua wai ke za zhi [Chinese journal of surgery] **38**(5): 358-359.

OBJECTIVE: To assess the management of penetrating cardiac injuries., METHODS: 56 patients with penetrating wounds of the heart were studied retrospectively. The study lasted for 11 years., RESULTS: Stab wounds accounted for 89.3% of the 56 patients. 56 patients underwent thoracotomy. Preoperative infusion was less than 1,000 ml in 68% of the patients. Preoperative pericardiocentesis was done only in 2 patients, of whom one was false negative. Four patients with cardiac arrest soon after arrival were subjected to emergency thoracotomy; three survived. After the operation, 2 patients died of associated abdominal injuries and failure of cerebral resuscitation. The overall survival rate was 96.4%., CONCLUSIONS: Early diagnosis and prompt thoracotomy are essential to the treatment of penetrating cardiac injuries. Preoperative massive transfusion and pericardiocentesis are not advocated.

1822. Gao, J., et al. (2006). "Transplantation of primed human fetal neural stem cells improves cognitive function in rats after traumatic brain injury." Experimental neurology **201**(2): 281-292.

Traumatic brain injury (TBI) often produces cognitive impairments by primary or secondary neuronal loss. Stem cells are a potential tool to treat TBI. However, most previous studies using rodent stem or progenitor cells failed to correlate cell grafting and cognitive improvement. Furthermore, the efficacy of fetal human neural stem cells (hNSCs) for ameliorating TBI cognitive dysfunction is undetermined. This study therefore characterized phenotypic differentiation, neurotrophic factor expression and release and functional outcome of grafting hNSCs into TBI rat brains. Adult Sprague-Dawley rats underwent a moderate parasagittal fluid percussion TBI followed by ipsilateral hippocampal transplantation of hNSCs or vehicle 1 day post-injury. Prior to grafting, hNSCs were treated in vitro for 7 days with our previously developed priming procedure. Significant spatial learning and memory improvements were detected by the Morris water maze (MWM) test in rats 10 days after receiving hNSC grafts. Morphological analyses revealed that hNSCs survived and differentiated mainly into neurons in the injured hippocampus at 2 weeks after grafting. Furthermore, hNSCs expressed and released glial-cell-line-derived neurotrophic factor (GDNF) in vitro and when grafted in vivo, as detected by RT-PCR, immunostaining, microdialysis and ELISA. This is the first direct demonstration of the release of a neurotrophic factor in conjunction with stem cell grafting. In conclusion, human fetal neural stem cell grafts improved cognitive function of rats with acute TBI. Grafted cells survived and differentiated into neurons and expressed and released GNDF in vivo, which may help protect host cells from secondary damage and aid host regeneration.

1823. Gao, M., et al. (2017). "Syringe needle skull penetration reduces brain injuries and secondary inflammation following intracerebral neural stem cell transplantation." Experimental and Therapeutic Medicine **13**(3): 885-890.

Intracerebral neural stem cell (NSC) transplantation is beneficial for delivering stem cell grafts effectively, however, this approach may subsequently result in brain injury and secondary inflammation. To reduce the risk of

promoting brain injury and secondary inflammation, two methods were compared in the present study. Murine skulls were penetrated using a drill on the left side and a syringe needle on the right. Mice were randomly divided into three groups (n=84/group): Group A, receiving NSCs in the left hemisphere and PBS in the right; group B, receiving NSCs in the right hemisphere and PBS in the left; and group C, receiving equal NSCs in both hemispheres. Murine brains were stained for morphological analysis and subsequent evaluation of infiltrated immune cells. ELISA was performed to detect neurotrophic and immuno-modulatory factors in the brain. The findings indicated that brain injury and secondary inflammation in the left hemisphere were more severe than those in the right hemisphere, following NSC transplantation. In contrast to the left hemisphere, more neurotrophic factors but less pro-inflammatory cytokines were detected in the right hemisphere. In addition, increased levels of neurotrophic factors and interleukin (IL)-10 were observed in the NSC transplantation side when compared with the PBS-treated hemispheres, although lower levels of IL-6 and tumor necrosis factor-α were detected. In conclusion, the present study indicated that syringe needle skull penetration vs. drill penetration is an improved method that reduces the risk of brain injury and secondary inflammation following intracerebral NSC transplantation. Furthermore, NSCs have the potential to modulate inflammation secondary to brain injuries.

1824. Gao, W., et al. (2018). "A possible candidate for triply degenerate point fermions in trigonal layered PtBi2." Nature Communications **9**(1).

Triply degenerate point (TP) fermions in tungsten–carbide-type materials (e.g., MoP), which represent new topological states of quantum matter, have generated immense interest recently. However, the TPs in these materials are found to be far below the Fermi level, leading to the TP fermions having less contribution to low-energy quasiparticle excitations. Here, we theoretically predict the existence of TP fermions with TP points close to the Fermi level in trigonal layered PtBi2 by ab initio calculations, and experimentally verify the predicted band topology by magnetotransport measurements under high magnetic fields up to 40 T. Analyses of both the pronounced Shubnikov–de Haas and de Haas–van Alphen oscillations reveal the existence of six principal Fermi pockets. Our experimental results, together with those from ab initio calculations, reveal the interplay between transport behaviors and unique electronic structures, and support the existence of TP fermions in trigonal layered PtBi2.

1825. Garcia, A., et al. (2014). "Cost-utility analysis of prehospital spine immobilization recommendations for penetrating trauma." The journal of trauma and acute care surgery **76**(2): 534-541.

BACKGROUND: The American College of Surgeons' Committee on Trauma's recent prehospital trauma life support recommendations against prehospital spine immobilization (PHSI) after penetrating trauma are based on a low incidence of unstable spine injuries after penetrating injuries. However, given the chronic and costly nature of devastating spine injuries, the cost-utility of PHSI is unclear. Our hypothesis was that the cost-utility of PHSI in penetrating trauma precludes routine use of this prevention strategy., METHODS: A Markov model based cost-utility analysis was performed from a society perspective of a hypothetical cohort of 20-year-old males presenting with penetrating trauma and transported to a US hospital. The analysis compared PHSI with observation alone. The probabilities of spine injuries, costs (US 2010 dollars), and utility of the two groups were derived from published studies and public data. Incremental effectiveness was measured in quality-adjusted life-years. Subset analyses of isolated head and neck injuries as well as sensitivity analyses were performed to assess the strength of the recommendations., RESULTS: Only 0.2% of penetrating trauma produced unstable spine injury, and only 7.4% of the patients with unstable spine injury who underwent spine stabilization had neurologic improvement. The total lifetime per-patient cost was $930,446 for the PHSI group versus $929,883 for the nonimmobilization group, with no difference in overall quality-adjusted life-years. Subset analysis demonstrated that PHSI for patients with isolated head or neck injuries provided equivocal benefit over nonimmobilization., CONCLUSION: PHSI was not cost-effective for patients with torso or extremity penetrating trauma. Despite increased incidence of unstable spine injures produced by penetrating head or neck injuries, the cost-benefit of PHSI in these patients is equivocal, and further studies may be needed before omitting PHSI in patients with penetrating head and neck injuries., LEVEL OF EVIDENCE: Economic and value-based evaluation, level II.

1826. Garcia, R. M., et al. (2015). "Early Postoperative Complications following Gracilis Free Muscle Transfer for Facial Reanimation: A Systematic Review and Pooled Data Analysis." Journal of reconstructive microsurgery **31**(8): 558-564.

BACKGROUND: Multiple studies have detailed promising smile restoration following gracilis free muscle transfer for facial reanimation but information detailing the potential complications is lacking. The aim of this study is to systematically review the literature to evaluate the reported complication rate associated with this procedure. We also aim to determine the most common occurring complications., METHODS: The PubMed, Embase, and Web of Science databases were queried with multiple search strategies for published articles between January 1950 and February 2013 that detailed gracilis free muscle transfer for facial reanimation. Title, abstract, and full text review was performed. Complications were defined as any reported, identifiable adverse outcome that required an alteration in treatment for correction., RESULTS: The literature search yielded 62 studies of gracilis free muscle transfer for facial reanimation. Overall, 36 articles (58%) reported whether or not a complication had occurred. The overall complication rate based on pooled proportions was 9.6% and the most commonly occurring complications were postoperative hematoma (3.6%) and infection (3.5%)., CONCLUSIONS: Our data suggests that complications after gracilis free muscle transfer for facial reanimation may be underreported and this complex procedure may in fact be associated with significant adverse outcomes as high as 9.6%. Copyright Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.

1827. Garcia-Manzanares, M. D., et al. (2000). "Brown-Sequard syndrome associated with Horner's syndrome after a penetrating trauma at the cervicomedullary junction." Spinal cord **38**(11): 705-707.

STUDY DESIGN: Case report of a 21-year-old man that had concurrence of Brown-Sequard syndrome and Horner's syndrome after a penetrating trauma in the neck., OBJECTIVES: This report analyzes the location of lesions that cause a combination of Horner's and Brown-Sequard syndrome. It is important to know the anatomic structure of spinal cord and the sympathetic nerve chain., SETTING: Spinal Cord Unit, Department of Physical Medicine and Rehabilitation, Hospital La Fe, Valencia, Instituto Oftalmologico de Alicante, Alicante, Spain., METHODS: Description of a single patient case report., RESULTS: The clinical findings and MRI showed a good correlation. The Horner's syndrome was confirmed with a 4% cocaine test. The patient received a conservative treatment with high-dose steroid therapy (NASCIS-3)., CONCLUSION: The patient presented with Brown-Sequard syndrome and Horner's syndrome. Clinical examination and MRI made a quick and correct diagnosis. The patient recovered completely after the conservative treatment.

1828. Garcia-Molina, A. (2012). "[Phineas Gage and the enigma of the prefrontal cortex]." Phineas Gage y el enigma del cortex prefrontal. **27**(6): 370-375.

Perhaps the most famous brain injury in history was a penetrating wound suffered by a rail road worker named Phineas Gage on September 13, 1848. Twelve years after his injury, on the 21st of May, 1860 Phineas Gage died of an epileptic seizure. In 1868 Dr. Harlow gave an outline of Gage's case history and first disclosed his remarkable personality change. One might think this report would assure Gage a permanent place in the annals of neurology, but this was not the case. There was a good reason for this neglect: hardly anyone knew about Harlow's 1868 report. Dr. David Ferrier, an early proponent of the localisation of cerebral function, rescued Gage from obscurity and used the case as the highlight of his famous 1878 Goulstonian lectures. Gage had, through a tragic natural experiment, provided proof of what Ferrier's studies showed: the pre-frontal cortex was not a "non-functional" brain area. A rod going through the prefrontal cortex of Phineas Gage signalled the beginning of the quest to understand the enigmas of this fascinating region of the brain.

1829. Garcia-Pertierra, S., et al. (2022). "Surgical management of intrathoracic wooden skewers migrating from the stomach and duodenum in dogs: 11 cases (2014-2020)." The Journal of small animal practice **63**(5): 403-411.

OBJECTIVES: To describe the clinical presentation, management and outcome of cases presenting with intrathoracic wooden skewers originating from the abdominal gastrointestinal tract., MATERIALS AND METHODS: Clinical records of dogs presented and treated for an intrathoracic wooden skewer were reviewed from June to August 2020. Data included signalment, clinical presentation, duration of clinical signs, haematological and biochemical abnormalities, diagnostic imaging findings, surgical procedure, postoperative complications and outcome., RESULTS: Eleven dogs were included in the study. In all cases, the foreign body was identified as a wooden skewer. The most common clinical signs were anorexia/hyporexia (n=7), vomiting/regurgitation (n=7), lethargy (n=6), pyrexia (n=4) and gait abnormalities/lameness (n=3). CT correctly identified a wooden skewer in all cases when performed (n=7). A coeliotomy combined with transdiaphragmatic thoracotomy was performed in six of 11 cases (55%), a coeliotomy

combined with median sternotomy in four of 11 cases (36%) and a median sternotomy alone was performed in one case. Foreign bodies penetrated from the stomach (n=10) or the duodenum (n=1). Intrathoracic trauma was most commonly identified to the lungs (n=3) and pericardium (n=3). Complications occurred in three of 11 cases (27%), two minor and one resulting in death. Ten of the 11 cases (91%) survived to discharge. Long-term outcome was available for seven of 11 cases (66%), all of them excellent., CLINICAL SIGNIFICANCE: Despite the challenges of managing wooden skewers penetrating the thoracic cavity from the abdominal gastrointestinal tract, the majority of the patients are stable to undergo diagnostic procedures, surgical exploration and management with low morbidity and excellent short- and long-term prognosis.

1830. Garcia-Segura, L. M., et al. (1999). "Aromatase expression by astrocytes after brain injury: implications for local estrogen formation in brain repair." Neuroscience **89**(2): 567-578.

Recent evidence indicates that 17beta-estradiol may have neuroprotective and neuroregenerative properties. Estradiol is formed locally in neural tissue from precursor androgens. The expression of aromatase, the enzyme that catalyses the conversion of androgens to estrogens, is restricted, under normal circumstances, to specific neuronal populations. These neurons are located in brain areas in which local estrogen formation may be involved in neuroendocrine control and in the modulation of reproductive or sex dimorphic behaviours. In this study the distribution of aromatase immunoreactivity has been assessed in the brain of mice and rats after a neurotoxic lesion induced by the systemic administration of kainic acid. This treatment resulted in the induction of aromatase expression by reactive glia in the hippocampus and in other brain areas that are affected by kainic acid. The reactive glia were identified as astrocytes by co-localization of aromatase with glial fibrillary acidic protein and by ultrastructural analysis. No immunoreactive astrocytes were detected in control animals. The same result, the de novo induction of aromatase expression in reactive astrocytes on the hippocampus, was observed after a penetrating brain injury. Furthermore, using a 3H2O assay, aromatase activity was found to increase significantly in the injured hippocampus. These findings indicate that although astrocytes do not normally express aromatase, the enzyme expression is induced in these glial cells by different forms of brain injury. The results suggest a role for local astroglial estrogen formation in brain repair.

1831. Gardner, W. J. and E. W. Shannon (1970). "Pneumocranium from gunshot wound of brain." JAMA **214**(13): 2333-2334.

1832. Garg, R. K., et al. (2015). "A novel classification of frontal bone fractures: The prognostic significance of vertical fracture trajectory and skull base extension." Journal of plastic, reconstructive & aesthetic surgery : JPRAS **68**(5): 645-653.

PURPOSE: The broad spectrum of frontal bone fractures, including those with orbital and skull base extension, is poorly understood. We propose a novel classification scheme for frontal bone fractures., METHODS: Maxillofacial CT scans of trauma patients were reviewed over a five year period, and frontal bone fractures were classified: Type 1: Frontal sinus fracture without vertical extension. Type 2: Vertical fracture through the orbit without frontal sinus involvement. Type 3: Vertical fracture through the frontal sinus without orbit involvement. Type 4: Vertical fracture through the frontal sinus and ipsilateral orbit. Type 5: Vertical fracture through the frontal sinus and contralateral or bilateral orbits. We also identified the depth of skull base extension, and performed a chart review to identify associated complications., RESULTS: 149 frontal bone fractures, including 51 non-vertical frontal sinus (Type 1, 34.2%) and 98 vertical (Types 2-5, 65.8%) fractures were identified. Vertical fractures penetrated the middle or posterior cranial fossa significantly more often than non-vertical fractures (62.2 v. 15.7%, $p = 0.0001$) and had a significantly higher mortality rate (18.4 v. 0%, $p < 0.05$). Vertical fractures with frontal sinus and orbital extension, and fractures that penetrated the middle or posterior cranial fossa had the strongest association with intracranial injuries, optic neuropathy, disability, and death ($p < 0.05$)., CONCLUSIONS: Vertical frontal bone fractures carry a worse prognosis than frontal bone fractures without a vertical pattern. In addition, vertical fractures with extension into the frontal sinus and orbit, or with extension into the middle or posterior cranial fossa have the highest complication rate and mortality.

1833. Garg, S. J., et al. (2005). "Bone from an orbital floor fracture causing an intraocular foreign body." American journal of ophthalmology **139**(3): 543-545.

PURPOSE: To describe the ophthalmoscopic and radiologic findings of a patient who sustained blunt orbital trauma. A piece of bone from the fractured orbital wall caused an intraocular foreign body., DESIGN: Case report., METHODS: An 18-year-old man underwent full ophthalmoscopic examination 1 week after sustaining blunt ocular trauma to the right eye while playing basketball. B-scan ultrasonography and computed tomography of the orbits were also performed., RESULTS: Visual acuity, intraocular pressure, and anterior segment examination were normal. Funduscopic examination revealed a fragment of bone that had penetrated the sclera, choroid, and retina. A hole in the sclera was visible. No treatment was performed. Three months later, the patient had no ocular complaints or complications as a result of this injury., CONCLUSION: Bone from a patient's orbit may cause an intraocular foreign body that may be followed conservatively in certain circumstances.

1834. Garner, J. (2005). "The early hospital management of gunshot wounds. Part 1: Head, neck and thorax." Trauma **7**(3): 143-154.

The management of gunshot wounds is an increasing problem for UK emergency doctors, but not to an extent where it has become routine or allowed individuals to gain significant experience in their treatment. This article reviews the pathophysiology of gunshot injury in general before examining the evidence available concerning the management of gunshot wounds to the head neck and thorax. © 2005 Edward Arnold (Publishers) Ltd.

1835. Garrido-Hermosilla, A. M., et al. (2018). "Penetrating orbital trauma without ocular compromise in gender-based violence." Traumatismo orbitario penetrante sin afectacion ocular en contexto de violencia de genero. **93**(8): e58.

1836. Gas, C., et al. (1999). "[Isolated fractures of the orbital floor. Conclusions of a retrospective study of 85 cases]." Fractures isolees du plancher orbitaire. Conclusions d'une etude retrospective portant sur 85 cas. **100**(1): 27-33.

UNLABELLED: We present a retrospective study of 85 patients presenting an isolated orbital floor fracture between 1993 and 1997; 79 of them (93%) were operated via a subciliary or transconjunctival approach. Surgical procedure included autologous graft or biomaterial (coral, polydioxanone) depending on the cases. The study was focused on clinical data (concerning diplopia, enophthalmia and sensorial disturbances) which were recorded pre- and post-operatively., RESULTS: 58 patients (68%) had a pre-operative diplopia, and 9 (11%) had a persistent post-operative diplopia: all of these patients were operated more than 8 days after trauma; no post-operative diplopia occurred without pre-operative diplopia; 8 patients (9%) presented a pre-op enophthalmia: all of them came more than 10 days after the trauma; a perfect symmetry was obtained post-operatively in only one of these 8 patients; no enophthalmia occurred in patients without pre-op enophthalmia; sensorial disturbances were seen pre-operatively in 27 patients (32%) and post-operatively in 17 (20%); no correlation was found with the timing or the procedure of the surgery., COMMENTS: The interest of an early diagnosis and treatment is confirmed, in order to avoid late functional (diplopia) or esthetic (enophthalmos) disturbances. Thus it seems necessary to obtain a computed tomography for any orbital trauma as conventional radiography can be less sensitive. Concerning the surgical procedure, resorbable biomaterials seem to be very well tolerated and easy to use. Autologous bone grafts always lead to a certain degree of morbidity without real advantage. The best way seems to be the trans-conjonctival approach, but subciliary incisions can also be used in these cases. The most important remaining problem to solve is probably focused on sensorial disturbances: their incidence is high and there is a high rate of sequels: further studies are obviously necessary to improve the knowledge of etiopathogenic factors and determine the best therapeutic attitude.

1837. Gascho, D., et al. (2020). "Noninvasive 7 tesla MRI of fatal craniocerebral gunshots - a glance into the future of radiologic wound ballistics." Forensic science, medicine, and pathology **16**(4): 595-604.

Compared to computed tomography (CT), magnetic resonance imaging (MRI) provides superior visualization of the soft tissue. Recently, the first 7 Tesla (7 T) MRI scanner was approved for clinical use, which will facilitate access to these ultra-high-field MRI scanners for noninvasive examinations and scientific studies on decedents. 7 T MRI has the potential to provide a higher signal-to-noise ratio (SNR), a characteristic that can be directly exploited to improve image quality and invest in attempts to increase resolution. Therefore, evaluating the diagnostic potential of 7 T MRI for

forensic purposes, such as assessments of fatal gunshot wounds, was deemed essential. In this article, we present radiologic findings obtained for craniocerebral gunshot wounds in three decedents. The decedents were submitted to MRI examinations using a 7 T MRI scanner that has been approved for clinical use and a clinical 3 T MRI scanner for comparison. We focused on detecting tiny injuries beyond the wound tract caused by temporary cavitation, such as microbleeds. Additionally, 7 T T2-weighted MRI highlighted a dark (hypo intense) zone beyond the permanent wound tract, which was attributed to increased amounts of paramagnetic blood components in damaged tissue. Microbleeds were also detected adjacent to the wound tract in the white matter on 7 T MRI. Based on the findings of radiologic assessments, the advantages and disadvantages of postmortem 7 T MRI compared to 3 T MRI are discussed with regard to investigations of craniocerebral gunshot wounds as well as the potential role of 7 T MRI in the future of forensic science.

1838. Gascho, D., et al. (2020). "Postmortem Computed Tomography and Magnetic Resonance Imaging of Gunshot Wounds to the Neck." Journal of forensic sciences **65**(4): 1360-1364.

Postmortem magnetic resonance imaging (MRI) is rarely used for the radiologic assessment of gunshot injuries, although it has clear advantages over postmortem computed tomography (CT) with regard to the imaging of soft tissue injuries. Another benefit in using MRI is that lodged projectiles composed of nonferromagnetic material such as lead present only marginal metal artifacts compared with severe artifacts on CT. This case report presents CT and MRI findings in a case with two gunshot wounds to the neck: a perforating wound and a nonperforating wound with a lead bullet lodged in the cervical spine. The decedent underwent CT and MRI before the scheduled autopsy. A ring of radiopaque material under the dermis in the fatty tissue was identified at both entrance wounds on CT, which was indicative of contact shots. The perforating gunshot was clearly indicated on CT by bullet fragments along the wound channel through the perforated 6th cervical vertebra and the fractured cricoid cartilage at the exit wound. The second trajectory, however, was only assumed based on the presence of gunshot residues at the entrance wound and the position of the lodged bullet. The radiologic assessment was severely impeded by the metal artifacts on CT. Barely noticeable metal artifacts on MRI allowed for clear visualization of the soft tissue injuries and the ruptured medulla oblongata. Only MRI clarified the soft tissue injuries of the brainstem noninvasively, which could provide specific and graphic information on the rapidity of death and the incapacitation of the victim.

1839. Gascho, D., et al. (2020). "Synergy of CT and MRI in detecting trajectories of lodged bullets in decedents and potential hazards concerning the heating and movement of bullets during MRI." Forensic science, medicine, and pathology **16**(1): 20-31.

The purpose of this study was to assess the value of magnetic resonance imaging (MRI) in addition to computed tomography (CT) in gunshot wound cases with bullets or pellets lodged inside the head. In this context, the potential heating and movement of the lodged bullets were additionally investigated using animal models. Eleven forensic cases of penetrating gunshot wounds underwent CT and MRI. The data of each imaging modality were reviewed according to the following relevant characteristics: bony lesion at the entrance, intracranial bone fragments, intracranial metal fragments, gunshot residues, the wound channel and the severity of metal artifacts. Four-point Likert scales were used for the assessment. The heating of projectiles and their magnetic field interactions with the static magnetic field were assessed using animal models. MRI presented major advantages in cases with transversal trajectories and non-ferromagnetic bullets compared to CT. In general, MRI enabled a clear visualization of the wound channel and gunshot-related soft tissue injuries. An image fusion of CT and MRI datasets demonstrated the individual strengths of both modalities. Radio frequency (RF)-induced heating due to bullets lodged inside the brain tissue was invalidated. The likelihood of ferromagnetic projectile migration inside brain tissue is low. MRI of decedents with a bullet lodged inside their heads is viable and provides a valuable supplement to CT. The in situ, noninvasive depiction of the wound channel and gunshot-related soft tissue injuries on MRI can contribute to the knowledge of wound ballistics.

1840. Gascho, D., et al. (2021). "Cinematic rendering of a burst sagittal suture caused by an occipito-frontal gunshot wound." Forensic science, medicine, and pathology **17**(4): 726-729.

The computed tomography (CT) scan of a 19-year-old man who died from an occipito-frontal gunshot wound presented an impressive radiating fracture line where the entire sagittal suture burst due to the high intracranial

pressure that arose from a near-contact shot from a 9 mm bullet fired from a Glock 17 pistol. Photorealistic depictions of the radiating fracture lines along the cranial bones were created using three-dimensional reconstruction methods, such as the novel cinematic rendering technique that simulates the propagation and interaction of light when it passes through volumetric data. Since the brain had collapsed, depiction of soft tissue was insufficient on CT images. An additional magnetic resonance imaging (MRI) examination was performed, which enabled the diagnostic assessment of cerebral injuries. Copyright © 2021. The Author(s).

1841. Gascho, D., et al. (2020). "FRACTURE MRI: Optimized 3D multi-echo in-phase sequence for bone damage assessment in craniocerebral gunshot injuries." Diagnostic and interventional imaging **101**(9): 611-615.

1842. Gasiorek, J. (1989). "[A case of elongated styloid process syndrome]." Przypadek zespolu przedluzonego wyrostka rylcowatego. **43**(3): 244-246.

The elongated styloid process was discovered during tonsillectomy in the tonsilar loge. However, the patient complaints were typically for chronic tonsillitis.

1843. Gasparini, G., et al. (2002). "Maxillofacial traumas." The Journal of craniofacial surgery **13**(5): 645-649.

Craniofacial traumas often involve the orbital region. This report describes an unusual case of penetration of an object into the left upper oral vestibule up to the left medial-upper orbital wall. The object was an indicator switch. A multidisciplinary approach was necessary to make a correct diagnosis and to apply the best surgical treatment. The object was surgically removed, and rigid internal fixation was used to reconstruct the inferior and medial orbital walls. The aesthetic and functional results were good. One year later, the patient showed a slight enophthalmos with normal ocular motility.

1844. Gassend, J.-L., et al. (2021). "Classic but unexpected: a case of Jefferson fracture." Forensic science, medicine, and pathology **17**(2): 346-349.

A man was found lying dead next to a ladder, with only a laceration surrounded by an abrasion visible upon external examination. No skull fractures were palpable. A CT scan and MRI showed a Jefferson fracture of the atlas, associated to a posterior displacement of the skull, a fracture of the dens of the axis, and fractures of the bodies of C5 and C6. Jefferson fractures typically result from a blow to the apex of the skull. In such cases, forensic pathologists should suspect the existence of a Jefferson fracture, particularly when no severe injuries are visible externally.

1845. Gassmann, K., et al. (2006). "[Impaired color perception after a gunshot wound to the head]." Farbsinnstorung nach Kopfschussverletzung. **103**(12): 1050-1052.

1846. Gataa, I. S. and Q. H. Muassa (2011). "Patterns of maxillofacial injuries caused by terrorist attacks in Iraq: retrospective study." International journal of oral and maxillofacial surgery **40**(1): 65-70.

Over the past 5 years, Iraq has witnessed daily terrorist attacks mainly using improvised explosive devices. The aim of this study was to analyze the patterns of maxillofacial injuries caused by terrorist attacks in a sample of Iraqi casualties. Records from two hospitals, including 551 patients who sustained maxillofacial injuries due to terrorists attacks, were analyzed according to the patients' age, sex, site of injury, type of injury and cause of injury. Concomitant injuries and mortality were also considered. The most common age group affected was those aged 15-29 years. Most of these injuries were caused by improvised explosive devices (71%). More than one facial zone was injured in 212 patients (38%). Isolated soft tissues injuries were detected in (54%) of victims. Pure maxillofacial injuries comprised 33%. The most common injuries associated with this type of trauma were eye injuries (29%). The mortality rate was 2% from pure maxillofacial injuries. Terrorist attacks cause unique maxillofacial injuries, which should be considered a new entity in the trauma field.

1847. Gates, M. A., et al. (1996). "Chondroitin sulfate proteoglycan and tenascin in the wounded adult mouse neostriatum in vitro: dopamine neuron attachment and process outgrowth." The Journal of neuroscience : the official journal of the Society for Neuroscience **16**(24): 8005-8018.

Extracellular matrix (ECM) molecules, including chondroitin-4 or chondroitin-6 sulfate proteoglycans (CSPGs) and tenascin, are upregulated in and around wounds and transplants to the adult CNS. In the present study, striatal wounds from adult mice were used in a novel in vitro paradigm to assess the effects of these wound-associated molecules on embryonic dopamine cell attachment and neurite outgrowth. Light and electron microscopic immunocytochemistry studies have shown that astroglial scar constituents persist in cultured explants for at least 1 week in vitro, and despite the loss of neurons from adult striatal explants, there is a retention of certain structural features suggesting that the wound explant-neuron coplant is a viable model for analysis of graft-scar interactions. Explants from the wounded striatum taken at different times after a penetrating injury in vivo were used as substrates for embryonic ventral mesencephalon neurons that were plated on their surfaces. Dopamine cell attachment is increased significantly in relation to the expression of both CSPG and tenascin. The increase in neuronal attachment in this paradigm, however, is accompanied by a postlesion survival time-dependent significant decrease in neuritic growth from these cells. In vitro ECM antibody treatment suggests that CSPG may be responsible for heightened dopamine cell attachment and that tenascin simultaneously may support cell attachment while inhibiting neurite growth. The present study offers a new approach for the in vitro analysis of cell and molecular interactions after brain injury and brain grafting, in essence acting as a nigrostriatal transplant-in-a-dish.

1848. Gates, T. and J. L. Frodel (1998). "Frontobasilar blast injuries: access and treatment." The Journal of cranio-maxillofacial trauma **4**(2): 32-31.

Blast injuries involving the frontobasilar region and orbit can present difficult evaluation and treatment challenges. This article presents the surgical treatment of four patients presenting with blast-type injuries involving the central periorbital region and anterior skull base. Three of these were the result of close-range gunshot wounds, and one was caused by an avulsive penetrating tree branch injury during a motor vehicle accident. All four patients underwent frontal craniotomy for exposure to repair significant intracranial injuries. Following intracranial repair of dural and brain injuries, anterior cranial fossa reconstruction was performed. In two of these patients, elective supraorbital osteotomies were performed to allow improved access to the posterior aspect of the anterior skull base. The healing period of all four patients has been without complications relative to the anterior fossa injuries.

1849. Gates, T. R. and M. Hardjasudarma (1992). "Neuroimaging of fractureless transforamen magnum penetrating injury of the cerebellum." The American journal of emergency medicine **10**(1): 69-72.

An unusual case of penetrating injury to the cerebellum by a foreign body is described. The authors recommend plain radiographs and computed tomography to rule out fractures of the skull vault and base and the upper cervical spine, as well as to ascertain the presence and location of foreign bodies. Magnetic resonance imaging is ideal for the follow-up assessment of brain damage.

1850. Gates, T. R. and M. Hardjasudarma (1993). "Computed tomography findings of an intraorbital pencil." The American journal of emergency medicine **11**(4): 433-434.

1851. Gaujac, C., et al. (2007). "Comparative analysis of 2 techniques of double-gloving protection during arch bar placement for intermaxillary fixation." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **65**(10): 1922-1925.

PURPOSE: This study was conducted to comparatively evaluate, in a prospective and randomized manner, 2 techniques for providing double-gloving protection during arch bar placement for intermaxillary fixation., MATERIALS AND METHODS: A total of 42 consecutive patients in whom application of an Erich bar was indicated for intermaxillary fixation were equally divided into 2 groups. In group 1, 2 sterile surgical gloves were used; in group 2, a nonsterile disposable inner glove was used under a sterile surgical glove. Wilcoxon, Mann-Whitney, Kruskal-Wallis, and binomial statistical tests were used to analyze the findings., RESULTS: A total of 103 perforations were found in the outer gloves

(47 in group 1 and 56 in group 2), along with 5 perforations in inner gloves in both groups (alpha = .01). No significant statistical difference was found between groups in terms of inner glove perforations (alpha = .05). The nondominant hand presented with 70.9% of the perforations, statistically significant to 1%., CONCLUSIONS: Both double-gloving techniques were found to provide effective clinician protection. The use of a nonsterile disposable glove under the surgical glove is possible for less-invasive procedures, offering the same safety as using 2 sterile surgical gloves while decreasing operational costs. This method does not eliminate the need to change gloves when a perforation is suspected or noted during the surgery, however.

1852. Gaur, N., et al. (2017). "Transorbital globe sparing penetrating cranial injury with a metallic screw: large cranio-orbital foreign body." BMJ case reports **2017**.

1853. Gaur, N., et al. (2016). "Bilateral complete blindness following globe-sparing single-bullet orbital injury." Indian journal of ophthalmology **64**(10): 770-771.

1854. Gawdat, T. I. and R. A. Ahmed (2010). "Orbital foreign bodies: expect the unexpected." Journal of pediatric ophthalmology and strabismus **47 Online**: e1-4.

Data of three pediatric patients with orbitofacial trauma were reviewed. Two patients presented with recurrent orbital inflammation with partial remission with antibiotics. One patient presented with diplopia. All patients underwent full opthalmic examination and computed tomography (CT) of the brain and orbit, followed by surgical intervention. The indication for surgery was either abscess evacuation, repair of blowout fracture, or mass excision. All of the patients had intraorbital wood foreign bodies that were not evident on CT and were not suspected from the history given by the parents. All were surgically removed. One patient had multiple wood foreign bodies (more than 10). Chronic or recurrent orbital inflammation, unexplained proptosis, or orbital masses following orbitofacial trauma in children should raise the suspicion of intraorbital foreign bodies even if not detected by CT studies. Presence of other sequelae of trauma such as blowout fracture does not exclude the possibility of associated foreign bodies. Copyright 2010, SLACK Incorporated.

1855. Geary, U. M., et al. (1997). "Occult gunshot injury of the temporal bone." Journal of accident & emergency medicine **14**(3): 185-186.

Increasing firearms violence has produced much public disquiet in recent months and Liverpool has seen a particularly well publicized spate of shootings. This is a case report of an initially occult intracranial injury which illustrates the unpredictable nature of missile trauma and the importance of computerised tomography in all cases of gunshot injury to the head.

1856. Gebhart, F. T. F., et al. (2012). "Gas at postmortem computed tomography--an evaluation of 73 non-putrefied trauma and non-trauma cases." Forensic science international **222**(1-3): 162-169.

Postmortem computed tomography (PMCT) has become an important complement in investigating forensic cases allowing an accurate detection of gas accumulations. The present study investigated the presence and distribution of gas in a large number of non-putrefied cases of traumatic and non-traumatic deaths. Furthermore the possibility of pneumobilia secondary to blunt abdominal trauma was studied. Retrospectively, 73 cases, underwent a whole-body PMCT prior to autopsy. These were divided into four groups: penetrating trauma (20 gunshot cases, 13 stabbing cases), blunt abdominal trauma (20 cases) and a control group of 20 non-trauma cases. Exclusion criteria were visible signs of decomposition. Each group was screened for gas accumulations in the vascular system, internal organs, soft tissues and body cavities. Gas accumulations were present in 98% of the trauma cases, compared to 80% of the control group. The most affected structures and/or organs in the trauma group were soft tissues, vessels and the liver. In most cases of the trauma group gas was associated with open injuries and lacerations of vessels. Furthermore, in the gunshot group gas was frequently seen in the intracranial cavity. Pneumobilia occurred in one case of the blunt trauma group; in that control group gas was also seen, but less frequently. Gas accumulation showed a strong association with traumatic events, but even the majority of non-trauma cases showed gas accumulations. Despite the exclusion of cases with visible

decomposition signs, a putrefactive origin of gas was assumed in some cases. Gas accumulations are a frequent finding in PMCT with a higher incidence in (open) trauma cases. Even though a differentiation between putrefactive and traumatic gas accumulations is still difficult, knowledge of the circumstance surrounding the case may help identify the origin of gas.

1857. Geggel, H. S., et al. (1984). "Histology of human conjunctival transplantation." Cornea **3**(1): 11-15.

The technique of conjunctival transplantation has proven very successful in reestablishing an intact ocular surface in patients with severe ocular surface disease in whom conventional treatment has failed. We present follow-up on the histology of the transplanted conjunctival tissue in four alkali-burned patients who underwent penetrating keratoplasty 3-28 months following conjunctival transplantation. The corneal button was re-epithelialized in all patients. The fate of the transplanted tissue agreed with experimental observations made in the rabbit model, i.e., under areas of vascularization and inflammation, the transplanted tissue resembled conjunctiva with numerous goblet cells and 3-4 cell layers of nonkeratinized, stratified epithelium. In one patient, a definite "transition zone" from conjunctival to corneal appearing epithelium was seen in an area with minimal inflammation and vascularization, again confirming the animal results showing that transdifferentiation of conjunctival to corneal epithelium can occur.

1858. Geisenberger, D., et al. (2020). "The punched-out tissue complex (skin-bone "imprimatum") in shots from captive-bolt guns: does it act as a secondary projectile?" International journal of legal medicine **134**(3): 1095-1102.

From the first half of the twentieth century to the present day, injuries and fatalities from captive-bolt livestock stunners are a major topic in forensic medicine. The vast majority of cases account for suicides with the frontal, temporal, parietal, and occipital regions being the most common sites of entrance (in descending order of frequency). Due to the limited length of the bolt, the corresponding wound channel within the braincase is only several centimeters long. It has been a controversial subject for a long time, whether the skin-bone complex punched out by the conically grooved end of the steel rod may act as a "secondary projectile" being propelled beyond the actual path of the bolt. To answer this question, experimental shots from various types of captive bolt-guns were fired to simulants. Video-documentation employing a high-speed motion camera showed that the punched-out pieces of skin and bone did not move further than the bolt. Thus, a secondary extension of the total wound channel could not be observed. However, the suction effect caused by the bolt's rearward movement may induce a slight retrograde displacement of the skin-bone complex.

1859. Geissler, K. (2007). "Unusual placement of a nasogastric tube." Radiologic technology **78**(3): 253.

1860. Gekeler, F., et al. (2005). "Intraconal grease-gun injury: a therapeutic dilemma." Ophthalmic plastic and reconstructive surgery **21**(5): 393-395.

The case of a 31-year-old man with an accidental grease-gun injury to his left orbital region is presented. CT and MRI showed a well-delineated intraconal cyst in the superior aspect of the left orbit surrounded by a significant inflammatory response. The patient was followed for 11 months. Diplopia was not reported at any time, and visual acuity, visual fields, and all other examinations remained normal. Uneventful surgical removal was performed at the patient's request. Histopathologic examination demonstrated a typical picture of lipogranulomatous inflammation. In a review of the accessible literature, only four cases of intraorbital grease-gun injuries were detected; all of them submitted to early surgical removal. We conclude, however, that an intraconal oil/grease cyst can be carefully monitored and--in the absence of symptoms--must not necessarily be removed.

1861. Gelazius, R., et al. (2018). "Self-inflicted face gunshot injuries: two case reports." Stomatologija **20**(1): 32-36.

Self-inflicted gunshot injuries to the head and neck area are challenging cases. Immediate and complex approach is required due to complexity of head and neck anatomy. The extent of injury largely depends on velocity of a rifle and penetrated tissues. Management of these type of patients consist of vital resuscitation, primary wound management, soft and hard tissue reconstruction and rehabilitation. Here we present two cases of self-inflicted gunshot injuries with low and high velocity rifles.

1862. Gelender, H., et al. (1988). "Temporary keratoprosthesis for combined penetrating keratoplasty, pars plana vitrectomy, and repair of retinal detachment." Ophthalmology **95**(7): 897-901.

The Landers-Foulks temporary keratoprosthesis was used to combine penetrating keratoplasty, pars plana vitrectomy, and scleral buckling in the management of 13 eyes with opaque cornea and posterior segment abnormalities. In seven cases, trauma precipitated the ocular disease. Complications of cataract surgery resulted in anterior and posterior segment pathology in six cases. The corneal graft was initially clear in all cases. However, corneal edema complicated phthisis bulbi in four cases and followed homograft reaction in two cases. Eight eyes with retinal detachment (RD) preoperatively were successfully reattached. In five eyes, the retina redetached as these eyes became phthisical. Visual function improved in six cases. In general, eyes with a history of trauma had a much poorer outcome than did eyes with anterior and posterior segment problems related to previous cataract surgery.

1863. Gelesko, S., et al. (2011). "Subcranial navigation-assisted repair of frontobasal skull fractures." Journal of oral and maxillofacial surgery **69**(9): e37-e38.

Statement of the Problem: The management of frontobasar fractures with orbital roof involvement has historically been transcranial, with multiple potential complications including brain injury, significant bleeding, and poor esthetic outcomes. The primary objective of this retrospective cohort study was to determine whether displaced frontobasal skull fractures involving the orbital roof may be safely and successfully repaired via a navigation-assisted transorbital approach. The secondary objective was to review the prevalence, management, and clinical outcomes of patients treated over the past 10 years at Legacy Emanuel Hospital (LEH) in Portland, OR for frontobasal skull fractures. Materials and Methods: A retrospective chart review of all patients with frontobasal skull fractures presenting to a level 1 trauma center from 2001-2011 were reviewed. Patients were identified using the Legacy Emanuel Trauma Registry. Patients with displaced frontobasal fractures, both pure and impure, involving the orbital roof, with dural embarrassment, who were treated via a subcranial, intraorbital, navigation-assisted approach were included in the study cohort. Patients who died within 24 hours of admission and who had significant brain injury were excluded from the study. Fractures were classified utilizing the Manson frontobasal fracture anatomic classification system. All patients in the study cohort underwent transorbital dural repair, fracture reduction, and plate stabilization of fractures. Normalization of orbital volumes was confirmed using intraoperative CT navigation software. Patients in the comparison group: those treated without navigation, those who had concomitant displaced frontal sinus fractures, disruption of the nasofrontal recess, and/or frontal sinus outflow obstruction underwent transcranial orbital roof repair and cranialization of the frontal sinus. The study cohort was compared to the comparison group, patients treated with traditional methods, on the basis of mean hospital days of stay, minor complications, and major complications. Data Analysis: Data were analyzed using descriptive statistics; major and minor complications were defined and analyzed. Results: Data were obtained from 800 subjects treated at LEH from 2001-2011 for frontobasal skull fractures, identified using the LEH Trauma Registry. Seven patients with displaced frontobasal fractures involving the orbital roof who were treated via a navigation-assisted transorbital approach were included in the study cohort. Patients were mostly male (57%), and ages ranged from 16 to 47 years. The minor complication rate was similar between the study cohort and the comparison group. Only one major complication was identified in the study group, pneumocephalus, requiring an additional operation via a transcranial approach. Conclusions: Subcranial, navigation-assisted approaches to frontobasal skull fractures, with and without dural embarrassment, has efficacy for carefully selected patients and may obviate the need for conventional open procedures in patients without frontal sinus outflow obstruction.

1864. Gelesko, S., et al. (2013). "A protocol for computer planning and intraoperative imaging as an aid to reconstruction of gunshot wounds to the face." Journal of oral and maxillofacial surgery **71**(9): e7-e8.

Problem: Facial gunshot wounds result in extensive soft and hard tissue loss. Computer-aided surgical simulation has been described as an aid in the reconstruction of complex cranio-maxillofacial deformities, incorporating the creation of guide stents, cutting guides, and models, as well as use of intraoperative imaging to facilitate transfer of the virtual plan to the patient.1,2 There are currently no guidelines for utilizing computer planning and intraoperative imaging in comprehensive reconstruction for patients with severe post-traumatic hard and soft tissue loss. The purpose of this investigation is to review our experience with computer-aided surgery in the setting of gunshot wounds to the face and propose a treatment protocol. Materials and Methods: Between January 2009 and March 2013, nine patients

with complex, avulsive, facial gunshot wounds were managed according to a protocol utilizing computer-aided design/computer-aided manufacturing (CAD/CAM) software. The virtual plan was transferred to the patient via a combination of cutting guides, guide stents, and intraoperative navigation. Accurate placement of implants, bone grafts, and composite tissue free flaps was confirmed with intraoperative computerized tomography (CT). The protocol involves a staged approach to surgical reconstruction, beginning with: 1) damage/hemorrhage control, airway stabilization, and maxillo-mandibular stabilization, as indicated; 2) debridement of non-viable bone and soft tissue; 3) virtual reconstruction using commercially available craniomaxillofacial surgical simulation software, and “back-conversion” of virtual plan into navigation system; 4) navigation-assisted reconstruction of midfacial skeletal anatomy; 5) computer-aided oro-mandibular reconstruction with or without microvascular free tissue transfer using custom guide stents and cutting guides; 6) navigation- assisted, computer-aided palatomaxillary reconstruction with microvascular free tissue transfer using cutting guides and guide stents as indicated; 7) navigation-assisted reconstruction of the internal orbit; and 8) confirmation of accurate reconstruction using intraoperative CT imaging. Data Analysis: Data analysis for this retrospective case series is limited to descriptive statistics obtained via chart review. Subjective comparison of the computer- assisted presurgical plan to the postoperative CT scan was completed intraoperatively. Jaw position, facial projection, separation of the nose and mouth, and oral competence was evaluated postoperatively at least one month after surgery. Results: All nine patients had severe disruption of the orbits, midface and mandible, with massive hard and soft tissue avulsion and oral-nasal communication. The computer- assisted surgery was successfully implemented in all patients and proved to be a useful adjunct for: the restoration of orbital volume, facial projection and symmetry; the inset of composite tissue free flaps, and the facilitation of dental implant supported prosthetic rehabilitation. Fibular free flaps were utilized to immediately reconstruct the maxilla and mandible in six patients, facilitating orthognathic jaw position, favorable facial projection, separation of the nose and mouth, and oral competence. The remaining patients were treated without microvascular free tissue transfer, but the virtual planning, pre-bent reconstruction plates, and intraoperative imaging significantly aided accurate reconstruction. Intraoperative CT scans facilitated recognition of minor inaccuracies in orbital plate placement in two patients, the position of which was corrected prior to leaving the operating room. Conclusion: Computer-aided presurgical planning, custom cutting guides and guide stents, and intraoperative imaging have the potential to favorably affect the functional and aesthetic outcomes of patients with severe facial injuries resulting from gunshot wounds.

1865. Geller, E., et al. (1997). "Head injuries in children from plastic hairbeads." Pediatric radiology **27**(10): 790-793.

BACKGROUND: Plastic hairbeads are often worn as decorative hair fasteners by children. Serious, penetrating head injuries may result from their use and have been observed in some children following a fall., OBJECTIVE: The objective of this report is to describe the imaging findings in children who have sustained head injury while wearing plastic hairbeads., MATERIALS AND METHODS: Three children with significant head injuries resulting from embedded hairbeads are described. Three additional cases of minor head injury reported to the Consumer Product Safety Commission are summarized., RESULTS: One child sustained a minimally depressed skull fracture without brain injury. The second child required surgical repair of a depressed skull fracture complicated by a parenchymal hemorrhage and dural tear. A third child required surgical evacuation of an organized, liquefied epidural hematoma 2 weeks after an initial evaluation at an outside emergency room., CONCLUSION: Children wearing plastic hairbeads are at risk for severe head injury following a fall. Caution must accompany their use.

1866. Gellis, M. B. (1983). "Massive craniofacial injury: initial treatment and methods of reconstruction." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **41**(9): 605-608.

A patient with a massive craniofacial injury is presented to illustrate useful flaps that may be used in the reconstruction of this type of injury. Initial management, consisting of basic life support, is indicated, because many patients who appear to be unsalvageable may be successfully restored to an active, productive life. Reconstruction of soft-tissue deficits was accomplished using the forehead and deltopectoral flaps. Although other methods of reconstruction may be used, the forehead and deltopectoral flaps remain among the more reliable flaps to restore thin lining to mucosal and external skin surfaces where bulky tissues are not desired.

1867. Gelston, C. D., et al. (2005). "Orbital foreign body masquerading as conjunctival melanoma 60 years after injury." Clinical & experimental ophthalmology **33**(6): 661-663.

A 74-year-old man presented with a 6-month history of a pigmented conjunctival lesion on his left eye. The lesion was initially suspicious for conjunctival melanoma. The patient admitted to a remote history of trauma from a airgun pellet over 60 years ago. Anterior examination revealed a 6 x 6 mm pigmented left conjunctival lesion and B-scan of the lesion was suggestive of a retained orbital foreign body. The lesion was removed through a transcaruncular medial orbitomy and pathology showed a retained orbital foreign body. A newly pigmented conjunctival lesion although initially concerning for melanoma represented a retained orbital body that surfaced many years after the initial orbital trauma.

1868. Gembitskii, E. V., et al. (1996). "[Pulmonary complications in severe combined craniocerebral trauma (their pathogenesis, clinical picture, diagnosis and treatment)]." Legochnye oslozhneniia pri tiazheloi sochetannoi cherepno-mozgovoi travme (patogenez, klinika, diagnostika, lechenie). **74**(2): 12-16.

Within 1979-1989 the authors treated 26 wounded soldiers and officers with brain injury inflicted by mine explosion. 5 patients were in severe condition, 18 in extremely grave and 3 in critical condition. The patients had concomitant blast injuries and contusions. Pulmonary complications observed in such patients compused to DIC and respiratory distress syndromes running in the presence of marked metabolic disorders, hypoxia and intoxication. It is thought important that conservative therapy of respiratory disorders in patients with brain traumas were not constricted with correction of bronchial obstruction. The additional intensive treatment of the above syndromes is needed including extracorporeal detoxication (plasmapheresis) and hyperbaric oxygenation.

1869. Gennari, T. D. and M. S. Koizumi (1995). "[Determination of the trauma severity level]." Determinacao do nivel de gravidade do trauma. **29**(5): 333-341.

The severity of traumas in hospitalized patients was characterized by means of the Injury Severity Score (ISS) was studied prospectively. One hundred trauma patients hospitalized in a trauma referral health facility located in S. Paulo, Brazil, were analyzed. Of the total number of patients, 68 had blunt trauma and 32 penetrating trauma. As to ISS, it was discovered that 53.0% of the blunt trauma patients had mild trauma (ISS 1-15), 29.4% moderate trauma (ISS 16-24), and 17.6% showed severe trauma (ISS 25); 34.4% of the penetrating trauma patients had mild trauma, 18.7% moderate trauma and 46.9% severe trauma. The mean and standard deviations relating to the ISS of blut and penetrating trauma patients were, respectively, 14.9 +/- 8.1 and 20.8 +/- 11.0; the respective mortality rates were of 11.8% and 12.5%.

1870. Gentile, R. C., et al. (1996). "Diagnosis of traumatic cyclodialysis by ultrasound biomicroscopy." Ophthalmic surgery and lasers **27**(2): 97-105.

BACKGROUND AND OBJECTIVE: To evaluate the ability of high-frequency ultrasound biomicroscopy to diagnose traumatic cyclodialyses not evident on clinical examination., PATIENTS AND METHODS: Six eyes to six patients with posttraumatic hypotony and/or shallow anterior chamber and suspected cyclodialysis clefts were examined with slit-lamp biomicroscopy, gonioscopy, B-scan ultrasonography, and ultrasound biomicroscopy. Ultrasound biomicroscopy provided high resolution of cross-sectional images of the anterior chamber angle, posterior chamber, and anterior uveal tissue., RESULTS: Ultrasound biomicroscopy confirmed the disinsertion of the ciliary body from the scleral spur and associated ciliary body detachment in all eyes. Gonioscopy failed to demonstrate a cyclodialysis cleft in five eyes because of hyphema (two eyes) and abnormal iris architecture (related to trauma) precluding visualization of the angle recess (three eyes). Using information from ultrasound biomicroscopy imagining, one patient underwent a ciliary body reattachment procedure and repair of the cyclodialysis cleft., CONCLUSION: Ultrasound biomicroscopy is a noninvasive method that can accurately diagnose the presence of traumatic cyclodialyses and can aid in surgical management. It is particularly useful in the presence of hazy media, hypotony, and/or abnormal anterior segment anatomy.

1871. George, D. D., et al. (2022). "Meningitis due to intra-abdominal cerebrospinal fluid fistula following gunshot wound successfully treated with antibiotics and blood patch: A case report and literature review." Surgical neurology international **13**.

Background: Penetrating spinal cord injury (PSCI) represents an average of 5.5% of all SCIs among civilians in the United States. The formation of a cerebrospinal fluid (CSF) fistula following PSCI occurs in approximately 9% of cases.

Intra-abdominal CSF fistulae are rarely reported. Case Description: We present the case of a 28-year-old Caucasian female who suffered a single gunshot wound to the abdomen with a missile fragment lodged within the left L2 pedicle and transverse process without obvious canal compromise. The patient developed bacterial meningitis 13 days after the initial injury, treated with IV antibiotics. CT myelogram demonstrated intra-abdominal ventral CSF fistula from the left L2–L3 neuroforamen. The patient was successfully treated with fluoroscopy-guided dorsal autologous blood patch graft. Conclusion: This case highlights a rare complication of PSCI successfully managed with the use of a blood patch graft.

1872. George, E. D. and T. F. Dagi (1995). "Military penetrating craniocerebral injuries. Applications to civilian triage and management." Neurosurgery clinics of North America **6**(4): 753-759.

Although facilities at many civilian centers far exceed those historically available to military neurosurgeons in the field, the principles derived from combat injuries continue to apply. It is hoped that there may be differences in salvageability at the margin owing to the availability of more sophisticated imaging and critical care monitoring techniques, neuroanesthesia, and the advent of possible pharmacologic neural salvage agents.

1873. George, M. and J. Round (2006). "An Eiffel penetrating head injury." Archives of disease in childhood **91**(5): 416.

1874. George, R., et al. (2019). "Coil Embolization of the Internal Carotid Artery in Patient with Retained Transcranial Knife." World neurosurgery **127**: 237-240.

BACKGROUND: We describe endovascular coil embolization of the internal carotid artery before removing a retained knife blade partially occluding the lacerum segment of the internal carotid artery., CASE DESCRIPTION: A 21-year-old male presented to the emergency department with a retained transcranial knife after sustaining a stab to the left temporal scalp. He was hemodynamically stable and neurologically intact on presentation. Computed tomography angiography followed by digital subtraction angiography revealed narrowing of the lacerum segment of the left internal carotid artery by the tip of the knife blade with adequate blood flow from the contralateral internal carotid artery. Embolization and occlusion of the internal carotid artery proximal and distal to the knife tip were performed. The patient was transferred to the neurosurgical operating room for extraction of the knife. A repeat left carotid artery angiogram post knife extraction showed no displacement of the coils and no extravasation of contrast. Follow-up imaging confirmed a good outcome., CONCLUSIONS: A staged approach of digital subtraction angiography and endovascular therapy followed by surgical treatment is a safe and effective management strategy for patients presenting with a retained transcranial knife and suspected vascular injury.

1875. Gepp, R. and M. Quiroga (2012). "Spinal cord trauma in children: Clinical features." Child's Nervous System **28**(5): 774.

Introduction: Spinal Cord Injury (SCI) is a common cause of morbidity and mortality in children. This study analyzed the clinical characteristics of SCI in children 10 years of age and younger, forms of prevention, and ways to improve treatment. Methods: Ninety-three children were reviewed between 1996 and 2009. The variables studied were: type, age, cause, neurological level, association between SCI and TBI, arthrodesis surgery, time lapsed between trauma and diagnosis, and causes of death. The statistical evaluations were done using the Chi Square andANOVAscales, in the SPSS program version 11.0. Results: The most common cause of the spinal cord injury was automobile accidents. Getting run over by a car was second (29.1%), followed by firearm injuries (11.8%). The thoracic spine was the most commonly impacted area. Evaluation showed that 83.9% had complete neurological injury. Associated TBI was present in 35.5% of the cases. Only 21.5% of the patients required arthrodesis of the spine. In 31.2% of the cases, myelopathy was not diagnosed at the time of the accident. There was no statistical correlation between TBI and a delayed diagnosis of SCI ($p \geq 0.231$). Five children (5.4%) died during the followup period. Discussion: The study showed that the cause of the trauma is associated with motricity in children and that prevention is important. Trauma from automobile accidents was a main cause, and, in older children, firearm injuries are an important risk. Spinal cord injury was not always diagnosed in children at the time of accident. Educating family members and training emergency teams to adequately treat children with multiple traumas are measures that can help reduce the incidence of SCIs and neurological damage.

1876. Gerard, M., et al. (1999). "[Surgical technique of limbal autotransplantation in severe and recent eye burns]." Technique chirurgicale de l'autotransplantation limbique dans les brulures oculaires graves et recentes. **22**(4): 502-506.

We report our surgical technique of limbal autograft for recent severe ocular burns. Our procedure is a modified Kenyon and Tseng technique. We discuss our main observations when using this procedure for serious ocular burns which demonstrate the physical signs best indicating surgery, the limbal region to be used, and optimal postoperative follow-up.

1877. Gerdin, W., et al. (2022). "A pilot multicentre cluster randomised trial to compare the effect of trauma life support training programmes on patient and provider outcomes." BMJ open **12**(4): e057504.

Introduction Trauma accounts for nearly 10% of the global burden of disease. Several trauma life support programmes aim to improve trauma outcomes. There is no evidence from controlled trials to show the effect of these programmes on patient outcomes. We describe the protocol of a pilot study that aims to assess the feasibility of conducting a cluster randomised controlled trial comparing advanced trauma life support (ATLS) and primary trauma care (PTC) with standard care. Methods and analysis We will pilot a pragmatic three-armed parallel, cluster randomised controlled trial in India, where neither of these programmes are routinely taught. We will recruit tertiary hospitals and include trauma patients and residents managing these patients. Two hospitals will be randomised to ATLS, two to PTC and two to standard care. The primary outcome will be all-cause mortality at 30 days from the time of arrival to the emergency department. Our secondary outcomes will include patient, provider and process measures. All outcomes except time-to-event outcomes will be measured both as final values as well as change from baseline. We will compare outcomes in three combinations of trial arms: ATLS versus PTC, ATLS versus standard care and PTC versus standard care using absolute and relative differences along with associated CIs. We will conduct subgroup analyses across the clinical subgroups men, women, blunt multisystem trauma, penetrating trauma, shock, severe traumatic brain injury and elderly. In parallel to the pilot study, we will conduct community consultations to inform the planning of the full-scale trial. Ethics and dissemination We will apply for ethics approvals to the local institutional review board in each hospital. The protocol will be published to Clinical Trials Registry - India and ClinicalTrials.gov. The results will be published and the anonymised data and code for analysis will be released publicly.

1878. Gerlach, K. (2008). "[Physical and sexual child abuse]." Kindliche Opfer sexueller und korperlicher Gewalt. **65**(7): 381-388.

Child abuse may result in dramatic short and longtime damage of children's physical and emotional well being. This underscores the clinician's special responsibility to contribute a sound professional and scientific approach to the multiprofessional diagnosis and intervention in suspected child abuse cases. The approach is to correlate the probability of a given finding with the history and comparing it to biomechanical principles. Of concern are especially all serious injuries with an alleged trivial or inadequate for age mechanism, missing, vague or changing patterns of explanation, injuries of different age, delay of medical care and allegations by independent observers or even the child. Exact documentation of all medical examinations is the basis of any forensic expertise if child abuse is to be considered. This paper ist dealing with morhological findings following various kinds of violence which can often be observed in connection with child abuse, as well as the interpretation of characteristic patterns of findings. Furthermore, practicable procedures after diagnosing child abuse ar being discussed on the basis of legal terms.

1879. Gerold, K. B. (1991). "Cranial gunshot wounds best managed in specialized trauma centers." The Journal of the American Osteopathic Association **91**(5): 425-430.

1880. Gervaise, A., et al. (2010). "[Imaging of cranial gunshot traumas]." Imagerie des traumatismes craniens par arme a feu. **91**(11 Pt 1): 1113-1120.

Cranial traumas from gunshot wounds are characterised by the impact of a high velocity projectile. There are therefore serious, life threatening traumas. CT Scan is essential in the emergency setting for initial evaluation of traumatic bone and parenchymatous injuries to determine the indication for neurosurgery and appropriate medical

management. In case of survival, CT Scan and MRI can be used to monitor progress and any possible complications, in particular vascular or infectious complications which are specific to this type of injury.

1881. Gervasio, K. A., et al. (2015). "Prognostic Value of Ocular Trauma Scores in Patients With Combined Open Globe Injuries and Facial Fractures." American journal of ophthalmology **160**(5): 882-888.e882.

PURPOSE: To assess the prognostic value of the Ocular Trauma Score in patients with combined open globe injuries and facial fractures., DESIGN: Retrospective cohort study., METHODS: A comprehensive chart review was conducted on 25 patients (28 eyes) identified from the Elmhurst City Hospital Trauma Registry between January 1, 2000 and June 30, 2012. Elmhurst City Hospital is a level 1 trauma center located in Elmhurst, New York, USA., RESULTS: Average age was 52 (range 18-88) and patients were predominantly male (84%). The majority of patients had an Ocular Trauma Score of 1 (87.5%), and of these patients, 76% and 14% had final visual acuities of no light perception (NLP) and light perception/hand motion (LP/HM), respectively. These corresponded to 74% and 15% predicted by the original Ocular Trauma Score guidelines (100% sensitive and 100% specific). Ocular Trauma Score of 1 was associated with zone 3 eye wound location (P = .02). Independent of Ocular Trauma Score, initial visual acuity and frontal bone fractures were predictive of NLP (P = .006 and P = .047). Nonblindness was associated with nasal bone fractures (P = .047)., CONCLUSION: This study validates the use of the Ocular Trauma Score in patients with combined facial fracture and open globe injury. The presence of facial fractures does not appear to influence visual prognosis for open globe injuries with an Ocular Trauma Score of 1. In the absence of data to calculate a full Ocular Trauma Score, initial visual acuity was the strongest predictor of final visual outcome.

1882. Gewertz, B. L., et al. (1980). "Management of penetrating injuries of the internal carotid artery at the base of the skull utilizing extracranial-intracranial bypass." The Journal of trauma **20**(5): 365-369.

Penetrating injuries of the internal carotid artery at the base of the skull often require permanent or transient occlusion of the injured vessel during repair. Extracranial-intracranial bypass (EC-IC) was employed in five patients to insure adequate cerebral perfusion during cervical exploration. Preoperative neurologic deficits were noted in three patients; two demonstrated complete reversal following EC-IC. This experience suggests that EC-IC can maintain adequate cerebral perfusion during repair of internal carotid injuries and allow selective revascularization of patients with neurologic deficit and carotid occlusion.

1883. Ghadersohi, S., et al. (2017). "Presentation, workup, and management of penetrating transorbital and transnasal injuries: A case report and systematic review." American journal of rhinology & allergy **31**(2): 29-34.

BACKGROUND: A foreign body (FB) penetrating intracranially after passing transorbitally or transnasally is a rare occurrence. However, otolaryngologists are increasingly being asked to participate in the care of these patients for both endoscopic removal of the object and repair of any skull base defects., OBJECTIVE: To assess the presentation, workup, and management of transnasal or transorbital penetrating FB injury., METHODS: Systematic review of the presentation, workup, and management of transnasal or transorbital penetrating FB injury; plus, a case report of a 53-year-old woman with a transorbital penetrating rose bush branch. We searched medical literature data bases, which resulted in 215 total titles, which were then narrowed based on inclusion and exclusion criteria., RESULTS: Thirty-five cases of transorbital or transnasal low-velocity trauma that involved the paranasal sinuses were reviewed from 33 articles. The average age was 30 years, 40% of the objects were made of wood. Fifty-seven percent of the cases were transorbital, whereas 43% were transnasal. Forty-six percent of the surgical interventions were completed endoscopically or with endoscopic assistance. Complications of injury were common, with 66% of patients experiencing cerebrospinal fluid leaks; 23%, permanent blindness; 17%, meningitis; 14%, ophthalmoplegia; 9%, decreased visual acuity; and 3%, brain abscess. Our patient presented with a traumatic cerebrospinal fluid leak, and recovered well after transorbital and endoscopic removal of the branch, skull base repair, and a prolonged course of antibiotics and antifungal medications., CONCLUSIONS: Transnasal and transorbital penetrating FB injuries are a relatively uncommon occurrence but when they do occur require rapid workup and interdisciplinary management to prevent acute and delayed complications.

1884. Ghoraba, H. H., et al. (2021). "Long-Term Outcome of Pars Plana Vitrectomy for Retained Posterior Segment Intraocular Foreign Body Secondary to Gunshot Injury." Clinical ophthalmology (Auckland, N.Z.) **15**: 1897-1904.

PURPOSE: To report the long-term outcome of pars plana vitrectomy (PPV) for management of retained posterior segment intraocular foreign body (IOFB) secondary to gunshot injury., METHODS: This is a retrospective interventional case series including consecutive patients who had PPV for retained posterior segment IOFB secondary to gunshot injury. Main outcome measures were final best-corrected visual acuity (BCVA), long-term globe survival and detection of complications. Spearman correlation analyzed relationships between numerical data. Kruskal-Wallis test compared differences in initial BCVA and final BCVA across variables. Categorical variables were tested using Chi square or Fisher's exact test. P value is significant at 0.05., RESULTS: The study included 103 eyes of 103 patients. Mean baseline BCVA was 0.01 decimal unit (2 logMAR). Mean duration from primary repair to PPV was 3 weeks. Mean duration of post-operative follow-up was 60 months. Mean final BCVA was 0.04 decimal unit (1.3 logMAR), p 0.001. Post-operatively, BCVA improved in 58.2% of patients. Nineteen patients (18%) gained >=2 lines of vision, and 15 patients (14.5%) achieved final BCVA of 0.4 decimal unit (logMAR 0.4). All complications were related to the original injury. These included macular scar (19%), macular pucker (6%), recurrent retinal detachment (4%), subretinal fibrosis (3%), consecutive optic atrophy (3%), and PVR (3%). Phthisis bulbi or sympathetic ophthalmia did not develop in any case., CONCLUSION: PPV for removal of IOFB caused by gunshot injury yielded long-term favorable functional outcome with excellent globe survival. Poor initial BCVA, location of IOFB in the posterior pole, associated lens injury and retinal detachment are significant adverse prognostic factors for final BCVA but not for globe survival.

1885. Ghorbani, M., et al. (2020). "Successful endoluminal reconstruction of a pseudoaneurysm of the internal carotid artery following a transorbital stab injury." Clinical neurology and neurosurgery **194**: 105838.

Traumatic penetrating injuries to the internal carotid artery (ICA) resulting in the formation of a traumatic pseudoaneurysm are potentially devastating injuries. Previously treatment included, open surgical occlusion of the affected vessel or endovascular embolization. However, with the advent of flow diverter stents, endoluminal reconstruction has become a viable treatment option. In this case report we describe the successful managment of an ICA pseudoaneurysm due to a transorbital stab injury. Endoluminal reconstruction in a traumatic aneurysm is a feasible option. Considering the risk of hemorrhagic complications due to dual antiplatelet therapy required after flow diverter placement, this treatment should only be chosen if insufficient collateral supply is found and occlusion of the affected vessel is not a viable option.

1886. Giacino, J., et al. (2016). "Behavioral and functional recovery in patients with prolonged traumatic disorders of consciousness." Archives of physical medicine and rehabilitation **97**(10): e3.

Research Objectives: To determine the incidence of recovery of pre-selected behavioral "benchmarks" during a 6-week period of inpatient rehabilitation. To establish the relationship between behavioral recovery and functional outcome ratings on the Disability Rating Scale (DRS). To compare behavioral and functional recovery between patients in MCS+, MCS- and VS. Design: Post-hoc analysis of subjects enrolled in the placebo arm of a previously-completed, prospective multicenter randomized-controlled trial of amantadine hydrochloride. We tracked the recovery of six behavioral benchmarks drawn from the Coma Recovery Scale e Revised (CRS-R) over a 6-week period during inpatient rehabilitation, investigated the relationship between the number of benchmarks recovered and the level of function attained on the Disability Rating Scale (DRS) by week 6 and compared differences in outcome between participants in VS, MCS- and MCS+ at the 6-week follow-up. Setting: Eleven rehabilitation hospitals in the United States and Europe with high admission rates for patients with post-traumatic disorders of consciousness. Participants: Subjects were 97 consecutively-enrolled patients between the ages of 16 e 65 who suffered a non-penetrating TBI 4 to 16 weeks prior to enrollment, and were receiving usual and customary inpatient physical, occupational and speech therapy services. All psychoactive medications were withdrawn prior to enrollment and subsequent use discouraged. At enrollment, 33 participants were in a vegetative state (VS) and 64 were in a minimally conscious state (MCS) as defined by a DRS score > 11 and absence of consistent command-following and reliable communication on the CRS-R. The MCS group was stratified further into MCS+ and MCS- subgroups, based on the presence or absence of behavioral signs of language comprehension or expression as defined by the CRS-R. Patients with pre-injury CNS-related disability, medical instability, pregnancy, significant renal disease, > 1 seizure in the prior month, prior amantadine treatment or allergy to amantadine were excluded. The protocol was approved by the institutional review boards of all participating sites and written informed consent obtained from each patient's legally authorized representative. The trial from which these data were extracted was registered with the ClinicalTrials.gov Protocol Registration System (ID# NCT00970944) and

independent oversight provided by an external Data Safety Monitoring Board. Interventions: Not applicable. Main Outcome Measure(s): Primary- Coma Recovery Scale e Revised. Secondary- Disability Rating Scale. All DRS and CRS-R assessments were conducted blindly. Results: The incidence of recovery of each of the six behavioral benchmarks was significantly higher for participants in MCS (range: 40% for reliable yes-no communication to 57% for object recognition and intelligible speech) relative to those in VS (range: 11% for reliable communication to 20% for consistent command-following). By the end of week 6, 20% of the entire sample had recovered all six behavioral benchmarks. Among the remainder, 8.42% recovered five benchmarks, 5.26% recovered four, 4.21% recovered three, 7.37% recovered two, 12.63% recovered one and 42.11% recovered none. In the MCS subgroup, 25% of participants recovered all 6 benchmarks and 37% recovered at least 5. In comparison, 11% of the VS subgroup recovered all 6 benchmarks and 14% recovered at least 5 (Mantel-Haenszel Chi-Square: 13.9374, P = 0.0002). Approximately 74% of participants who achieved all 6 benchmarks progressed to the moderately severe to severe disability range on the DRS. Conversely, nearly 68% of participants who failed to recover any benchmarks remained in the vegetative to extreme vegetative range. The median DRS score at week 6 was 11 (moderately-severe) for participants who achieved all six benchmarks, 18 for those with three (severe to extremely severe) and 23 (vegetative to extreme vegetative state) for those with none. Regression analysis demonstrated a linear relationship between the number of enchmarks recovered by week 6 and degree of residual disability on the DRS (Adjusted R-square = 0.6381; P < 0.0001). For each benchmark detected, the DRS score decreased (i.e., improved) by 1.7 points on average. while nearly half of the MCS+ subgroup (46.2%) recovered all 6 benchmarks, approximately 1 in 10 subjects in the MCS- (8.82%) and VS (11.4%) subgroups did so (see table 5). Degree of disability at week 6 indexed by the mean DRS differed significantly in favor of the MCS+ subgroup (MCS+ = 12; MCS- = 17; VS = 23; Kruskal-Wallis Test = P<0.001), as did the percentage of participants who emerged from MCS (MCS+ = 73.1%; MCS- = 38.2%; VS = 14.3%; chi2MH = 21.20, 1 d.f., P < 0.0001). Conclusions: Significant functional recovery is common in patients with prolonged traumatic DoC following discharge from the intensive care setting. Patients in MCS with evidence of language function are most likely to recover other high-level behaviors linked to improvement in functional status. These findings should be considered in the context of early decision-making in the ICU concerning intensity of care and indications for rehabilitative treatment.

1887. Gianelli Castiglione, A., et al. (1998). "Intracranial insertion of a nasogastric tube in a case of homicidal head trauma." The American journal of forensic medicine and pathology **19**(4): 329-334.

A case of accidental intracranial penetration of a 29-cm-long portion of nasogastric tube (NGT) in a 27-year-old female victim of a severe homicidal skull and brain trauma is reported. Accidental penetration of the NGT occurred through a large fracture of the ethmoid lamina cribrosa. In addition to a systematic review of previously reported cases, circumstantial data, clinical aspects, and autopsy data have been analyzed to draw medicolegal considerations concerning the connection between death and insertion of an NGT, which may also contribute to the ascertaining of any possible professional responsibility of medical staff, in a case fraught with numerous legal complications.

1888. Giannakopoulou, M., et al. (2000). "NMDA receptor mediated changes in IGF-II gene expression in the rat brain after injury and the possible role of nitric oxide." Neuropathology and applied neurobiology **26**(6): 513-521.

This study was undertaken in order to investigate the role of insulin-like growth factor (IGF)-II, c-fos, N-methyl-D-aspartate (NMDA) receptors, and nNOS in the cellular processes following a penetrating brain injury. IGF-II mRNA levels, as determined by Northern analysis, were decreased at 4, 8, and 24 h after brain injury, in the lesioned, compared to the contralateral intact hemisphere. Forty-eight and 72 h after the injury, there was no difference between the lesioned and the contralateral intact hemisphere in IGF-II mRNA levels. c-fos mRNA levels followed a parallel, but opposite course: They were increased at 4, 8 and 24 h after the injury, while at 48 and 72 h c-fos mRNA levels in the lesioned hemisphere did not differ from those in the intact. Administration of MK-801 reversed the injury-induced decrease in IGF-II mRNA levels. Administration of MK-801 resulted in an increase in IGF-II mRNA in both the intact and the lesioned hemispheres. Brain injury resulted in an increase in nNOS immunopositive cells in the hippocampal formation, which was detectable at 4 and 12, but not 48 h after the injury. These results suggest that IGF-II, c-fos, NMDA receptors and nNOS are involved in the cellular responses to brain injury.

1889. Giatsidis, G., et al. (2017). "Reflections on a Decade of Face Transplantation." Annals of surgery **265**(4): 841-846.

On November 27, 2005, Isabelle Dinoire underwent the world's first partial face transplant in Amiens (France) after a dog attack had left her face severely disfigured. The abrupt surgical leap found the medical community and society unprepared to deal with the scientific, ethical, and societal implications of a surgical procedure that was striving to transition from sci-fi novels to science. Today, 10 years and over 35 transplants later, public opinion has become accustomed to the concept of "face restoration" through transplantation. However, face transplantation is far from being a safe "routine" surgery and the science behind it is still mostly unknown. Patients and multidisciplinary teams of physicians confront daily medical challenges, life-threatening risks, and personal struggle that only in part come to light. Could (or should) this be the laborious, uncertain, and high-risk trajectory of disruptive medical innovation? Over the last decade, some medical discoveries and surgical advancements in the field have been closely accompanied by partial regulatory frameworks, intense ethical discussions, and meaningful changes in social beliefs across cultures and continents. Yet, a very long way is to come and the questions we still have today greatly outweigh the answers we can offer. Here, we take the chance of the 10-year anniversary of face transplantation to reflect on the path traveled and to look forward to the challenges lying ahead.

1890. Gibikote, S., et al. (2006). "Pneumorrhachis secondary to traumatic pneumomediastinum in a child." Pediatric radiology **36**(7): 711-713.

Pneumorrhachis (air within the spinal canal) is rare, and even more so in the paediatric population. We report a case in a 4-year-old boy that resolved spontaneously on treating the underlying traumatic pneumomediastinum, and discuss the causes, mechanism and implications of this condition.

1891. Giese, A., et al. (2002). "Pattern of injury and clinical prognosis of penetrating craniocerebral trauma from gunshot wounds." Rechtsmedizin **12**(1): 13-23.

Gunshot injuries to the neuro-cranium are relatively rare in western European metropolitan areas. These injuries carry a high mortality and only a fraction of the victims survives till intensive care can be provided at a trauma center. We have analyzed the injury pattern, early complications and the clinical course of 31 patients, which on arrival at the emergency room of the University Hospital Eppendorf, Hamburg, Germany, could be stabilized for further diagnostic imaging procedures and neurosurgical assessment and therapy. The initial neurological performance status and injury pattern diagnosed on initial CT scans, such as bihemispheric injury, intraventricular hematoma, burst fractures of the vault, and severe brain edema were strong negative predictors for a poor clinical outcome. The epidemiology and reasons for these injuries and the spectrum of weapons used are presented.

1892. Giese, A., et al. (2002). "Head injury by gunshots from blank cartridges." Surgical neurology **57**(4): 268-277.

BACKGROUND: Blank cartridge handguns are generally underestimated in their capacity to inflict serious and potentially life threatening injuries. The predominant reasons for these injuries are suicide or suicide attempts, followed by accidental injuries., METHODS: A series of 26 gas gunshots to the neurocranium is presented. The injury pattern relevant to neurosurgical practice is illustrated in a case summary of 7 selected cases and the clinical courses as well as outcomes are presented., RESULTS: The injury pattern demonstrates that the energy density of the gas jet and the high temperatures of the exploding gas volume cause extensive soft tissue injuries. In close-range shots the gas jet takes on physical properties of a projectile. In these injuries impression fractures and dislocation of bone fragments are common., CONCLUSIONS: Gas handguns, contrary to public opinion, are dangerous weapons and may inflict potentially fatal injuries to the neurocranium when fired at close range. These weapons are frequently used in criminal or careless activities predominantly by young males. Extensive CNS injuries including hematomas, subarachnoid hemorrhage, foreign body contamination, and increased intracranial pressure are frequently observed.

1893. Giffen, M. A., Jr., et al. (2018). "Forensic Radiology Pitfalls: CT Imaging in Gunshot Wounds of the Head." Journal of forensic sciences **63**(2): 631-634.

Computed tomography (CT) imaging is increasingly used in emergency departments and trauma services and is being offered as a supplemental tool with autopsy in coroner's and medical examiner's offices throughout the United States. The availability of CT images in lieu of traditional X-rays for medicolegal autopsies may lead to misinterpretation of images for forensic pathologists who are not familiar with these types of images. Forensic pathologists must become

familiar with CT imaging, the basis of CT image formation and how to interpret CT images appropriately. We highlight potential pitfalls of CT image interpretation through two cases of fatal gunshot wounds of the head. Antemortem CT imaging available at the time of autopsy led to discrepancy between the initial image findings and the autopsy due to inexperienced manipulation of the images. With appropriate understanding of CT image interpretation and manipulation, forensic personnel should be able to avoid most sources of misinterpretation. Copyright © 2017 American Academy of Forensic Sciences.

1894. Gilbert, R. G. and G. F. Brindle (1966). "Head injuries." International anesthesiology clinics **4**(4): 881-895.

1895. Gildenberg, P. L. and H. T. Wycis (1971). "Trauma to the central nervous system." Progress in neurology and psychiatry **26**: 395-406.

1896. Gill, J. R. and C. S. Hirsch (2011). "Russian roulette deaths." The American journal of forensic medicine and pathology **32**(2): e14.

1897. Gill, Z. A., et al. (2020). "Problems related to prosthetic components seen in amputees of pakistan law enforcement agencies during prosthetic episodes." Rawal Medical Journal **45**(3): 656-660.

Objectives: To identify the common issues r el at ed t o pr ost het i c component s among amputees of law enforcement agencies reporting for fol l ow-up i n Armed Forces Insti tute of Rehabilitation Medicine (AFIRM), Rawalpindi and calculate the life for the frequently changed components. Methodology: It was a cross-sectional descriptive study carried out in AFIRM Rawalpindi from October 2013 to December 2014. Through non-probability consecutive sampling, we included individuals with amputations of any etiology. Information was recorded about the type, side, and etiology of amputation, place of injury, time passed in months since previous consultation, the reasons for follow-up (damaged prosthetic foot, damaged liner, socket problems, accessories problems, and problems with cosmetic gloves and sleeves), and the average life of the frequently changed components. Results: Of 98 individuals (mean age 27±6 years, range: 18-43 years), majority suffered from IED bl ast i nj ur y (n=44, 44. 9%) i n Feder al l y Administered Tribal Areas (FATA) region (n=58, 59.2%). Transtibial amputation (n=78, 79.6%) was the most common level of amputation, with equal percentage for the side of body involved (46 each). The average fol l ow-up t i me f rom t he l ast consultation was 17±15 months (range 2-32 months). The primary prosthetic concerns for the follow-up were regarding prosthetic foot and liner (34 each). The average ti mes after whi ch prosthetic foot and liner were replaced since initial provi si on were 22±10 months (range12-32 months) and 5±3 months (range 2-8 months), respectively. Conclusion: Maximum patients reported with issues related to prosthetic foot and liner. The average life reported for these components was shorter than previous studies.

1898. Gilmour, D. F., et al. (2003). "Trans-orbital intra-cranial air gun injury." European journal of ophthalmology **13**(3): 320-323.

PURPOSE: To describe a case of trans-orbital intra-cranial air gun injury with a discussion on air gun related morbidity and mortality., METHODS: Case report and literature review., RESULTS: The air gun pellet travelled through the orbit without penetrating the globe. It passed into the middle cranial fossa through the superior orbital fissure and lodged in the temporal lobe. The patient was managed conservatively with antibiotics and antiepilectis., CONCLUSIONS: Air gun design has changed in recent years resulting in an increased morbidity and mortality. Stricter legislation on the sale and use of these weapons needs to be implemented.

1899. Gimenez, L. G., et al. (2022). "A review of the genetic epidemiology of preterm birth in a Latin American population." Placenta **122**: 6.

Objetives: Preterm birth (PTB) is considered a complex and heterogeneous trait resulting from the interplay of several genetic and environmental factors. The greatest single risk factor for delivering a preterm neonate is a history of a prior PTB. The role of other proposed predictors such as maternal and/or genetic factors, environment, or synergy or

interaction between these remains unknown. PTB can be categorized by its clinical presentation: idiopathic (PTB-I), premature rupture of membranes (PTB-PPROM), and medically induced (PTB-M). The clinical subtypes PTB-I and PTB-PPROM are together designated spontaneous preterm birth (PTB-S). Given the heterogeneity within clinical subtypes of preterm birth, it is helpful to examine the subtypes separately in terms of etiology and management. In addition, identifying specific characteristics of each clinical subtype is essential to employing effective prevention methods of preterm birth. Results: We found significant differences in epidemiological characteristics of mothers of premature newborns among the different clinical subtypes in a Latin American population. PTB-PPROM represented 37.9% of the sample, PTB-I 36.6%, and PTB-M 25.5%. This distribution was different from that described in the literature. The PTB-I subtype was characterized by younger mothers of lower socioeconomic status, PTB-PPROM was characterized by environmental factors resulting from inflammatory processes, and PTB-M was characterized by increased maternal or fetal risk pregnancies. The main risk factor for PTB-I and PTB-M was to have a prior preterm delivery; however previous spontaneous abortion was not a risk factor, suggesting a reproductive selection mechanism. The characterization of preterm subtypes is important not only to elucidate the heterogeneity in the etio-pathogenesis, but also to implement measures that are more efficient in the treatment of preterm birth. Moreover, we evaluated the associations between specific candidate genes and clinical subtypes of PTB. Twenty-four single-nucleotide polymorphisms (SNPs) were genotyped in 18 candidate genes in 709 infant triads. Of them, 243 were PTB-I, 256 were PTB-PPROM, and 210 were PTB-M. These data were analyzed with a Family-Based Association. It's noteworthy that PTB was nominally associated with rs2272365 in PON1, rs883319 in KCNN3, rs4458044 in CRHR1, and rs610277 in F3. Regarding clinical subtypes analysis, three SNPs were associated with PTB-I (rs2272365 in PON1, rs10178458 in COL4A3, and rs4458044 in CRHR1), rs610277 in F3 was associated with PTB-PPROM, and rs883319 in KCNN3 and rs610277 in F3 were associated with PTB-M. Conclusion: Based on these results, it was possible to identify polymorphisms potentially associated with specific clinical subtypes of PTB in this Latin American population. These results could suggest a specific role of such genes in the mechanisms involved in each clinical subtype.

1900. Ginsberg, L. E., et al. (1993). "CT in penetrating craniocervical injury by wooden foreign bodies: reminder of a pitfall." AJNR. American journal of neuroradiology **14**(4): 892-895.

The authors report three cases of penetrating craniocervical injury by wooden foreign bodies, which were initially hypodense on CT and thought to be air. When these structures were scrutinized with higher window settings, they had a higher attenuation and a unique striated internal architecture which the authors propose may be specific to wood.

1901. Gioia, S., et al. (2014). "Instantaneous death due to transorbital reverse penetration of a screw in an accidental fall: unusual autopsy case report and review of the literature." The American journal of forensic medicine and pathology **35**(1): 15-19.

We present a peculiar autopsy case of a transorbital penetrating head injury, in a male worker, after an accidental fall onto a screw not completely stuck into a wooden board. A 13-cm screw entered the cranium 9.5 cm deep, penetrating with the flat end, a condition defined in literature as "reverse penetration." The death was instantaneous and caused by a neurogenic shock due to injuries to the brain stem and the right cerebellar hemisphere. These injuries, enabled by the length of the screw, are generally described in literature as due to nontransorbital penetrations, frequently associated with posterior entry and a large intracranial injury. The ocular globe has been, furthermore, perfectly preserved thanks to its mobility in the orbit. Even the dynamic of the incident is peculiar because of the stationary nature of the penetrating object, which the victim actively fell on by accident. To the best of our knowledge, the matter is therefore a very peculiar mortal case of transorbital intracranial penetration, whose verified injuries and dynamics are absolutely atypical. The case is now under discussion, and a review of pertinent literature is performed.

1902. Gipe, B. T., et al. (1981). "Delayed cerebral embolization of a shotgun pellet with fatal consequences." The Journal of trauma **21**(4): 326-329.

A case of shotgun pellet embolization to the middle cerebral artery is presented. Embolization occurred approximately 36 hours following successful resuscitation of blood pressure, respirations, and neurologic function in a 21-year-old man who had sustained a massive chest wound. The diagnosis of pellet embolization was made within 8 hours of the onset of neurologic deficits; however, fatal cerebral infarction had occurred before surgery could be

undertaken. Seven similar cases are briefly reviewed and it is concluded that low velocity and low kinetic energy missiles are more likely to embolize, and that left lower extremity injuries are more frequently involved in embolization. In all cases of shotgun trauma to the chest cerebral embolization of pellets should be considered at any sign of neurologic change and skull films obtained. Surgical intervention is necessary before cerebral infarction.

1903. Girard, L. J. and K. Donaldson (1997). "Combined peribulbar and retrobulbar block anesthesia and antibiotic-steroid injection: a simple method to prevent retrobulbar hemorrhage, globe perforation, or infection." Ophthalmic surgery and lasers **28**(3): 251-254.

1904. Girard, P. F., et al. (1969). "[Traumatic aneurysm of the ophthalmic artery. Secondary obliteration of the sylvian artery by an embolus]." Anevrysme traumatique de l'artere ophtalmique. Obliteration secondaire de l'artere sylvienne par un embol. **41**(2): 66-72.

1905. Giraux, P., et al. (2001). "Cortical reorganization in motor cortex after graft of both hands." Nature neuroscience **4**(7): 691-692.

1906. Giray, E., et al. (2021). "Ultrasound and electromyography & electrical stimulation-guided botulinum toxin injection of salivary glands for drooling: A case report with a description of the technique." Turkish Journal of Physical Medicine and Rehabilitation **67**(1): 120-121.

1907. Girdler, N. M. (1993). "Unusual delayed sequel to facial trauma." Oral surgery, oral medicine, and oral pathology **75**(2): 264.

1908. Giri, P. (2018). "Penetrating injury of skull bone : Its a knife!" Journal of neurotrauma **35**(16): A226.

Presenting the experience of two difficult skull base injuries with sharp object ; knife. Both the time young patients and most commonly had been hit from front. First one suffered on the temporal squamous part and got penetration upto sellar region, the second one had on frontal region reaching upto tuberculum sellae. The sharp ragged edges were the main crucial weapon risk factor and the depth and path were the patient related factors while delivering out of the knives. In both the cases, adequate craniotomies were done and releasing of the knieves blades was the most difficult part. Penetration of the dura matter and injury to the cortical substance decide the neurological prognosis of the patients. In both the cases, the dura was pierced sharply and the tracjectory of the knieves were so much luckily safe that both the patients were neurologically intact preop and postop. We didn't come across the deadly complication of meningitis in any case and no postop csf leakage was noted. Both the patients were discharged on 8th day and had nice follow up of one year. There were no delayed complications like wound infection seizures and meningitis. We learned from our cases that penetration tracjectory decides the initial neurological damage and emergency of the situation. The adequacy of the craniotomy helps a lot in delivering the weapon and the complications like meningitis can be taken care with proper antibiotics. We are presenting these cases to share the expierence of operating on knife injury supposedly rare on skull. Literature review showed isolated case reports with knife injury and none of them has operated two cases in a single institute.

1909. Girod, D. A. (2008). "Free tissue reconstruction of traumatic facial bony defects." Operative Techniques in Otolaryngology - Head and Neck Surgery **19**(2): 80-85.

Traumatic facial bony defects present one of the most challenging problems for the facial plastic reconstructive surgeon. The most common mechanisms of trauma resulting in a bony defect of the facial skeleton include gunshot injuries, motor vehicle accidents, and burns. These bony defects of the facial skeleton resulting from trauma rarely occur in isolation. Rather, there is uniformly varying degrees of soft-tissue trauma and/or loss, potential visual, neurological and spinal injuries, and other associated life-altering implications. The application of free tissue transfer techniques to

the management of these complex defects has allowed a significant change in paradigm, permitting early intervention and improved long-term outcomes. © 2008.

1910. Girotto, J. A. and J. Gruss (2004). "Primary post-traumatic mandibular reconstruction in infancy: a 10-year follow-up." The Journal of craniofacial surgery **15**(2): 255-260.

Ballistic trauma to the craniofacial skeleton combines the challenges of complex bone injury and loss with severe soft tissue injury and violation of the naso-orbital or oropharyngeal cavities. The authors report a patient who experienced a unique ballistic injury at 28 months of age that resulted in loss of the mandibular ramus and condyle. A segmental injury to the facial nerve was also identified. Primary costochondral grafting and delayed interpositional nerve grafting was undertaken. After 10 years, the patient has nearly 40 mm of opening, with only slight deviation to the injured side. Her facial nerve regeneration provides complete orbicularis oculi function, oral competence, and only slight facial asymmetry. This traumatic reconstruction differs from that of patients with hemifacial microsomia or post-traumatic/arthritic ankylosis in that the joint space itself was spared. Thus, the costochondral graft benefits from the remaining articular disk and upper disk space and is able to rotate and translate. Function and growth are adequately re-established, even in this young pediatric patient.

1911. Giuffre, G., et al. (1995). "Retrobulbar anesthesia complicated by combined central retinal vein and artery occlusion and massive vitreoretinal fibrosis." Retina (Philadelphia, Pa.) **15**(5): 439-441.

1912. Giulian, D. (1987). "Ameboid microglia as effectors of inflammation in the central nervous system." Journal of neuroscience research **18**(1): 155-153.

Techniques for selective isolation, labeling, stimulation, and destruction of ameboid microglia allow study of some fundamental questions in neuroimmunology. Examination of surface morphology, proliferative capacity, and cytochemistry suggests that microglia are a class of brain mononuclear phagocytes distinct from blood monocytes, spleen macrophages, or resident peritoneal macrophages. Moreover, cultured ameboid microglia isolated from newborn brain can be induced to grow thin cytoplasmic projections several hundred microns in length; these process-bearing cells resemble a differentiated form of microglia found in adult brain. Ameboid microglia may contribute to brain inflammation by engulfing debris, by releasing cytotoxins, by killing neighboring cells, and by secreting astroglial growth factors. Importantly, ameboid microglia are closely tied to a network of immunomodulators that include colony-stimulating factors and Interleukin-1. The presence of activated microglia during normal embryogenesis and at sites of penetrating brain injury suggests that these cells serve as important effectors linking the immune system with growth and repair of the CNS.

1913. Giulian, D., et al. (1989). "The role of mononuclear phagocytes in wound healing after traumatic injury to adult mammalian brain." The Journal of neuroscience : the official journal of the Society for Neuroscience **9**(12): 4416-4429.

We monitor cellular responses to a penetrating wound in the cerebral cortex of adult rat during the first weeks after injury. Two classes of activated mononuclear phagocytes containing acetylated low-density lipoprotein (ac-LDL) receptors appear within hours at the wound site. One type of cell surrounding the lesion edge had thin, delicate processes and is identical in appearance to ramified microglia found in developing brain. Within the lesion, round cells are recognized as blood-borne macrophages when labeled by intravenous injection of carbon particles. Thus, both process-bearing reactive microglia and invading macrophages respond to brain trauma. The greatest number of ac-LDL(+) or nonspecific esterase(+) mononuclear phagocytes appears 2 days after injury within the wound site and are associated with a peak production of the cytokine interleukin-1 (IL-1). Because intracerebral infusion of IL-1 is known to stimulate astrogliosis and neovascularization (Giulian et al., 1988), we examine the time course of injury-induced reactive astrogliosis and angiogenesis. A 5-fold increase in the number of reactive astroglia is found at 3 d and a marked neovascularization at 5 d after injury. During the first week, mononuclear phagocytes engulf particles and clear them from the wound site either by migrating to the brain surface or by entering newly formed brain vasculature. To investigate further the role of reactive brain mononuclear phagocytes in CNS injury, we use drugs to inhibit trauma-induced inflammation. When applied in vivo, chloroquine or colchicine reduce the number of mononuclear phagocytes in damaged brain, help to block reactive astrogliosis and neovascularization, and slow the rate of debris clearance from

sites of traumatic injury. In contrast, the glucocorticoid dexamethasone neither reduces the number of brain inflammatory cells nor hampers such responses as phagocytosis, astrogliosis, neovascularization, or debris clearance in vivo. Our observations show that mononuclear phagocytes play a major role in wound healing after CNS trauma with some events controlled by secretion of cytokines. Moreover, certain classes of immunosuppressive drugs may be useful in the treatment of acute brain injury.

1914. Givner, A., et al. (2002). "Reimaging in pediatric neurotrauma: factors associated with progression of intracranial injury." Journal of pediatric surgery **37**(3): 381-385.

PURPOSE: The purpose of this study was to characterize the radiologic changes that are seen in the first 24 to 48 hours after head injury and to correlate those changes with clinical findings, to determine which children are at greatest risk for progression of their neurologic injury., METHODS: The authors identified 104 children (less-than-or-equal17 years of age) who had a second computed tomography (CT) scan of the head within 24 to 48 hours of admission. CT scans were evaluated systematically in a blinded fashion. Mechanism of injury, findings on physical examination, therapeutic measures, and changes in management were recorded from hospital medical records. The 50 children whose second CT scan showed progression of injury were compared with the 54 patients whose intracranial injuries were unchanged or improved on their second CT., RESULTS: Twenty-six percent of patients (13 of 50) with radiographic progression of injury had an admission Glasgow coma score of 15. Progression of injury was more common, however, in patients with lower Glasgow coma scores, averaging 9 on admission and 10 at the time of the second CT. Progression of injury also was more common if the initial head CT showed 3 or more intracranial injuries, mass effect, intraventricular hemorrhage, or an epidural hematoma., CONCLUSIONS: Children with an intracranial injury identified on their initial head CT scan should undergo a second scan 24 hours after injury, especially if the initial CT shows 3 or more intracranial injuries, mass effect, intraventricular hemorrhage, or an epidural hematoma. . Copyright 2002 by W.B. Saunders Company.

1915. Glapa, M., et al. (2009). "Gunshot wounds to the head in civilian practice." The American surgeon **75**(3): 223-226.

Gunshot wounds to the head are associated with poor outcome. We reviewed data to identify prognostic factors. We performed a retrospective study of all patients admitted to a Level 1 trauma center with isolated gunshot injury to the head during 6 1/2 years. Data collected included demographics, mechanism of injury, prehospital and resuscitation room data, and initial CT scan characteristics. The primary outcome measure was the Glasgow Outcome Scale. Seventy-two patients with isolated gunshot wounds to the head were admitted. Overall mortality was 58 per cent. The mortality for patients with an initial Glasgow Coma Scale score of 8 ($P < or = 0.0001$). Fifty per cent had pupillary abnormalities on arrival at the Emergency Department. Mortality in this group was 78 per cent versus 53 per cent in those with normal pupillary reflexes ($P = 0.06$). Elevated plasma lactate was associated with nonsurvival. Thirteen per cent of survivors were assessed as able to live independently after their injury. Civilian gunshot injury to the head is related to high mortality. Indicators of outcome are the admission Glasgow Coma Scale score, pupillary abnormality, metabolic acidosis, and CT pattern of severe injury. The majority of deaths occur at an early stage. Among survivors the functional outcome can be acceptable.

1916. Glass, L., et al. (2013). "Mental paper folding performance following penetrating traumatic brain injury in combat veterans: a lesion mapping study." Cerebral cortex (New York, N.Y. : 1991) **23**(7): 1663-1672.

Mental paper folding is a complex measure of visuospatial ability involving a coordinated sequence of mental transformations and is often considered a measure of mental ability. The literature is inconclusive regarding the precise neural architecture that underlies performance. We combined the administration of the Armed Forces Qualification Test boxes subtest measuring mental paper folding ability, with a voxel-based lesion symptom mapping approach to identify brain regions associated with impaired mental paper folding ability. Using a large sample of subjects with penetrating traumatic brain injury and defined lesions studied over 2 time points, roughly 15 and 35 years post-injury, enabled us to answer the causal questions regarding mental paper folding impairment. Our results revealed that brain injury significantly exacerbates the decline of performance on mental paper folding tasks over time. Our study adds novel neuropsychological and neuroimaging support for parietal lobe involvement; specifically the right inferior parietal lobule (Broadmann's Area [BA] 40) and the left parahippocampal region (BAs 19, 36). Both areas were consistently associated

with mental paper folding performance and demonstrate that the right parietal lobe and the left parahippocampal gyrus play an integral role in mental paper folding tasks.

1917. Glass, L., et al. (2016). "Neural signatures of third-party punishment: evidence from penetrating traumatic brain injury." Social cognitive and affective neuroscience **11**(2): 253-262.

The ability to survive within a cooperative society depends on impartial third-party punishment (TPP) of social norm violations. Two cognitive mechanisms have been postulated as necessary for the successful completion of TPP: evaluation of legal responsibility and selection of a suitable punishment given the magnitude of the crime. Converging neuroimaging research suggests two supporting domain-general networks; a mentalizing network for evaluation of legal responsibility and a central-executive network for determination of punishment. A whole-brain voxel-based lesion-symptom mapping approach was used in conjunction with a rank-order TPP task to identify brain regions necessary for TPP in a large sample of patients with penetrating traumatic brain injury. Patients who demonstrated atypical TPP had specific lesions in core regions of the mentalizing (dorsomedial prefrontal cortex [PFC], ventromedial PFC) and central-executive (bilateral dorsolateral PFC, right intraparietal sulcus) networks. Altruism and executive functioning (concept formation skills) were significant predictors of TPP: altruism was uniquely associated with TPP in patients with lesions in right dorsolateral PFC and executive functioning was uniquely associated with TPP in individuals with lesions in left PFC. Our findings contribute to the extant literature to support underlying neural networks associated with TPP, with specific brain-behavior causal relationships confirming recent functional neuroimaging research.

1918. Glasscock, M. E., 3rd, et al. (1979). "Rehabilitation of the face following traumatic injury to the facial nerve." The Laryngoscope **89**(9 Pt 1): 1389-1404.

Etiology, diagnosis, and surgical management of facial paralysis due to traumatic injury of the VIIth cranial nerve are discussed. Sixty patients are reviewed who underwent some type of surgical procedure for the repair of the facial nerve. These cases are categorized according to etiology, which includes temporal bone fractures, iatrogenic injuries, and penetrating wounds of the head and neck. The results of a poll of eight leading otologists on their approaches to several aspects of the surgical management of these injuries are presented in the Discussion section. The diagnostic and prognostic studies associated with facial paralysis, as well as the more common surgical procedures available for repair of the facial nerve, are briefly reviewed.

1919. Glick, Y., et al. (2019). "The Israeli Defense Forces Point of Injury Antimicrobial Treatment Protocol - A New Protocol and Review of the Literature." Military medicine **184**(Suppl 1): 78-82.

INTRODUCTION: Combat wound infection is a common and serious complication, leading to significant morbidity and mortality. In 2005, a point of injury antimicrobial protocol was published by the Israel Defense Forces, in which Moxifloxacin was chosen. During 2016-2017, a revision of this protocol was performed and concluded with the publication of an updated protocol. The purpose of this report is to present this process and the revised protocol, together with a review of the literature., METHODS: We searched "Medline" and "Google Scholar" for studies dealing with antimicrobial prophylaxis in trauma, for militaries' point of injury antimicrobial protocol protocols and for established surgical antimicrobial prophylaxis protocols., RESULTS: Point of injury antimicrobial protocol is aimed at preventing early infection and its complications. The choice of Moxifloxacin for this purpose may not be optimal since Moxifloxacin spectrum might be overly broad, there is scant evidence supporting it for this indication, and the available preparation does not meet distinctive technical requirements. Contrarily, Ceftriaxone seemed to have suitable microbiological, pharmacological and technical features., CONCLUSION: Point of injury antimicrobial protocol should be used especially when evacuation and definitive surgical treatment are delayed. According to present scientific data and operational needs, Ceftriaxone was chosen for most penetrating injuries, with Metronidazole addition for penetrating abdominal and cranial trauma.

1920. Gloulou, F., et al. (2009). "Unusual suicides with band saws: two case reports and a literature review." Forensic science international **183**(1-3): e7-10.

Suicides or suicide attempts with power saws (band, circular or chain saws) are rather rare events and only a few case reports exist in the forensic literature. The use of a band saw, in particular, has been extremely rare in cases of suicide. We report two cases of suicide that occurred in the same suburban area, three years apart. In each case, the victim was a carpenter and had a history of psychiatric disorder and/or of prior suicide attempts. We summarize the findings of the death scene investigations, the pertinent autopsy findings, and also summarize the world literature pertaining to suicide committed with power saws.

1921. Gluncic, I., et al. (2001). "Unusual stab wound of the temporal region." Croatian medical journal **42**(5): 579-582.

We report the case of an unusual penetrating injury of the temporal region of the head caused by knife. A long kitchen knife was protruding from the upper auricular area of the left temporal region of victims head. It cut through the posterosuperior part of the left auricula and remained fixed to the postauricular region. Brain computorized tomography (CT) scan revealed that the knife had reached deep into the petrous part of the temporal bone, and was directed toward the sulcus of the sigmoid sinus. There were no signs of intracranial bleeding. An otorhinolaryngologist and a neurosurgeon removed the knife in operating room, with the patient in general anesthesia. The audiogram obtained after 7 days of hospitalization showed left conductive hearing loss of 40 dB at frequencies up to 2 kHz, and of 90 dB above 2 kHz, probably due to hemotympanum caused by the operation. Control examinations performed 14 days and one month after discharge confirmed the patients complete recovery and no significant defects in his hearing or balance. We suggest multidisciplinary teamwork as a proper approach in the treatment of such injuries.

1922. Gluncic, V., et al. (2019). "Anesthetic Management of Jael Syndrome With Impacted Blade in Close Proximity to the Internal Carotid Artery: A Case Report." A&A practice **12**(10): 369-371.

A patient presented with a stab injury caused by a knife penetrating the orbital floor and maxillary sinus along the skull base with the tip situated adjacent to the left internal carotid artery. A flexible fiberoptic bronchoscope loaded with an endotracheal tube was initially positioned superior to the vocal cords and advanced into the trachea immediately following induction. The blade was removed after occluding endovascular balloons were positioned distal and proximal to the potential internal carotid artery injury site. Therefore, contralateral nasal fiberoptic intubation might be safely performed in patients with unilateral maxillofacial trauma, no intracranial penetration, and minimal bleeding.

1923. Gnjidic, Z., et al. (2002). "Epidemiological, forensic, clinical, and imaging characteristics of head injuries acquired in the suicide attempt with captive bolt gun." Acta neurochirurgica **144**(12): 1271-1277.

The captive bolt gun (slaughterer's gun) is a tool used in the meat industry for "humane killing" of animals. Used with the intent of suicide, the captive bolt gun causes very serious injuries. We analysed 19 self-inflicted head injuries with captive bolt gun during the past 20 years. Autopsy of 20 pigs killed by this method was also performed. All 19 cases were middle-aged men from rural areas, with low level of education, and without a previous psychiatric history. Five of them used the captive bolt gun daily in their professional activities, while the remaining 14 handled it only sometimes. In seven cases suicide was primarily successful, while in five patients, despite intensive medical care, serious craniocerebral injuries eventually resulted in death. Total mortality was 63.2%. The clinical appearance of the entrance wound and the imaging characteristics of the cranial trauma are very specific, and can be easily differentiated from firearm or other penetrating injuries. These wounds were always primarily infected with mixed bacterial flora from the skin. Therefore, besides radical primary wound care, especially of the wound canal with removal of foreign bodies, it is important to administer high doses of wide spectrum antibiotics.

1924. Go, J. L., et al. (2019). "Traumatic Neck and Skull Base Injuries." Radiographics : a review publication of the Radiological Society of North America, Inc **39**(6): 1796-1807.

Patients with blunt and penetrating traumatic injuries to the skull base and soft tissues of the neck present to the emergency department every day. Fortunately, truly life-threatening injuries to these regions are relatively uncommon. However, when encountered and not correctly diagnosed, these entities may result in severe morbidity or mortality. The radiologist plays a critical role recognizing these injuries, in which findings may often be subtle and the anatomy potentially challenging to identify. Multisection CT and CT angiography are commonly performed to assess these injuries in the emergency department. Vascular injury to the neck may result in dissection, occlusion,

pseudoaneurysm formation, or frank extravasation resulting in stroke or death. Airway compromise may result from laryngotracheal injury. Injuries to the pharynx and esophagus may result in perforation. Injuries to the temporal bone may result in vascular injury to the internal carotid artery or facial nerve injury, which would require immediate surgery or intervention to prevent paralysis.©RSNA, 2019.

1925. Godard, E., et al. (2019). "Transorbital penetrating trauma caused by a fall on the antenna of a radio receiver: Case report and review." Revue de Medecine Legale **10**(3): 113-117.

We report the case of a patient who died after falling on the antenna of a radio receiver that was stood on the floor. External examination showed an orificial contuse wound, less than a centimetre in diameter, on the right upper eyelid. There was no ocular lesion. Full-body CT (computed tomography) scan imagery revealed a fracture of the roof of the right orbit and diffuse intra and pericerebral haemorrhages. Those haemorrhages had caused the death of the patient. Penetrating transorbital traumas represent a very small part of cranial traumas and orbital pathologies. They are usually linked to the high-velocity traumas associated with traffic accidents or penetration by firearm projectiles. Low-energy penetrating transorbital traumas are even less frequent; associated prognoses are rarely lethal and generally functional. These traumas cause minimal palpebral or periocular wounds that can seem insignificant upon external forensic examination, especially when the foreign body involved is fully intracranial or absent. Performing a cerebral scan, or even post-mortem angiography, thus appears to be a key-procedure, very useful to the medical examiner.

1926. Godil, S. S., et al. (2011). "Cranial reconstruction after decompressive craniectomy: prediction of complications using fuzzy logic." The Journal of craniofacial surgery **22**(4): 1307-1311.

INTRODUCTION: Cranial reconstruction after decompressive craniectomy (DC) has been shown to be associated with a relatively high complication rate (16.4%-34%) compared with standard neurosurgical procedures (2%-5%). Most studies that have previously attempted to formulate a multivariate model for identifying factors predictive of postoperative complications of cranioplasty either were unsuccessful or yielded conflicting results. Therefore, fuzzy logic-based fuzzy inference system (FIS), which has proven to be a useful tool for risk prediction in medical and surgical conditions, was used in this study to identify predictors of complications of cranioplasty., METHODS: A retrospective chart review of all the patients who underwent DC followed by elective cranioplasty at Aga Khan University Hospital, during a 10-year period (2000-2010), was carried out to collect data on 24 carefully selected preoperative variables or inputs. The proposed FIS had 24 inputs, 3 outputs, and a set of 7 fuzzy-based rules. All inputs were assigned degrees of membership, and complications were further divided into "severe," "minor," and "least" output classes with each of them representing 2 membership functions: "less" and "more." For each set of inputs, a specific portion of the hypersurface was masked out. The centroid of this subsurface represented the defuzzified output corresponding to 1 percentage value for each output. The maximum of these outputs for each of the 3 output classes was selected to be the final output class. Each output class was compared to the actual outcome of patients, and positive predictive value, negative predictive value, sensitivity, and specificity of FIS for predicting complications were calculated., RESULTS: A total of 89 patients (mean [SD] age, 33.1 [15.0] y; male-to-female ratio, 3:1) were included in the study. The common postoperative complications included seizures (14.6%), cerebrospinal fluid leak (4.5%), neurologic deficits (3.4%), hydrocephalus (3.4%), superficial wound infection (3.4%), and osteomyelitis (2.2%). The FIS correctly identified all 7 patients who developed severe complications after cranioplasty (true positives) and all 82 patients who did not develop severe complications (true negatives). Thus, the FIS has a sensitivity and specificity of 100% in predicting severe complications., CONCLUSIONS: Our study shows that the procedure of cranioplasty is associated with a high complication rate and that FIS has a 100% sensitivity and specificity in predicting severe complications after cranioplasty. It will prove to be an invaluable tool for clinicians once the results are validated by a similar prospective study with a larger sample size.

1927. Godino, M., et al. (2010). "Ventricular dysfunction associated with brain trauma is cause for exclusion of young heart donors." Transplantation proceedings **42**(5): 1507-1509.

OBJECTIVE: Ventricular dysfunction (VD) in the context of brain death (BD) is one medical cause that may be reversed to extend the range of donors for cardiac transplant programs. The aim of this study was to identify and quantify the causes for exclusion of potential heart donors and to define risk factors for VD among the BD population., MATERIALS AND METHODS: This study of 100 heart-beating potential donors defined subjects as those younger than 50

years. We defined hemodynamic dysfunction (HD) as failure to achieve hemodynamic objectives despite the use of inotropic agents by protocol or upon diagnosing VD., RESULTS: Among 246 BD subjects were 100 potential heart donors. Of these, 75 were transformed into real donors (RD) including 13 heart RD and 62 noncardiac RD. The conversion rate of BD subjects younger than 50 years to heart RD was 17%. When we analyzed the medical reasons for exclusion of the 62 donors who were not converted to heart RD, we observed that HD was the major cause (34%). When we analyzed the causes for exclusion related to cause of death, cranial trauma predominated (52%; P = .01; relative risk 3.5; 95% confidence interval 1.4-8.5)., CONCLUSION: Hemodynamic dysfunction represented the major cause for loss of heart donors; it was associated with younger patients with cranial trauma.

1928. Goel, N., et al. (1994). "Grease gun injuries to the orbit and adnexa." Ophthalmic plastic and reconstructive surgery **10**(3): 211-215.

The grease gun injury is an uncommon injury to the orbit. However, high-pressure injection of grease, oil, or paint is frequently reported in injuries of the hand and usually affects the fingers or palm, which require complicated surgical and medical care. Two cases of grease gun injury to the orbit are reported: one, a catastrophic injury, and the other resulting in satisfactory recovery after surgical debridement and adjuvant medical treatment. Presentation, investigation, and therapy are discussed.

1929. Goffin, J. and C. Plets (1985). "Tension pneumocephalus in association with ventriculoperitoneal shunt." Acta neurochirurgica **76**(3-4): 121-124.

The authors report a case of tension pneumocephalus in association with a ventriculoperitoneal shunt for obstructive hydrocephalus, due to the presence of a pineal tumour. In this unique form of tension pneumocephalus, air from the middle ear must have penetrated into the brain parenchyma and later on into the ventricular system through pre-existing congenital defects in the bony tegmen tympani and the covering dura mater. The possible pathogenetic mechanisms of this kind of tension pneumocephalus are discussed.

1930. Goffstein, R. and T. C. Burton (1982). "Differentiating traumatic from nontraumatic retinal detachment." Ophthalmology **89**(4): 361-368.

Five hundred and eighty-six phakic retinal detachments were studied to characterize the features of 111 cases with a history of trauma and to establish improved guidelines for medico-legal determinations. Twenty-eight percent of contusion detachments were myopic, nine times higher than expected. Myopes typically developed giant tears and nasal dialyses (p less than 0.001); emmetropes developed inferotemporal dialyses (p less than 0.005). Lattice degeneration did not increase post-traumatic detachments risk. Dialyses and giant tears caused 69% of traumatic detachments and 6% of nontraumatic detachments (p less than 0.001). Forty-seven percent of contusion detachments had no late objective evidence of trauma. Five percent of detachments with a history of trauma were not caused by trauma (false positives).

1931. Gofman, V. R. and A. S. Kiselev (1998). "[The surgical procedure in blind gunshot wounds of the skull base]." Khirurgicheskaia taktika pri slepykh orgnestrel'nykh raneniiakh osnovaniia cherepa. **157**(5): 74-78.

Personal clinical observations during the recent years allow the authors to confirm the indisputable value of surgical experience got during the Great Patriotic War (1941-1945) and in particular, the "fourfold" scheme proposed by V. I. Voiachek for the diagnosis and treatment of blind gunshot wounds to the skull base. Computed tomography considerably increases the probability of detection of the exact localization of foreign bodies in complex anatomical structures of the skull and thus facilitates choosing the most rational surgical management. The use of the electro-optical transducer for the extraction of foreign bodies from almost inaccessible areas of the skull base decreases the risk of operation.

1932. Goga, D., et al. (1998). "[Microvascular mandibular reconstruction and implantology. A study of the stability of long-term results, apropos of 2 cases followed for 8 years]." Reconstruction mandibulaire microvascularisee et implantologie. Etude de la stabilite des resultats a long terme, a propos de deux cas suivis a 8 ans. **99**(5-6): 231-234.

The objective of this study was to determine the long term stability of implants on mandibles reconstructed by microvascular bone transfer. We present two cases of mandible reconstruction, the first one was performed after tumor resection and the second one after gunshot injury. The reconstructions were performed by iliac crest osseous and osteocutaneous free flaps and the mean follow-up period was 8 years. The implant was an IMZ Titanium and a classic prosthetic system was used. No complication was observed (mucous ulceration, infiltration around the implant), and the feared friction phenomenon between the neo mucosa and the reconstructed bone has not been a problem for long term follow-up.

1933. Goh, A. Y. T. and Q. Mok (2004). "Clinical course and determination of brainstem death in a children's hospital." Acta paediatrica (Oslo, Norway : 1992) **93**(1): 47-52.

AIM: To study the aetiology and clinical course of children with brainstem death in a paediatric intensive care unit (ICU) and to determine whether current the practices that are used to declare brainstem death conform to accepted criteria., METHODS: A retrospective review chart of all patients with brainstem death (n = 31) admitted to the paediatric ICU between January 1995 and December 1998 was drawn up., RESULTS: Mean age of the patients was 51.9 +/- 54.5 mo with the main diagnoses being head trauma in 11 children, anoxic encephalopathy in 7, brain tumour in 5, drowning in 4, CNS haemorrhage in 3 and CNS infection in 1 child; 32.3% of the children were given pre-ICU admission cardiopulmonary resuscitation. The average time from insult to suspected brainstem death was 27 h and suspected brainstem death to confirmation was 25 h, with an average of 1.6 examinations performed. EEG was done in 14 patients, with electrocerebral silence in 8 after the first examination and in a further 5 after repeat testing. Cerebral blood-flow scans were done in 3 children and evoked potentials in 1 child., CONCLUSIONS: Trauma remains the most common primary diagnosis leading to brainstem death. Intensivists in this large hospital for children mainly conform to accepted guidelines for determination of brainstem death although there is a wider use of ancillary tests to aid diagnosis. The study also showed a low rate of < 10% of organ procurement for transplantation.

1934. Gokcek, C., et al. (2007). "Intracranial foreign body." Turkish neurosurgery **17**(2): 121-124.

Intracranial foreign bodies due to nonmissile intracranial penetrations occur rarely. Most of these penetrating injuries result from industrial accidents or criminal assaults. The complications which cause mortality in early stage are intracerebral hemorrhage, contusion, major vascular injury and meningitis. In case of such injuries, foreign bodies near the major vascular structures should not be attempted to taken out. Total excision of the foreign body via craniotomy should be planned and possible dural and vascular injuries should be repaired during surgery. Urgent surgery should be performed as there is 53% morbidity in case of late surgery and 62% morbidity in nonoperated cases. We herein report a 20-year old man who attempted suicide by introducing a nail into his brain and review the related literature.

1935. Gökdemir, M. T., et al. (2012). "Analysis of patients injured during the local elections in sanliurfa province." Turkiye Acil Tip Dergisi **12**(1): 29-33.

ObjectivesCriminal cases constitute a significant part of the patients referred to the emergency department. In this study, we aimed to analysis the cases who admitted to our emergency department resulted in judicial incidents due to the local elections in the surrounding of Sanliurfa. Methods Cases referred to the Emergency Department due to injuries obtained during the local elections held on March 29, 2009 were included in the study. Computer records, hospital treatment order books, judicial records, and autopsy reports were examined. Results In total, 126 people injured during the local elections between March 29, 2009 and March 30, 2009 were referred to the Emergency Department of the Education and Research Hospital, Sanliurfa. The Hospital Disaster Plan was activated, and triage was performed. Of the 126 patients, 119 (94.4%) were male, and 7 (5.6%) were female; the average age was 37 years. The most frequent cause of injury was beating, and deaths were mostly due to cranial trauma caused by firearm injuries. After first evaluation and treatment in the emergency department, of the 98 (77.7%) were discharged, 28 (22.3%) were hospitalized, and 6 died. Conclusions In the present study, our objective was to draw attention to the criminal incidents resulted from mass casualities in the districts of Sanliurfa and its villages and management of those cases in our emergency department.

1936. Gold, M. (2016). "Partially Thrombosed Internal Maxillary Pseudoaneurysm after Gunshot Wound." Craniomaxillofacial Trauma and Reconstruction **9**(4): 335-337.

A 29-year-old man arrived in our emergency department after being shot on the face. Computed tomography (CT) revealed multiple facial bone fractures along the bullet trajectory. On day 10 of admission, CT angiogram of the neck revealed a partially thrombosed pseudoaneurysm in the parapharyngeal fat pad. The pseudoaneurysm was successfully treated with coil embolization. This report discusses diagnosis and treatment of a partially thrombosed internal maxillary artery pseudoaneurysm. Although digital subtraction angiography is the gold standard for pseudoaneurysm diagnosis, CT angiography may provide complimentary information, as seen in this case.

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1937. Goldberg, R. A., et al. (1993). "Oculoplastic uses of cranial bone grafts." Ophthalmic surgery **24**(3): 190-196.

Cranial bone grafting for craniofacial reconstruction has gained wide acceptance in recent years and is being used with increasing frequency by ophthalmic plastic surgeons. Alloplastic materials (particularly newer materials such as porous polyethylene, hydroxyapatite, and rigidly fixated metal alloys) have a clear role in orbital reconstruction, and in many oculoplastic applications are the material of choice. However, in certain applications cranial bone grafts may be superior, eg, in managing large posttraumatic or postsurgical orbital defects or orbito-sinus defects in the milieu of chronic sinusitis. We describe our current techniques for harvesting full-thickness outer-table grafts and split-thickness periosteally-bound "fish-scale" grafts. Harvesting cranial bone grafts is not without risk and donor site morbidity, and we do not advocate the use of cranial bone grafts in those cases that might be managed as well (or better) with alloplastic material. At the same time, ophthalmic surgeons involved in orbital reconstruction should be familiar with the indications for bone grafts and comfortable with harvesting techniques so that they are not limited when circumstances warrant the use of autogenous material.

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1938. Goldman, J. L., et al. (1996). "Priorities in the management of penetrating maxillofacial trauma in the pediatric patient." The Journal of cranio-maxillofacial trauma **2**(1): 52-55.

Penetrating facial trauma is uncommon in children; a large series published by Cooper et al revealed that only 1% to 2% of the total population of infants and children admitted for trauma during their study period had a diagnosis of penetrating trauma to the head or neck. Little has been published specifically addressing these injuries in the pediatric population. The records of 20 patients treated for penetrating facial injuries at Kosair-Children's Hospital in Louisville, Kentucky from January 1991 through December 1994 were reviewed. The location, mechanism and extent of injury, as well as the diagnostic and management practices used in patient treatment, were collected. Categorizing the injuries relative to the involvement of one or more facial zones helped guide diagnostic studies and therapeutic intervention and predict associated injuries. This article evaluates the authors' method of management and any differences in management between pediatric and similarly injured adult patients.

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1939. Goldman, R. L. and R. F. Carmody (1984). "Foreign body pulmonary embolism originating from a gunshot wound to the head." The Journal of trauma **24**(3): 277-279.

Foreign body pulmonary emboli from a cranial venous sinus are unusual. Two patients are presented with gunshot wounds to the head who subsequently developed foreign body pulmonary emboli. Neither had any pulmonary complaints at presentation or during followup. Radiologists and primary care physicians should be aware of the possibility of distal missile pulmonary emboli when a foreign body enters the peripheral venous system or an intracranial venous sinus.

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1940. Gomez, D., et al. (2012). "Controversies in the management of splenic trauma." Injury **43**(1): 55-61.

BACKGROUND: The technologic innovations of the last three decades, coupled with a deeper understanding of the immunologic role of the spleen, have significantly shifted the management of splenic injuries towards non-operative approaches. However, there continuous to be a wide range of practice patterns related to the non-operative management of splenic injuries, from which the authors infer a gap between the best available evidence and its translation into practice. We sought to explore ongoing areas of controversy in the non-operative management of splenic trauma with the aim of further elucidating why these controversies continue to exist., METHODS: We explored areas of ongoing controversy in the management of splenic injury though a series of iterative surveys. We invited 70

experts in trauma care from ten countries around the world to participate. Areas of controversy explored included: indications and frequency for in-hospital and follow-up imaging, definitions of failure of non-operative management, indications for angioembolisation and non-operative management in special populations (i.e. elderly, concomitant traumatic brain injury, penetrating trauma)., RESULTS: A 49% response rate was obtained. Even though a wide range of practice patterns were identified, no controversies were identified in areas that do not involve the adoption of new technologies. In areas where practice pattern variation was observed, the strong influence of the local environment was constantly identified as an impediment to changes in practice., CONCLUSIONS: We have identified that barriers present within local practice environments are the major driving forces behind controversies in the non-operative management of splenic injuries.

1941. Gomez, D. E., et al. (2019). "Pharyngeal trauma in dairy cattle: 27 cases." Journal of veterinary internal medicine **33**(4): 1833-1839.

BACKGROUND: Characterization of the clinical signs, response to treatment and prognosis can be useful information for decision-making when evaluating cattle with pharyngeal trauma., OBJECTIVE: To describe the signalment, history, clinicopathologic, endoscopic, ultrasonographic, radiographic, and postmortem findings as well as treatments and outcomes of cattle diagnosed with pharyngeal perforation/trauma., ANIMALS: Review of medical records of cattle >1 month of age admitted to a Veterinary Teaching Hospital from 1995 to 2017., METHODS: Retrospective study. Review of medical records of cattle with pharyngeal perforation/trauma identified by oral or endoscopic examination in hospital setting., RESULTS: Twenty-seven out of 7550 (0.36%) cases met the inclusion criteria. Pharyngeal perforation/trauma was associated with the administration of a bolus in 24 (89%) cows and a magnet in 3 (11%) cases. The boluses contained monensin (n = 12), calcium salts (n = 5), iodine (n = 1), aspirin (n = 1), vitamins (n = 1), and an unknown product (n = 4). The primary clinical signs were dysphagia, swelling of the throatlatch, subcutaneous emphysema, swelling, and pain on palpation of the throatlatch. Seventeen (63%) cows were discharged whereas 10 (37%) were euthanized. Median time between the suspected traumatic event and hospital admission was 1 day (range: 0.5-3 days) and 2 days (range: 0.5-15) for surviving and nonsurviving cattle, respectively. All 5 cows that suffered pharyngeal trauma associated with administration of calcium salt bolus were euthanized., CONCLUSIONS AND CLINICAL IMPORTANCE: Pharyngeal trauma is a rare condition in cattle. Case fatality rate increases if not diagnosed and treated promptly. The nature of the penetrating foreign body influences the outcome.

1942. Gomez, J., et al. (2008). "[Brain abscess. The experience of 30 years]." Abscesos cerebrales. Experiencia de 30 anos. **130**(19): 736-739.

BACKGROUND AND OBJECTIVE: The aim of this study was to evaluate epidemiological and clinical aspects of brain abscess (BA) and changes in clinical patterns during the last 30 years., PATIENTS AND METHOD: Observational study of a cohort of non-pediatric patients with BA admitted at a 944-bed hospital. Data collection from clinical records was done according to a standard protocol. We analysed epidemiological, clinical and microbiological data and localization as well as changes during a 30 year period divided in 2 equal length phases: 1976-1989 (P1), and 1990-2005 (P2)., RESULTS: 108 patients with BA were included (mean age: 45 years; range: 12-86; > 40 years in 42.4% P1, and 71.4% in P2, $p < 0.05$); 66 patients were treated in P1 and 42 in P2 (annual incidence: 4-5 cases and 2-3 cases per 10(6) population in P1 and P2, respectively). A predisposing condition was identified in 86% cases with statistically significant differences ($p < 0.05$) in: otitis media (18.2% vs 2.4%); dental infection (3% vs 16.7%); penetrating cranial trauma (16.7% vs 0%); post-neurosurgery (15.1% vs 21.4%), in P1 and P2, respectively; microbiologic diagnosis was made in 76% (no statistical differences P1/P2). Clinical aspects statistically different in P1/P2: severely altered mental status (10.6% vs 0%); vomiting (37.9% vs 21.4%); focal neurological deficits (37.9% vs 71.4%). No statistically significant differences were found in other epidemiological, clinical, radiological, microbiological or outcome characteristics in P1/P2., CONCLUSIONS: In spite of a lower incidence in P2 and certain epidemiological and clinical differences in P1/P2, mortality and relapses rates have not significantly changed in a 30 year period.

1943. Gomez, J., et al. (2019). "Early continuous transcranial doppler in the ICU in patients with traumatic brain injury." Journal of Neuroimaging **29**(2): 277-278.

Background and Purpose: Cerebral hemodynamic changes after sustaining traumatic brain injury (TBI) are a major factor responsible for morbidity and mortality in this disease population. A plethora of research is available on continuous monitoring of the brain's hemodynamic response following such injury using invasive modalities like brain tissue oxygenation, regional blood flow, microdialysis, and electroencephalography. There is emerging interest in noninvasive monitoring of cerebral hemodynamics in guiding clinical paradigms in TBI. Transcranial Doppler ultrasound (TCD) is a noninvasive, portable modality to study the large intracranial vessels, and measure cerebral blood flow velocities. Numerous hemodynamic indices can be derived from TCD waveforms, which can serve as indicators of cerebral events, including vasospasm, hypoperfusion, hyperperfusion, vasoreactivity, and autoregulation. TCD can also be used to elucidate phenomenon such as the triphasic hemodynamic response with continuous monitoring after TBI. This ongoing study focuses on the feasibility and utility of TCD to evaluate changes in cerebral hemodynamic patterns following TBI. Methods: This institutional review board-approved study involves enrolling patients -18 years old admitted to the Neuro-Sciences Intensive Care Unit (ICU) or Trauma ICU at a tertiary-level academic medical center with a diagnosis of TBI. Diagnosis is confirmed with historical and radiographic evidence of head injury including, but not limited to traumatic subarachnoid hemorrhage, intraparenchymal contusion, intraventricular hemorrhage, diffuse axonal injury, or epidural hematoma. Eligible patients need to have a leveled trauma code (1-3), defined by emergency department admission and trauma team evaluation. Patients are excluded for pregnancy, incarceration, or penetrating skull trauma. Continuous TCD recordings are obtained from the bilateral middle cerebral arteries (MCAs) using a monitoring headband from the bilateral MCAs for 15 minutes-1-hour duration with a maximum of 4 hours of monitoring. Informed consent is obtained from the patient or surrogates prior to use of any of the collected data for research. Physiological parameters, including blood pressure intracranial pressure, end-tidal carbon dioxide, and arterial oxygen saturation, are recorded during TCD monitoring. Results: In this ongoing study, between 06/01/2018 and 09/15/2018, 400 patients were screened for study enrollment. Thirty-eight patients screened positive for TBI, with 13 found eligible for inclusion. Of these eligible patients, 9 expired prior to TCD scanning or declined consent. Data were able to be analyzed from 3 of the remaining 4 patients. Descriptive parameters of this sample (n = 3) included mean age of 62 years and mean Glasgow Coma Scale score of 13.6 on admission. All patients had neuroradiographically confirmed subarachnoid hemorrhage, with 1 patient having diffuse axonal injury. All met criteria for mild TBI. Mean values for physiological parameters included mean arterial pressure (98 mmHg), systolic blood pressure (BP) (148.33 mmHg), diastolic BP (74.67 mmHg), hemoglobin (7.77 g/dL), and pulse (90 bpm) during TCD. An average of 30 minutes of TCD recording was obtained on each patient. The TCD monitoring was well tolerated with no adverse effects. Mean duration of time between admission and TCD study was 5.33 days. Mean length of ICU stay was 13 days. MCA peak flow was aggregated for all patients with a mean flow of 82.4 and 51.55 for right and left recordings, respectively. Conclusion: At this time, no abnormal results have been observed. Our ongoing study is limited by the small sample size. While no anomalous flow patterns have been recorded, we have shown that monitoring cerebral hemodynamics with continuous TCD is feasible in ICU patients. This ongoing study provided a practical assessment of the feasibility of continuous TCD and allowed for the creation of a workflow to continue to pursue recording the triphasic response in moderate-to-severe TBI patients.

1944. Gomez-Caro, A., et al. (2006). "Role of conservative medical management of tracheobronchial injuries." The Journal of trauma **61**(6): 1426-1425.

BACKGROUND: The purpose of this study is to describe and assess the effectiveness of conservative treatment as the chosen treatment for tracheobronchial injury (TBI) management. This is a retrospective and descriptive study, which took place at a single center., METHODS: From January 1993 to July 2004, 33 TBIs were treated in our hospital. Eighteen (54.5%) were iatrogenic injuries and 15 (45.5%) were traumatic noniatrogenic injuries. Eighteen (55%) of the TBI patients were women and 15 (45.5%) were men, with a mean age of 46.7 +/- 23.4 years (range, 14-88 years). Eighteen (54.5%) of the injuries were caused by orotracheal intubation or tracheostomy, 13 (39.4%) by blunt trauma, and 2 (6.1%) by penetrating tracheal injuries. The average diagnostic delay was 18.29 +/- 19.8 hours. The mean injury size was 2.6 +/- 1.3 cm (range, 1-7 cm). Fourteen (42.4%) injuries were located in the cervical trachea, 8 (24.2%) in the thoracic trachea, 10 (30.3%) in the bronchi, and 1 (3%) involved both trachea and the main bronchi. Conservative treatment was applied in 20 (60.6%) of the 33 cases. Surgery should be performed in cases of esophageal-associated injuries, progressive subcutaneous or mediastinal emphysema, severe dyspnea requiring intubation, difficulty with mechanical ventilation, pneumothorax with an air leak through the chest drains, or mediastinitis., RESULTS: Conservative medical or surgical treatments achieved good outcomes in 28 (84.8%) cases. Five patients (15.2%) died while in the hospital; 4 of these were medically treated and 1 was surgically treated. Mortality was related to older

patients and patients that had been diagnosed during mechanical ventilation. Major symptoms (progressive subcutaneous emphysema, dyspnea, sepsis) were detected more often in cartilaginous injuries ($p < 0.05$). Conservative treatment was considered more effective in membranous injuries ($p < 0.05$), and these sorts of injuries were not related to a high mortality rate ($p > 0.05$). Mortality was not related to conservative treatment, sex, diagnostic delay, injury mechanism, location, or length of the TBI ($p < 0.05$)., CONCLUSIONS: Conservative treatment for TBI is effective regardless of the mechanism of production, length, or site of the injury. Conservative treatment should be carefully assessed in patients who meet strict selection criteria. Membranous injuries can be treated more often with a conservative approach, however, cartilaginous injuries should be treated surgically if major symptoms are detected.

1945. Gomez-Rios, M. A. and L. Nieto Serradilla (2010). "[Comments on the letter "Pneumocephalus as a complication of accidental spinal puncture during epidural anesthesia"]." Comentarios al articulo "Neumoencefalo como complicacion de puncion dural inadvertida en analgesia epidural". **57**(9): 603-604.

1946. Goncalves, B., et al. (2016). "Characteristics of patients with gunshot wounds to the head-an observational Brazilian study." Critical Care **20**.

Introduction Penetrating gunshot wounds to the head (PGWH) are associated with high mortality and morbidity. Getulio Vargas Hospital is a public trauma center in Rio de Janeiro with a high volume of neurocritical patients and an unusual number of civil patients admitted with PGWH. The aim of this study was to describe patients with PGWH admitted in Intensive Care Unit (ICU), investigating clinical characteristics, complications and management that could be related to a better outcome in this setting. Methods We retrospectively assessed the hospital records of every patient with PGWH admitted to the ICU from October 1st, 2014 to September 30th, 2015. Exploratory analysis of clinical data, image results, treatment, complication and outcomes was made. The primary end point was the modified Rankin scale at hospital discharge. Results In the period of the study, 1789 patients were admitted to the ICU and 13 PGWH patients were included. There were 10 male patients (77 %) and 3 female (23 %), with a mean age of 30 years (range 14- 64). There were no self-inflicted lesions (all PGWH were results of aggression). Glasgow Coma Scale at admission was 8 or less in 10 patients. On admission, 7 patients were anisocoric, 8 presenting shock, 5 had associated body lesions from another gunshot wound (such as limbs or in the thorax). Mean SAPS 3 was 67 (range 35-94) and mean Apache II, 26 (range 8-37). The CT scan findings were: midline shift in 8 patients, 7 single lobe haemorrhages (such as frontal or parietal lobe), and 6 patients with bleeding in more than one lobe. Six patients had subarachnoid and 3 had intraventricular hemorrhage. Early surgical procedure was made to 10 patients (mainly decompressive craniectomy). The mean hospital length of stay was 21 days (range 2 to 136 days). Six patients had wound infection, and three, infection in other sites. The mortality rate for the entire group was 54 % (7 out 13). 4 patients progressed to brain death. Of the six patients discharged from the hospital, four had good outcome (defined as modified Rankin scores of 0-3), and two, bad outcome (modified Rankin of 4). Conclusions In agreement with previous reports, our results showed that the surviving group was mostly of hemodynamically stable patients, included all with GCS above 8, and had lower SAPS3 and APACHE 2 scores. Patients with multiple gunshot wounds, even on non-vital organs, had worse outcome.

1947. Gonnering, R. S. (1987). "Ocular adnexal injury and complications in orbital dog bites." Ophthalmic plastic and reconstructive surgery **3**(4): 231-235.

Orbital dog bites, though statistically uncommon, occur most frequently in children and are associated with severe ocular adnexal injury. Of 16 victims, two-thirds were under 10 and over half under 5 years of age. The wounds consisted of numerous periorbital punctures, and in most cases, full-thickness lid lacerations involving the tear system. There were no serious injuries to the globe. Reversible amblyopia occurred in two children under 3 years of age with damage to the levator muscle. One child suffered a naso-orbital fracture. Because of the obvious nature of the injury, most patients present early and can be managed well with meticulous wound care and primary surgical repair. The use of prophylactic antibiotics, though controversial, appears prudent in such cases. Ophthalmologists treating these injuries must be aware of serious potential complications including occult facial fracture or intracranial penetration in young children, septicemia caused by bacillus DF-2 in patients with prior splenectomy, tetanus, and rabies.

1948. Gonul, E., et al. (1999). "Orbital foreign bodies after penetrating gunshot wounds: retrospective analysis of 22 cases and clinical review." Minimally invasive neurosurgery : MIN **42**(4): 207-211.

We conducted a retrospective analysis of 22 patients having orbital penetrating gunshot wounds treated over a 4-years period. The neurological status and the site of injury for each patient are evaluated in this study. We propose a practical protocol in the management of these orbital foreign bodies. Surgical treatment was performed in 4 patients (had functional deficit) with medial orbitotomy in 2, lateral orbitotomy in 1, and superior orbitotomy in 1. 3 of them are improved, in one case the blindness has been continued. 18 patients were treated conservatively and all of them are improved. All patients were followed-up for 2 years with cranial X-rays and CT scans. Neurological sequelae were regressed which existed before the surgery. In conservatively treated cases, infection, migration and functional deficit were not seen. In conclusion, orbital penetrating gunshot wounds must be evaluated precisely by the surgeon and this evaluation sets the guidelines for management. The operation should be reserved for the patients in whom the necrotic soft tissues or orbital damages restrict ocular movements.

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1949. Gonul, E., et al. (1998). "Tension pneumocephalus after frontal sinus gunshot wound." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **118**(4): 559-561.

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1950. Gonul, E., et al. (1997). "Causes of infections and management results in penetrating craniocerebral injuries." Neurosurgical review **20**(3): 177-181.

From February 1992 to December 1994, 148 patients with penetrating craniocerebral injuries were treated surgically with primary and secondary debridement including repair of dural defects and removal of retained intracranial bone and metal fragments. Dural defects were closed primarily or with temporalis fascia, pericranium, and cadaver graft. Cerebrospinal fluid fistulas were observed in 11 (7.3%) patients; 7 of these were infected. Central nervous system (CNS) infection was seen in 2 patients without CSF fistula. Excluding those 11 patients with CSF fistula CNS infection was shown in 2 of the 137 cases (1.5%). All patients underwent CT scans periodically. In 51 (34%) of 148 patients, bone and metal fragments were determined on control CT scans. During this time, 12 patients died (8%). Most of deaths were caused by the direct effect of brain injury and occurred within the first month after injury. Fragments retained after first debridement were followed periodically by CT scan. Surgery was not performed until infection developed. Retained fragments did not increase the infection risk, but high rates of infection did occur in cases with CSF fistula.

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1951. Gonul, E., et al. (1999). "Craniocerebral gunshot wounds: Analysis of 288 cases, a clinical review." Turkish neurosurgery **9**(1-2): 1-7.

This paper is a retrospective analysis of 288 craniocerebral gunshot wounds treated over a 5-year period. Twenty-one in-hospital deaths occurred, most as a direct result of brain injury. The level of central nervous system (CNS) damage was the most valuable prognostic factor in these cases. The presence of diffuse brain damage, brainstem injury, CNS infection, or ventricular injury was associated with poor outcome.

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1952. Gonul, E., et al. (2005). "Penetrating orbitocranial gunshot injuries." Surgical neurology **63**(1): 24-31.

BACKGROUND: The aim of this study was to analyze the effect of a surgical management protocol and other important clinical features on the prognosis of patients who had penetrating orbitocranial gunshot injuries., METHODS: Thirty-five patients (30 unilateral, 5 bilateral) who had penetrating orbitocranial gunshot injuries were analyzed. The wounds were mainly caused by shrapnel fragments or bullets. Craniotomy was the standard treatment in all patients. Investigated clinical features included Glasgow Coma Scale (GCS) score on admission, the mode and the extent of brain injury, and the presence of an intracranial retained foreign body. The prognostic importance of complications such as infection, intracranial hemorrhage, cerebrospinal fluid leak, and epileptic seizures was also investigated. The mechanism and the injury characteristics of the patients were evaluated by predicting the visual outcome of the victims according to a newer classification system as well as other variables pertinent to this specific clinical setting of severe eye trauma. Final visual acuities of the patients were also measured., RESULTS: The outcome of 35 penetrating orbitocranial gunshot injured patients was as follows: death in 3 patients, vegetative state in 1, severe disability in 2, moderate disability in 2, and good recovery in 27 cases. Localization and extent of the injury and GCS score on admission were the most important indicator for good neurological outcome. The predictors for good visual outcome were type B, grade 1, zone I,

and relative afferent pupillary defect-negative injuries. The predictors for poor outcome were type A, grade 5, zone III, and relative afferent pupillary defect-positive injuries., CONCLUSION: The prognosis of the injury depends on the course of the bullet or shrapnel fragment and the interdisciplinary care. An extensive preoperative evaluation of penetrating orbital trauma and a combined ophthalmic and neurosurgical approach are recommended to minimize the morbidity of the patients. However, complete removal of the foreign material in a deep or ventricular localization is not mandatory because careful debridement and tight closure of dura provides desired outcome. Evaluation of trauma mechanism and injury characteristics according to the Ocular Trauma Classification System seems to predict accurately the visual outcomes in this series.

1953. Gonullu, M. E., et al. (2016). "The Surgical Strategy for the Intraorbital Foreign Bodies." The Journal of craniofacial surgery **27**(7): 1785-1788.

PURPOSE: Four patients with intraorbital foreign bodies admitting to our clinic between 2001 and 2011 are presented. Their clinical and radiologic findings and surgical strategies are discussed., OBJECTIVE: The success of surgery for the intraorbital foreign bodies largely depends on the determination of the exact localization of them. Radiologic examination should follow clinical diagnosis. Computed tomographic views are especially required to demonstrate the foreign body., MATERIALS AND METHODS: Four patients with different etiologies of trauma are presented. Each had computed tomography views for foreign body localization. All but 1 had surgery for removal of the object under general anesthesia., RESULTS: No complications were observed postoperatively. Only 1 patient is followed up without an operation due to the risk of damaging delicate structures that the foreign body is close to. He has no loss of function., CONCLUSION: Early removal of foreign bodies in orbital region is usually preferred due to the risk of neurologic damage and other complications. Surgical removal is quite challenging for foreign bodies like wood. Magnets can be used for metallic bodies.

1954. Gonzalez, C., et al. (2011). "Impact of therapeutic temperature modulation in severe traumatic brain injury." Neurocritical care **15**(1): S213.

Introduction It is estimated that 1.7 million people suffer from Traumatic Brian Injury (TBI) every year in the United States. This constitutes a major public health problem. Secondary brain injury is a consequence of multiple factors including excess glutamate, oxidative damage and ischemia. Therapeutic temperature modulation may have a neuro protective role in these patients. However temperature modulation may cause increased ICU length of stay, increase ventilator days, thromboembolic events, pneumonia and other infections complications. Methods We retrospectively analyzed 28 charts of patients admitted to NSICU or TICU in our institution, between 2007-2009. Inclusion criteria: GCS < 9, admission to the ICU 24 hrs and non-penetrating TBI. The patients were divided into a temperature modulation group, both induced normothermia and hypothermia, and controls. The decision to use temperature modulation was at the discretion of the attending physician. Results There were thirteen patients in the temperature modulation (TM) group (10 males, 3 females) and fifteen in the control group (C) (12 males and 3 females). Mean aGCS was 4.15±1.72 for TM group and 4.71±1.90 for C group; p=0.43. The ICU los was, TM group 19.64±8.25, C group 14.5±7.90; p=0.16). Ventilator days were 17.5±9.65, 14.21±10.18 in TM group and controls p=0.41. Maximal ICP in TM group 36.7±22.08 and controls 30.5±21.97; p=0.47. Mortality was 15.4 % in TM group and 20% in controls p=0.7 Conclusions In this cohort of subjects with severe TBI there was a weak trend towards increased length of ICU stay in the TM group without a difference in mortality or ventilator days. The difference in maximal ICP may indicate significant selection bias as this was a retrospective study patients may have been treated with therapeutic hypothermia because of increasing ICP. We will need to continue to study this in a larger cohort to determine if these observations are statistically significant.

1955. Gonzalez-Cruz, J., et al. (2007). "Penetrating orbitocranial injury to the sella: case report and review of the literature." The Journal of the Louisiana State Medical Society : official organ of the Louisiana State Medical Society **159**(6): 310-314.

UNLABELLED: A 39-year-old woman sustained a self-inflicted transorbital penetrating injury that resulted in direct pituitary injury with hypopituitarism and decreased vision in the opposite eye. Several hormone deficiencies were detected. Even though this patient did not develop any other complications from her injury (abscess, cerebrospinal fluid fistula or pseudoaneurysm), after two years of follow-up no recovery of pituitary or visual function has occurred.,

CONCLUSION: From our experience in this case, we propose a conservative multidisciplinary approach when dealing with this type of lesion. Broad spectrum antibiotic coverage and early detection and replacement of any hormone deficiency should be instituted.

1956. Goodfellow, J. F. B. and R. H. Caesar (2010). "Pellet injuries to the orbit." Ophthalmologica. Journal international d'ophtalmologie. International journal of ophthalmology. Zeitschrift fur Augenheilkunde **224**(4): 265-266.

1957. Goodman, C., et al. (2012). "Penetrating brain injury from nail guns: Epidemiological, clinical and forensic characteristics." Journal of neurotrauma **29**(10): A85-A86.

Introduction Nail guns, essential tools in modern construction, propel nails using compressed air, electromagnets, explosive gases or gunpowder. 37,000 nail gun injuries, including cranial injuries, occur annually. There are similarities and differences between penetrating head injury from nail guns versus firearms. Methods We ascertained and reviewed cases of cranial nail gun injuries at the Ben Taub General Hospital (one of two Level I Trauma Centers in Houston, Texas) and the Harris County Institute of Forensic Sciences. The site of injury, patient demographics, clinical outcome and nature of the projectiles were recorded. Nails ejected from nail guns are classified by size ranging from finishing nails (25.4mm long · 1.47 mm weighing 336 mg) to framing nails (152.4mm long · 6.68mm weighing 45.36 gm). Results We identified six cases of cranial nail gun injury. All were in men below age 45 years. Two cases were fatal and four were non-lethal with four accidents, one assault and one suicide attempt. The penetration was supratentorial in five and infratentorial in one. Large framing nails were the solitary projectiles in 5 cases and in the one suicide attempt, multiple (4) finishing nails penetrated the skull. In the lethal cases, one involved the nail traveling through the thin bones of the orbit into the brain, and the other caused hemorrhage following removal of the nail at the construction site where the injury occurred. It appears that venous sinuses were penetrated and tamponaded by the nail, and upon removal of the projectile, hemorrhage and clinical deterioration ensued. In the survivable cases, nails were removed under controlled conditions. The most serious morbidity was ataxia and cranial nerve dysfunction from pontine and cerebellar damage in the case of infratentorial penetration. The severity of tissue damage inflicted by a penetrating missile depends on the amount of kinetic energy that the projectile brings to the transaction. Nail gun injuries differ from firearm injuries because they possess less kinetic energy. Nails emerge from nail guns at a velocity of between 100-150 meters/second; therefore, even the heaviest framing nail will possess modest kinetic energy compared to firearm bullets. Additionally, framing nails possess a flat head that affixes the nail to the skull, preventing the projectile from completely entering the cranial vault. Lethality occurs when vascular structures such as venous sinuses are lacerated or when the projectile travels relatively unimpeded through thin bone. Conclusions Nail gun brain injuries are increasing in frequency with more widespread use of these tools largely among young men. Mechanistically the tissue injury reflects parenchymal laceration without large kinetic energy transfer with cavitation and shock waves. Survival is likely unless vascular structures are lacerated or the projectile penetrates vital parenchymal structures. These injuries may be preventable and public health campaigns are underway to educate end users about the correct and safe use of nail guns. If injury with cranial penetration occurs, it is critical that the nail not be removed at the construction site, during transport or in the emergency center, but under controlled conditions in the operating room. The ballistics of nail gun injuries differ fundamentally from firearm injuries; therefore, they are not an appropriate model of high energy penetrating brain injury.

1958. Goodman, J., et al. (2016). "Penetrating brain injury from nail guns: Epidemiological, clinical and forensic features." Neurology **86**(16).

Objective: To report clinical aspects of cranial nail gun injuries. Background: Nail guns are essential tools in construction but nail gun injuries result in 37,000 Emergency Department visits annually including cranial injuries. Methods: We reviewed cranial nail gun injuries at the Ben Taub General Hospital and the Harris County Institute of Forensic Sciences. Injury site, demographics, outcome and nature of the projectiles were recorded. Results: We identified six cases of cranial nail gun injury. All were in men below age 45 years. Two were fatal and four were non-lethal with four being accidental, one assault and one suicide attempt. The penetration was supratentorial in five and infratentorial in one. Large framing nails were solitary projectiles in 5 cases and in the suicide attempt, multiple finishing nails penetrated the skull. Lethal cases involved the nail traveling through thin orbital bones into the brain or hemorrhage following ill-advised nail removal at the construction site. In the non-lethal injuries, the nails were removed

under controlled conditions. The most serious morbidity was ataxia and cranial nerve dysfunction from pontine and cerebellar damage following infratentorial penetration. Nails emerge from nail guns at a velocity of 100-150 meters/second; therefore, even the heaviest framing nail possess modest kinetic energy compared to firearm bullets. In addition, framing nails possess a flat head that affixes the nail to the skull, preventing the projectile from completely entering the cranial vault. Conclusions: Nail gun brain injuries are increasing reflecting widespread use of these tools particularly among young men. The tissue injury reflects parenchymal laceration without large kinetic energy transfer. These injuries are preventable and public health campaigns are underway to educate users about the safe use of nail guns. If injury with cranial penetration occurs, it is critical that the nail be removed under controlled conditions in the operating room.

1959. Goodman, J. M. and J. Kalsbeck (1965). "Outcome of self-inflicted gunshot wounds of the head." The Journal of trauma **5**(5): 636-642.

1960. Goodnight, S. H., et al. (1974). "Defibrination after brain-tissue destruction: A serious complication of head injury." The New England journal of medicine **290**(19): 1043-1047.

1961. Goodrich, J. T. (2008). "Sir Victor Horsley's contributions to the study and treatment of gunshot wounds of the head: Commentary." Neurosurgery **63**(4): 811.

1962. Goodrich, J. T., et al. (1992). "Split-thickness bone grafts in complex craniofacial reconstructions." Pediatric neurosurgery **18**(4): 195-201.

We have operated on 20 patients with various forms of complex skull defects due either to trauma, tumor, or craniofacial problems. These cases have required complex reconstruction of defects involving the calvarium and anterior skull base. We review here our techniques of using locally harvested split-thickness calvarium bone grafts in the reconstruction of complex face and anterior fossa defects, secondary to tumor, trauma and craniofacial problems. With these harvesting techniques sufficient bone becomes available for large reconstructions, with minimum morbidity to the patient. The aesthetic results are excellent allowing for good facial and forehead contouring with minimal risk to the patient. In the case of traumatic injuries the surgery can also be performed early with the risk of infection being markedly reduced. Long-term results with split-thickness calvarial grafts have shown less bone resorption when compared with rib grafts.

1963. Goodship, J., et al. (2018). "'Board' out of my skull: penetrating skull fracture from a surfboard nose." BMJ case reports **11**(1).

1964. Gopal, L., et al. (1995). "Retinal detachment secondary to ocular perforation during retrobulbar anaesthesia." Indian journal of ophthalmology **43**(1): 13-15.

The clinical characteristics and the retinal breaks associated with rhegmatogenous retinal detachments secondary to accidental globe perforation during local infiltration anaesthesia in five highly myopic eyes are presented. Retinal detachment was total with variable proliferative vitreoretinopathy. The pattern of retinal breaks was rather typical and predictable. Management involved vitreous surgery with internal tamponade by silicone oil in four eyes and perfluoropropane gas in one eye. At the last follow-up, all eyes had attached retina. One eye did not recover useful vision due to possible concurrent optic nerve damage.

1965. Gopal, L., et al. (1995). "Vitrectomy for accidental intraocular steroid injection." Retina (Philadelphia, Pa.) **15**(4): 295-299.

BACKGROUND: Accidental perforation of the globe and intraocular injection of steroid is a potential complication of periocular injections. Final outcomes in eyes in which this complication has occurred have been reported

to be unsatisfactory in the past. However, the advent of vitrectomy has altered their prognosis significantly., METHODS: A retrospective analysis was done of five cases of accidental intraocular steroid injection, treated by vitrectomy. Additional procedures involved treatment of retinal breaks (where required) with endolaser or transscleral cryopexy. Scleral buckling was done in one case., RESULTS: Barring one case in which retinal detachment developed, there were no postoperative complications. At last follow up all patients had satisfactory recovery of visual acuity; had attached retina; and quiet anterior chamber and vitreous cavities., CONCLUSION: Vitrectomy is associated with satisfactory results in cases of accidental intraocular steroid injection. Delay up to a few days does not seem to materially influence the outcome.

1966. Gor, D. M., et al. (2001). "Radiologic differentiation of intraocular glass: evaluation of imaging techniques, glass types, size, and effect of intraocular hemorrhage." AJR. American journal of roentgenology **177**(5): 1199-1203.

OBJECTIVE: The accurate detection of intraocular foreign bodies is critically important in treating ocular trauma. The purpose of this study was to evaluate the efficacy of CT, MR imaging, and sonography in detecting seven types of glass varying in size and placed in three locations in the globe, and to examine the effect of intraocular hemorrhage., MATERIALS AND METHODS: Glass pieces were cut into 1.5-, 1.0-, and 0.5-mm pieces and implanted on the corneal surface and the anterior and posterior chambers of 42 fresh porcine eyes. Twenty-one eyes were scanned comparing axial CT, helical CT, and MR imaging. The remaining 21 eyes were scanned using helical CT and sonography after implantation in a simulated human skull before and after placement of blood in the anterior chamber (hyphema)., RESULTS: Detection rates were 57.1% for helical CT, 41.3% for axial CT, and 11.1% for T1-weighted MR imaging (n = 63 fragments). Results were significant ($p < 0.0001$). Sonography detected 43% of glass fragments in the posterior chamber and 24% in the anterior chamber. Detectability was greatest for green beer bottle glass (90.3%) and least for spectacle glass (43.1%) ($p < 0.0001$). Detection rates for size ranged from 96.2% at 1.5 mm to 48.3% at 0.5 mm, which was also significant ($p < 0.0001$). On helical CT, anterior chamber glass was easiest to detect (91.7%) and corneal surface glass the most difficult (64.9%). Hyphema made no statistical difference ($p < 0.0001$)., CONCLUSION: Helical CT was the most sensitive imaging modality for the detection of intraocular glass. The sensitivity of detection was unaffected by hyphema but was determined by the type of glass, size, and location.

1967. Gorbulenko, V. B., et al. (2002). "[Treatment of the wounded and patients with acquired facial defects and deformations]." Lechenie ranenykh i bol'nykh s priobretennymi defektami i deformatsiiami litsa. **323**(8): 19-96.

The authors describe the peculiarities of surgical treatment of 293 casualties with gunshot injuries and burns of maxillofacial area and 637 oncologic patients. The working classification of facial defects and deformations based on topographic-and-anatomic, morphological, functional and expert signs was developed 4 degrees of tissue lesions that are very important in the choice of rational treatment method were selected. Individual dental splints and method of formation combined round petiole consisted of arterialized musculocutaneous and dermatofatty parts were proposed. Long experience obtained in surgical treatment of patients with acquired facial defects and deformations permitted to reduce the treatment periods and to obtain good and satisfactory functional and cosmetic results in 95.3% of the cases.

1968. Gordon, D. (1976). "Depressed fractures and missile wounds of the skull." Nursing mirror and midwives journal **142**(8): 45-46.

1969. Gordon, D. S. (1974). "Depressed fractures and missile wounds of the skull." British journal of hospital medicine **12**(2): 177-192.

It is customary to consider head injuries in two chief categories; generalized and localized, while recognizing that some patients have features of both types of injury. In this article the features of generalized brain damage are considered only briefly and in relation to very severe penetrating head injuries. There is no room for complacency about the surgical management of depressed fractures of the skull. Delayed diagnosis or inadequate surgery still gives rise to serious complications. Advances in supportive treatment evolved in the past decade have improved the outlook for patients with severe depressed fractures and penetrating wounds resulting from explosions or firearms. The mortality from penetrating missile injuries, however, remains high.

1970. Gordon, D. S. (1975). "Surgery of violence. V. Missile wounds of the head and spine." British medical journal **1**(5958): 614-616.

The patient with a cerebral gunshot wound has a very unstable condition. In Belfast emphasis has been laid on rapid evacuation and on starting resuscitation within a few minutes of injury. Early and adequate transfusion combats shock; controlled ventilation helps limit the rise in intracranial pressure. Intracranial haematomata should be sought by early operation. Operation seldom improves neurological function in missile wounds of the spine.

1971. Gordon, D. S. and G. A. Blair (1974). "Titanium cranioplasty." British medical journal **2**(5917): 478-481.

The technique of repairing defects of the skull with titanium is described. The skull contour can be accurately reproduced. The technique is simpler than wiring or suturing methods. The material is inert, radiolucent, and rigid.

1972. Gordon, D. S. and H. A. Crockard (1974). "Early management of the severe head injury." Proceedings of the Royal Society of Medicine **67**(1): 8-9.

1973. Gordon, M. N., et al. (1997). "Exaggerated astrocyte reactivity after nigrostriatal deafferentation in the aged rat." The Journal of comparative neurology **388**(1): 106-119.

Although clinical experience suggests that brain injury in the aged is associated with a poor prognosis, little research has examined this phenomenon at a cellular or molecular level. Unilateral 6-hydroxydopamine lesions of the nigrostriatal system were produced in 6-, 15- or 24-month-old rats. In the deafferented neostriatum, the time-dependent induction of glial fibrillary acidic protein (GFAP) was larger and persisted longer in the aged rats. The response of middle-aged rats was intermediate. In contrast, no induction of S-100 or glutamine synthetase was observed in any age group. In a second series of rats with stab wounds in the neostriatum, there were substantially larger GFAP inductions than after deafferentation, but fewer effects of age. However, in both lesion paradigms, GFAP staining increased in the contralateral striatum of old rats, but not in young rats. These data support and extend our earlier work describing larger GFAP RNA inductions after fornix transections in aged mouse hippocampus. The consistency of this exaggerated glial reactivity in the aged brain after modest injury suggests the following: 1) aged astrocytes are more sensitive to gliotrophic factors released by terminal degeneration, 2) larger quantities of such factors are produced after injury, 3) clearance of these factors is delayed in old rodents, and/or 4) aged astrocytes are less able to terminate GFAP inductions after activation. Given the potential role of inflammatory reactions as pathogenic mechanisms in Alzheimer's dementia, these data suggest that age-related glial hypersensitivity may independently increase the risk for some degenerative diseases.

1974. Gordon, S. B., et al. (1992). "Brain abscess ten years after penetrating glass injury to the skull." The Ulster medical journal **61**(1): 116-118.

1975. Gordon, W. E., et al. (2020). "Commentary: The Clinical Experience of a Junior Resident in Pediatric Neurosurgery and Introduction of the Resident Experience Score." Neurosurgery **86**(5): E447-E454.

1976. Gorissen, Z., et al. (2019). "Pneumocephalus: a rare and life-threatening, but reversible, complication after penetrating lumbar injury." Acta neurochirurgica **161**(2): 361-365.

Pneumocephalus, the presence of intracranial air, is a complication especially seen after neurotrauma or brain surgery. When it leads to a pressure gradient, a so-called tension pneumocephalus, it may require emergency surgery. Clinical symptomatology, especially in young children, does not differentiate between a pneumocephalus and a tension pneumocephalus. An additional CT scan is therefore warranted. Here, we report on a rare case of pneumocephalus after penetrating lumbar injury. Additionally, the pathophysiology of pneumocephalus, as well as its recommendations for diagnosis and treatment, will be elucidated.

1977. Goswami, S. (2013). "A bullet in the maxillary antrum and infratemporal fossa." Indian journal of dental research : official publication of Indian Society for Dental Research **24**(1): 149.

A young male patient was shot from a revolver on his left temple from a close range, but surprisingly he survived. On imaging, a complete bullet was found occupying his left maxillary sinus and infratemporal fossa. The bullet, after hitting and breaking the neck of the mandible on the left side, ricocheted and entered the left maxillary sinus through its posterior wall. It was removed safely by a combination of sublabial antrotomy and endoscopic approach.

1978. Gotham, J. E., et al. (1965). "OBSERVATIONS ON CEREBROSPINAL FLUID RHINORRHEA AND PNEUMOCEPHALUS." The Annals of otology, rhinology, and laryngology **74**: 215-233.

1979. Gottlieb, R. D., et al. (1992). "Foreign body of the skull base due to transorbital penetrating trauma." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **107**(6 Pt 1): 800-802.

1980. Govorun, M. I., et al. (2009). "[Damages of ENT-organs inflicted by the weapon of not-lethal (traumatic) action]." Voenno-meditsinskii zhurnal **330**(9): 32-37.

There was effectuated a research of killability of traumatic weapon in laboratory as well as during analyzing of clinical observations. There were considered the results of treatment of 8 persons, suffered from traumatic weapon. It was occurred a clinical recovery by 7 wounded persons from 8. There was 1 case of lethal outcome for first hours, caused by trauma of temporal bone and cerebrum (suicide). Thus, influence of traumatic weapon on ENT-organs can be a reason of serious penetrating wounds, facial bones fracture, hematomas and contusion, formation of foreign bodies and middle ear barotraumas.

1981. Gowing, G., et al. (2006). "Mouse model for ablation of proliferating microglia in acute CNS injuries." Glia **53**(3): 331-337.

Activation of microglia, the primary immune effectors of the CNS and proinflammatory signaling, is a hallmark of brain damage. However, it remains controversial whether microglial cells have beneficial or detrimental functions in various neuropathological conditions. We report the generation of transgenic mice that express a mutant form of herpes simplex virus type 1 thymidine kinase (HSV-1 TK(mt-30)) driven by the myeloid-specific CD11b promoter. Using two paradigms of nervous system damage, hypoglossal nerve axotomy, and cortical stab injury, we show that specific ablation of proliferating microglia in CD11b-TK(mt-30) mice can be achieved by administration of ganciclovir. For example, after hypoglossal nerve injury, a 75% reduction in proliferating microglial cells was observed at the site of injury. The CD11b-TK(mt-30) transgenic mouse should provide a valuable tool for studying the role of microglia in CNS damage and repair. Copyright (c) 2005 Wiley-Liss, Inc.

1982. Goyal, K., et al. (2021). "Ocular spectrum of kite injury: A six-year trend at a tertiary eye care center." Indian journal of ophthalmology **69**(2): 286-289.

Purpose: To assess ocular morbidity attributable to kites (patang) with emphasis on the cause, type and severity of the injury, complications, and final visual outcome., Methods: All the patients with a history of kite injury during months of Makar Sankranti for consecutive 6 years (2014-2019) were included in this study. A B-scan, orbital X-ray, and CT scan were performed for extensive ocular evaluation., Results: : Out of 68 patients with kite-related injury, 58 were male and 10 were female. Globe rupture (20), lid laceration (18), penetrating injury (9), wooden foreign body in the anterior or posterior chamber (7), superficial foreign body (4), hyphema (7), and vitreous hemorrhage (3) due to falling from height were noted. Factors associated with a poor final visual outcome in our study were poor initial visual acuity, globe rupture, intraocular foreign body, and development of endophthalmitis., Conclusion: Kites can cause serious preventable injuries mostly among pediatric males. The use of protective eyewear and public awareness can decrease ocular injury significantly.

1983. Goyal, S. and A. K. Sinha (2014). "Pterygovaginal artery: An important anastomotic artery to recognize." Current Medicine Research and Practice **4**(2): 97-98.

1984. Goycoolea, A. N., et al. (2014). "Transorbital penetrating brain injury, caused by metallic cloth hanger in a 3 year old child; removal strategy and review of literature." Child's Nervous System **30**(11): 1991-1992.

Penetrating brain injury is a very rare condition during times of peace. In the child population, low-velocity, non-missile objects are the most frequent.We report the case of a 3 years old child, who fell into a metallic cloth hanger resulting in a severe type of Traumatic Brain Injury. To avoid unwanted movement of the hanger, the patient was deeply sedated and connected to mechanical ventilation, that allow us to complete the study with computed tomography, 3D reconstructions, and brain angiography. We concluded that there was no vascular damage or brain hemorrhage. With the tip of the hanger just 1 millimeter from the right internal Carotid artery, and 3 millimeters from the brain stern, a dangerous and ambitious removing strategy was proposed. With direct angiography vision, and the operating room prepared for open skull vascular reparation, the team removed the hanger slowly pulling it backwards with no immediate complications. After the sedation was suspended, the child had a complete right side third nerve palsy, with normal visual function and no other neurologic damage. One week after the removal of the hanger, the patient had positive clinical evolution, a post procedure MRI showing minimal hemorrhagic contusion and no infectious complication, free from antibiotic treatment. He was discharged wile partially recovering the right third nerve palsy. Penetrating transorbital brain injury are uncommon and potentially severe lesions. The damage mechanism is mainly direct laceration of vascular structures or parenchymal contusion. Damage could occur during the accident or removal, as the object may be tamponading an injured vessel. Strategies to remove foreign objects without causing secondary damage could vary case to case. Diverse objects are described in the literature, but no cases of cloth hangers were found in the review. Authors (primarily Japanese) agree that no attempt should be made to remove the foreign body without the backup of an operating room, or a complete study of vascular structures involved. As explained through this case, a careful and multidisciplinary approach to these infrequent cases will increase the chances of a positive outcome.

1985. Gozzi, M., et al. (2009). "Dissociable effects of prefrontal and anterior temporal cortical lesions on stereotypical gender attitudes." Neuropsychologia **47**(10): 2125-2132.

Clinical observations of patients with ventral frontal and anterior temporal cortical lesions reveal marked abnormalities in social attitudes. A previous study in seven patients with ventral prefrontal lesions provided the first direct experimental evidence for abnormalities in social attitudes using a well-established measure of gender stereotypes, the Implicit Association Test (IAT). Here, we were able to test whether these first findings could be reproduced in a larger sample of 154 patients with penetrating head injuries, and to determine the differential effects of ventromedial prefrontal (vmPFC) and ventrolateral prefrontal (vlPFC) cortical lesions on IAT performance. In addition, we investigated the role of the superior anterior temporal lobe (aTL), recently shown to represent conceptual social knowledge. First, we used a linear regression model to identify the role of each of the three regions, while controlling for the extent of damage to other regions. We found that larger lesions in either the vmPFC or the superior aTL were associated with increased stereotypical attitudes, whereas larger lesions in the vlPFC were associated with decreased stereotypical attitudes. Second, in a confirmatory analysis, we grouped patients by lesion location and compared their performance on the IAT with that of healthy volunteers. Compared to controls, patients with lesions in either the vmPFC or the superior aTL showed increased stereotypical attitudes, whereas patients with lesions in the vlPFC showed decreased stereotypical attitudes. The functional contributions of these regions in social attitudes are discussed.

1986. Grabb, P. A., et al. (1997). "Continuous intraoperative electromyographic monitoring of cranial nerves during resection of fourth ventricular tumors in children." Journal of neurosurgery **86**(1): 1-4.

The authors reviewed the results of continuous intraoperative electromyographic (EMG) monitoring of muscles innervated by cranial nerves in 17 children whose preoperative imaging studies showed compression or infiltration of the fourth ventricular floor by tumor to determine how intraoperative EMG activity correlated with postoperative cranial nerve morbidity. Bilateral lateral rectus (sixth) and facial (seventh) nerve musculatures were monitored in all children. Cranial nerve function was documented immediately postoperatively and at 1 year. Of the 68 nerves monitored, nine new neuropathies occurred in six children (sixth nerve in four children and seventh nerve in five). In five

new neuropathies, intraoperative EMG activity could be correlated in one of four sixth nerve injuries and four of five seventh nerve injuries. Electromyographic activity could not be correlated in four children with new neuropathies. Of 59 cranial nerves monitored that remained unchanged, 47 had no EMG activity. Twelve cranial nerves (three sixth nerves and nine seventh nerves) had EMG activity but no deficit. Of four children with lateral rectus EMG activity, three had new seventh nerve injuries. Lateral rectus EMG activity did not predict postoperative abducens injury. The absence of lateral rectus EMG activity did not assure preserved abducens function postoperatively. Likely because of the close apposition of the intrapontine facial nerve to the abducens nucleus, lateral rectus EMG activity was highly predictive of seventh nerve injury. Although facial muscle EMG activity was not an absolute predictor of postoperative facial nerve dysfunction, the presence of facial muscle EMG activity was associated statistically with postoperative facial paresis. The absence of facial muscle EMG activity was rarely associated with facial nerve injury. The authors speculate that EMG activity in the facial muscles may have provided important intraoperative information to the surgeon so as to avoid facial nerve injury.

1987. Gracheva, N. D. and M. A. Mirzaev (1977). "[Effectiveness of different means of surgically treating cranio-cerebral wounds following whole body x-irradiation of animals]." Effektivnost' raznykh sposobov khirurgicheskoi obrabotki pronikatiushchikh cherepno-mozgovykh ranposle obshchego rentgenovskogo oblucheniia u zhivotnykh.(3): 7-13.

In 184 rabbits experiments it was demonstrated that debridement with suction of the damaged portion of the brain within the macroscopically intact brain tissue and a leak-proof suture undertaken on the 1st and 3rd day following a penetrating skull-brain trauma in irradiated with 400 r and non-irradiated animals prevents heamorrhagic and purulent complications, permits primary healing of the wound, and a nearly 100% survival of the animals. The irradiated animals without debridement died in 67% of cases, non-irradiated--in 43%. Debridement limited to wound debris washing-out failed to free the irradiated animals from purulent complications, but prevented the development of cerebral haematomas, the mortality being reduced to 40%. In the non-irradiated animals such debridement did not alter the mortality figures.

1988. Gracheva, N. D. and M. A. Mirzaev (1977). "Efficacy of different methods of debridement of penetrating craniocerebral injuries following total X-ray irradiation in animals." Zhurnal Voprosy Nejrokhirurgii Imeni N.N. Burdenko **41**(3): 7-13.

In experiments with 184 rabbits it was demonstrated that debridement with suction of the damaged portion of the brain within the macroscopically intact brain tissue and a leak-proof suture undertaken on the 1st and 3rd day following a penetrating skull-brain trauma in animals irradiated with 400 r and non-irradiated animals prevents hemorrhagic and purulent complications, permits primary healing of the wound, and a nearly 100% survival. The irradiated animals without debridement died in 67% of cases, non-irradiated - in 43%. Debridement limited to wound debris washing-out failed to free the irradiated animals from purulent complications, but prevented the development of cerebral hematomas, the mortality being reduced to 40%. In the non-irradiated animals such debridement did not alter the mortality figures.

1989. Gracias, V. H., et al. (2001). "Computed tomography in the evaluation of penetrating neck trauma: a preliminary study." Archives of surgery (Chicago, Ill. : 1960) **136**(11): 1231-1235.

HYPOTHESIS: Penetrating neck trauma has traditionally been evaluated by surgical exploration and/or invasive diagnostic studies. We hypothesized that computed tomography (CT), used as an early diagnostic tool to accurately determine trajectory, would direct or eliminate further studies or procedures in stable patients with penetrating neck trauma., DESIGN: Retrospective case series., SETTING: Academic, urban, level I trauma center., PATIENTS: Hemodynamically stable patients without hard signs of vascular injury or aerodigestive violation who had sustained penetrating trauma to the neck., INTERVENTIONS: Patients underwent a spiral CT as an initial diagnostic study after initial evaluation in the trauma bay. Further invasive studies were directed by CT findings., MAIN OUTCOME MEASURES: Number of invasive studies performed., RESULTS: Twenty-three patients were identified during the 30-month period. Nineteen patients sustained gunshot wounds; 3, shotgun wounds; and 1, a stab wound. One patient died of a cranial gunshot wound. Three isolated zone I, 1 isolated zone II, 9 isolated zone III, and 10 multiple neck zone trajectories were evaluated. Thirteen patients were identified by CT to have trajectories remote from vital structures and required no further evaluation. Ten patients underwent angiography. Only 2 underwent bronchoscopy and esophagoscopy. Four

patients were discharged from the emergency department; 7 other patients were discharged within 24 hours. No adverse patient events occurred before, during, or after CT scan., CONCLUSIONS: Computed tomography in stable selected patients with penetrating neck trauma appears safe. Invasive studies can often be eliminated from the diagnostic algorithm when CT demonstrates trajectories remote from vital structures. As a result, efficient evaluation and early discharge from the trauma bay or emergency department can be realized. Further prospective study of CT scan after penetrating neck trauma is needed.

1990. Graf, C. J., et al. (1981). "Complications of spinal drainage in the management of cerebrospinal fluid fistula." Journal of neurosurgery **54**(3): 392-395.

Continuous cerebrospinal fluid (CSF) drainage may be used in the treatment CSF fistula. The procedure, however, is not without risk. Marked gradients between the intracranial and intraspinal CSF pressures and intravasation of air through an unsealed fistula may produce serious neurological problems. The use of continuous CSF drainage requires an alert, informed nursing staff to avert catastrophe.

1991. Graf, S., et al. (2014). "[Fat prolapse following trauma to the bulb and orbit?]." Fettprolaps nach Bulbus- und Orbitatrauma? **231**(7): 686-687.

1992. Grafman, J., et al. (1990). "Wisconsin Card Sorting Test performance based on location and size of neuroanatomical lesion in Vietnam veterans with penetrating head injury." Perceptual and motor skills **71**(3 Pt 2): 1120-1122.

We examined Wisconsin Card Sorting Test performance in a large group of brain-damaged patients and controls. No differences were found between patients with frontal lesions only and those with nonfrontal lesions. Patients with left dorsofrontal and anterior temporal lobe lesions committed the most perseverative errors. More analyses regarding requirements for information processing on the Wisconsin Card Sorting Test are needed.

1993. Grafman, J., et al. (1988). "Intellectual function following penetrating head injury in Vietnam veterans." Brain : a journal of neurology **111 (Pt 1)**: 169-184.

The extent to which intellectual processes are preserved as a function of preinjury 'intelligence' and of size and location of the brain lesions was evaluated in Vietnam war veterans who survived penetrating missile wounds. With regard to an overall postinjury intelligence test score, preinjury intelligence was most predictive, size of lesion was next most predictive and lesion location was least important. For subtest scores from the same intelligence test, lesion location assumed much greater predictive value. Specifically, left temporal and occipital lesions impaired performance on subtests assessing vocabulary and object-function matching ability.

1994. Grafman, J., et al. (1986). "The relationship of brain-tissue loss volume and lesion location to cognitive deficit." The Journal of neuroscience : the official journal of the Society for Neuroscience **6**(2): 301-307.

We examined the relationship of preinjury intelligence, a lesion-severity variable (brain-tissue loss volume), and lesion location to the persistence of cognitive deficits in Vietnam veterans with penetrating brain wounds. Using stepwise multiple linear regression procedures, we found that preinjury intelligence predicted a significant amount of the variance on postinjury cognitive testing, being a better predictor for tests requiring a number of complementary cognitive processes (e.g., intelligence tests) than for tests measuring a specific cognitive process (e.g., face recognition). Brain-tissue volume loss was found to play a larger role when a global cognitive measure was used, but a smaller role when a specific cognitive process was measured. Finally, lesion location was shown to be a significant predictor of performance only for specific cognitive processes. Nevertheless, preinjury intelligence/education appears to play an even larger role in postinjury performance than either brain-tissue loss volume or a particular structural loss.

1995. Grafman, J., et al. (1986). "Face memory and discrimination: an analysis of the persistent effects of penetrating brain wounds." The International journal of neuroscience **29**(1-2): 125-139.

This study was designed to examine the effects of penetrating head injury upon face discrimination and memory in 213 brain-injured Vietnam veterans and 49 normal controls. Impairment on tests of face memory was most associated with bilateral lesions and with unilateral lesions of the temporal lobe. Impairment on a test of face discrimination was most associated with right hemisphere, and with bilateral lesions which included either frontal or parietal lobe involvement. Performance on these tasks appeared independent of other visuospatial or verbal tasks. Cluster analysis revealed a dissociation between performance on facial memory and facial discrimination tasks.

1996. Grafman, J., et al. (1985). "Isolated impairment of memory following a penetrating lesion of the fornix cerebri." Archives of neurology **42**(12): 1162-1168.

Persistent memory problems were reported by a 39-year-old man who suffered a penetrating brain wound while serving in Vietnam 15 years earlier. Neuropsychological testing indicated an unusually isolated memory impairment. Computed tomography revealed transection of the columns of the fornix cerebri with no temporal-lobe involvement and minimal thalamic damage. We suggest that the fornix cerebri has a role in the maintenance of information accessibility to both encoding and recall during post-working memory processing and in the organization of verbal information during encoding and/or retrieval for declarative (recall) purposes. These processes are not essential for verbal recognition but can result in decrements on specific laboratory tasks and in social adjustment.

1997. Graham, E. W., et al. (2014). "Decreased subject contrast and summation artifact: an explanation for a nearly imperceptible bullet by X-ray examination." The American journal of forensic medicine and pathology **35**(4): 249-252.

X-ray examination is used to detect foreign bodies during forensic autopsy of a suspected gunshot wound case. There are several previously described situations in which a projectile is not immediately localized by radiography. In this report, we present a case of a metal bullet lodged near the atlanto-occipital junction, where it was present but not readily apparent on radiograph. Although computed tomography is ideal for detecting such objects, many forensic pathologists must still rely on x-ray only. To our knowledge, the forensics literature does not contain a case where a lead bullet was rendered nearly imperceptible by x-ray examination. We describe 2 concepts of radiation physics-poor x-ray penetration and summation artifact-which can cause a radiopaque object such as a bullet to seem much less so. The difference between best practices in hospital and forensic radiology may explain how this occurred. This case serves to caution the pathologist that forensic radiographs may not completely depict the type or quantity of projectiles present in a gunshot wound case.

1998. Grahm, T. W., et al. (1990). "Civilian gunshot wounds to the head: a prospective study." Neurosurgery **27**(5): 696-700.

Previous retrospective studies of cranial gunshot wounds have failed to determine whether aggressive field resuscitation, triage to a neurosurgical center, and early surgical intervention can improve the assumed poor outcome of these severely injured patients. Therefore, we studied 100 consecutive patients prospectively to establish a systematic approach to treatment. If the patient retained two or more neurological signs after aggressive field resuscitation/intubation, a computed tomographic scan was performed. Rapid surgical debridement was done unless the patient deteriorated to clinical brain death. The Glasgow Coma Scale (GCS) score after resuscitation was 3 to 5 in 58 patients, 6 to 8 in 8 patients, 9 to 12 in 12 patients, and 13 to 15 in 22 patients. Seventy-six computed tomographic scans and 43 craniotomies were performed. The Glasgow Outcome Scale scores showed that 60 patients died, 2 were vegetative, 6 were severely disabled, 20 were moderately disabled, and 13 had good outcomes. There were 10 postoperative deaths. No patient with a GCS score of 3 to 5 had a satisfactory outcome; however, outcome progressively improved as the GCS score increased. We conclude that all cranial gunshot patients should initially receive aggressive resuscitation. Patients with stable vital signs should be examined by computed tomographic scan. If the patient's GCS score after resuscitation is 3 to 5 and no operable hematomas are present, then no further therapy should be offered. All patients with a GCS score greater than 5 should receive aggressive surgical therapy.

1999. Granicki, A., et al. (1992). "[Removal of a foreign body penetrating through the orbit into the cranial cavity]." Operacja usuniecia ciala obcego wbitego przez oczodol do jamy czaszki. **Suppl 1**: 353-355.

2000. Granier, P. and H. Namaki (2012). "[Coverage of post-traumatic brain exposure by a total temporal flap: a case report]." Couverture d'une exposition cerebrale post-traumatique par un lambeau temporal total : a propos d'un cas. **58**(5): 301-308.

Major defect of the scalp associated with penetrating brain injury is one of the most challenging issues in acute craniofacial trauma. Depressed skull fractures associated with injuries of the skin and periosteal tissue can be easily covered using various locoregional scalp flap techniques. However, if the skin is damaged around the wound, the surgical possibilities are reduced, allowing only local transposition flap or free flap coverage with many disadvantages for the latter such as vascular micro-anastomosis issues, unsuitable underlying vascular status, and a "patch" effect which is often unsightly. The authors describe, using a clinical case, the steps to provide a total temporal flap to cover a defect of both skin and bone. This can be performed in three separated stages: the first is the empowerment of both middle temporal pedicles; the second stage, 15 days later, is the section, transposition and coverage of the wound; the third stage, 30 days later, is the flap separation. Copyright © 2012. Published by Elsevier Masson SAS.

2001. Grant, G. A. (2014). "Management of penetrating head injuries: lessons learned." World neurosurgery **82**(1-2): 25-26.

2002. Grant, S., et al. (2015). "Direct optic neuropathy in a simple temporal laceration: A case report." International journal of oral and maxillofacial surgery **44**: e216.

Background: Facial lacerations are a common presentation in emergency departments. It is important to appreciate the mechanism of injury and the anatomy of structures involved in penetrating lacerations in the maxillofacial region. These penetrating injuries can easily be over looked, especially if the patients appear well on presentation. Case report: We report an unusual injury with a serious complication. A65-year-old gentleman lost his footing whilst buttering toast with a sharp kitchen knife. He fell to the floor with the knife penetrating the right temporal region. He immediately removed the knife, there was no loss of consciousness. There was a single laceration to the right temporal region. The right eye had no perception to light, a total afferent and efferent pupillary defect and partial ophthalmoplegia. CT scan revealed signs of penetration through the skin, temporalis, postero-lateral orbital wall and orbital apex. There was no injury to the globe or either retrobulbar or intracranial haemorrhage. Discussion: Direct Traumatic Optic Neuropathy (TON) results from disruption of the optic nerve by a penetrating object. Direct TON causes severe and immediate loss of vision with little prospect of recovery. The initial visual acuity is the strongest predictor of visual recovery. Only two similar cases of penetrating trauma in the temporal region resulting in directTONhave been identified in the literature. This case presentation, with clinical photographs and CT scan images, highlights the structures that are at risk of damage from penetrating trauma in the maxillofacial region.

2003. Grant, W. F., Jr. and K. G. Swan (1980). "Gunshot wounds of the orbit." The Journal of trauma **20**(9): 809-811.

Isolated gunshot wounds of the orbital contents are relatively rare, and therefore their management deserves updating in terms of current practices. Two cases of isolated gunshot wounds to the orbital contents are presented, and the diagnosis, management, and prognosis are reviewed. In general, in the absence of light perception, enucleation within a planned timetable is the treatment of choice to prevent sympathetic ophthalmia from destroying sight in the uninjured eye. If light perception is present, every attempt should be made to preserve the injured eye. Enucleation of a blind injured eye is the treatment of choice because it is a more complete eradication of the potential for sympathetic ophthalmia. In selected cases, evisceration can be successfully substituted.

2004. Grassetto, A., et al. (2012). "Rotational thromboelastometry analysis and management of life-threatening haemorrhage in isolated craniofacial injury." Blood coagulation & fibrinolysis : an international journal in haemostasis and thrombosis **23**(6): 551-555.

Massive haemorrhage from facial fractures is rare but the associated mortality rate is high. Here, we describe a case in which thromboelastometry [rotational thromboelastometry (ROTEM)]-guided administration of prothrombin complex concentrate and fibrinogen concentrate was effective in correcting coagulopathy in a 68-year-old man with serious craniofacial trauma and massive haemorrhage. The patient, a cyclist who collided with a car, was transferred to

the emergency department of our hospital with signs of shock and significant bleeding from multiple fractures and soft tissue injuries to the face. Blood gas analysis and standard laboratory tests revealed the presence of anaemia and acidosis, and our massive haemorrhage protocol was initiated. E-FAST and total-body computed tomography scans excluded the possibility of bleeding from other sites. All efforts were directed towards stopping bleeding from craniofacial lesions, but the surgeon experienced difficulty in maintaining haemostasis. ROTEM analysis revealed severe coagulopathy and was indispensable in guiding transfusion: 2 g tranexamic acid, followed by 1000 IU prothrombin complex concentrate, 5 g fibrinogen and 2 U platelet concentrate. Two hours later, ROTEM analysis showed that coagulopathy had been corrected, and haemostasis was confirmed by cessation of bleeding. This report highlights the potential for using ROTEM to guide treatment with fibrinogen and prothrombin complex concentrates in the presence of profuse multifocal bleeding and severe coagulopathy.

2005. Graves, W. C., et al. (2021). "Pre- and in-hospital mortality for moderate-to-severe traumatic brain injuries: an analysis of the National Trauma Data Bank (2008-2014)." Brain injury **35**(3): 265-274.

Objectives: This study aimed to: (1) evaluate pre- and in-hospital mortality for moderate-to-severe TBI in the U.S. by injury type (blunt vs. penetrating) and (2) estimate annual regression-adjusted mortality from 2008-2014. Methods: Data were analyzed from the National Trauma Data Bank (N=247,648). Multivariable logistic regression analyses were performed by injury type to assess changes in mortality between study periods (early period: 2008-2010; late period: 2011-2014) and to estimate annual regression-adjusted mortality. Mortality odds ratios and 95% confidence intervals were calculated. Results: Total observed mortality was 18.8%. After covariate adjustment, patients in the late period had an increased odds of prehospital mortality compared to patients in the early period for blunt (OR: 4.69; 95%CI: 4.41-4.98) and penetrating trauma (OR: 4.71; 95%CI: 4.39-5.06). In contrast, patients in the late period had a decreased odds of in-hospital mortality compared to patients in the early period for blunt (OR: 0.95; 95%CI: 0.91-0.98) and penetrating trauma (OR: 0.92; 95%CI: 0.85-0.98). Conclusions: The decreasing in-hospital mortality trend is consistent with previous literature. Additional research is warranted to validate the observed increase in prehospital mortality and to identify best practices that can improve prehospital outcomes for patients with moderate-to-severe TBI.

2006. Gray, E., et al. (2002). "Survey of trauma patients requiring maxillofacial intervention, ages 56 to 91 years, with length of stay analysis." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **60**(10): 1114-1125.

PURPOSE: The purpose of this study was to analyze trauma patients, ages 55 and older, sustaining multiple injuries including maxillofacial trauma. Factors influencing length of intensive care unit stay (ICUS) and length of total hospital stay were delineated and examined to determine if specific causes of increased length of stay could be elucidated, and, once known, if these causes could translate into recommendations tailored to the oral and maxillofacial surgery trauma practice., PATIENTS AND METHODS: One hundred ninety-six patients, 55 years of age or older, who received either consultation alone, or consultation with surgical treatment, by oral and maxillofacial surgeons, from January 1991 to August 1998 were included in this study. Variables of interest included location of traumatic event, mechanism of injury, patient age and gender, comorbidities on presentation, Injury Severity Score (ISS), specific injuries incurred, ICUS, length of hospital stay (LOS), surgical interventions, and disposition., RESULTS: Complications were the statistically significant factor determining length of ICU stay. ICUS, complications incurred, and ISS were the important predictors of total LOS. The significant complications affecting LOS were infectious, respiratory, and hematologic complications., CONCLUSION: The number of complications the patient incurs after an injury can predict length of ICUS. Length of ICUS, ISS, and number of complications incurred were the strongest predictors for total length of hospital stay. Other variables, including age, gender, living or dead, blunt versus penetrating injury, ISS, fracture site (skull, midface, or lower face), and comorbidities on presentation were not statistically significant in this patient population. Infectious, respiratory, and hematologic complications were the complications most closely correlated with increasing length of ICUS and total hospital stay. Copyright 2002 American Association of Oral and Maxillofacial Surgeons

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2007. Gray, J., et al. (2004). ""Glass in a scalp laceration": an unusual case of penetrating head injury presenting to the emergency department." European journal of emergency medicine : official journal of the European Society for Emergency Medicine **11**(2): 117-118.

A case of penetrating head injury caused by glass is reported. Rarely does this material cause such an injury. Other reports of this unusual type of head injury are reviewed. The potential for misdiagnosis, the correct management and possible complications of this type of injury are discussed.

2008. Gray, R. C. and D. L. Coppel (1975). "Surgery of violence. III. Intensive care of patients with bomb blast and gunshot injuries." British medical journal **1**(5956): 502-504.

2009. Greaves, I., et al. (2002). "Fluid resuscitation in pre-hospital trauma care: a consensus view." Journal of the Royal College of Surgeons of Edinburgh **47**(2): 451-457.

Fluid administration for trauma in the pre-hospital environment is a challenging and controversial area. The available evidence does not clearly support any single approach. Nevertheless, some provisional conclusions may be drawn. It was with this intention that the Faculty of Pre-Hospital Care (RCSEd) arranged to meet in August 2000 in an attempt to reach a working consensus. The following guidelines are the result of those discussions. It is intended that they will be modified as future research brings clarity to the area. When treating trauma victims in the pre-hospital arena cannulation should take place en route, where possible. Only two attempts at cannulation should be made. Transfer should not be delayed by attempts to obtain intravenous access. Entrapped patients require cannulation at the scene. Normal saline may be titrated in boluses of 250 ml against the presence or absence of a radial pulse (caveats; penetrating torso injury, head injury, infants).

2010. Green, A. J., et al. (2005). "Post-traumatic epidermoid cyst presenting with headache." Neurology **64**(9): 1657.

2011. Greenberg, J. K., et al. (2014). "Management of children with mild traumatic brain injury and intracranial hemorrhage." The journal of trauma and acute care surgery **76**(4): 1089-1095.

BACKGROUND: Traumatic brain injury (TBI) is a significant public health problem affecting tens of thousands of children each year, and an important subset of these patients sustains intracranial hemorrhage (ICH). The purpose of this study was to test the hypothesis that we could identify a subset of children with traumatic ICH who could be monitored on a general neurosurgery ward with a low risk of clinical deterioration., METHODS: We performed a retrospective review of pediatric patients 18 years or younger with mild TBI (Glasgow Coma Scale [GCS] score 14-15) and traumatic ICH admitted to Saint Louis Children's Hospital between 2006 and 2011. We excluded patients with injuries unrelated to the TBI that would require intensive care unit (ICU) admission and those with penetrating intracranial injuries., RESULTS: We identified 118 patients meeting inclusion criteria. Repeat neuroimaging was obtained in 69 (58%) of 118 patients. Radiologic progression was noted in 6 (8.7%) of 69 patients, with a trend toward more frequent progression in patients with epidural hematoma (EDH) versus other ICH (3 [20%] of 15 vs. 3 [5.6%] of 54; $p = 0.11$). Of 118 patients, 8 (6.8%) experienced clinically important neurologic decline (CIND) and 6 (5.1%) required neurosurgical intervention. Both CIND and the need for neurosurgical intervention were significantly higher in patients with EDH (21% each) compared with those with other types of ICH (4% and 2%, respectively) ($p = 0.02$, $p < 0.01$). Based on these results, we developed a preliminary management framework to assist in determining which patients can be safely observed on a neurosurgery ward without an ICU admission. Specifically, those patients without EDH, intraventricular hemorrhage, coagulopathy, or concern for a high-risk neurosurgical lesion (e.g., arteriovenous malformation) may be safely observed on the ward., CONCLUSIONS: These results demonstrate that few children with mild TBI and ICH experience CIND and the preliminary framework we developed assists in identifying which patients can safely avoid ICU admission. This framework should be validated prospectively and externally., LEVEL OF EVIDENCE: Therapeutic/care management, level IV.

2012. Greene, K. A., et al. (1995). "Impact of traumatic subarachnoid hemorrhage on outcome in nonpenetrating head injury. Part I: A proposed computerized tomography grading scale." Journal of neurosurgery **83**(3): 445-452.

The presence of traumatic subarachnoid hemorrhage (tSAH) on admission computerized tomography (CT) scans obtained from patients suffering from severe, nonpenetrating head injury has been shown to be associated with a worse outcome than the injury alone would warrant. However, no previous study has provided a simple means of relating the

amount of tSAH, its location, or other abnormal findings on initial head CT scans to outcome in patients with non-penetrating head injury. In this study, admission head CT scans from 252 patients with tSAH, treated at a single institution, were reviewed to ascertain thickness of the tSAH; its location; evidence of mass lesion(s); shift of midline structures (5 mm); basal cistern effacement; and cortical sulcal effacement. The CT scans were then organized into Grades 1 to 4 with 1 indicating thin tSAH (5 mm); 3, thin tSAH with mass lesion(s); and 4, thick tSAH with mass lesion(s). A stepwise regression analysis of CT features ranked them in descending order of contribution to Glasgow Outcome Scale (GOS) scores at the time of discharge from acute hospitalization as follows: basal cistern effacement, thickness of tSAH, cortical sulcal effacement, presence of mass lesion(s), and location of tSAH. A shift of midline structures was not found to be a significant variable. Further analysis comparing CT grades and admission postresuscitation Glasgow Coma Scale (GCS) scores was highly significant. Patients with lower CT grades had better admission GCS values and discharge GOS scores than those with higher CT grades. From their experience, the authors conclude that their CT grading scale is simple and reliable and relates significantly to outcome at the time of discharge from acute hospitalization.

2013. Greene, M. W., et al. (1991). "Fractured knife blade--an incidental finding." Oral surgery, oral medicine, and oral pathology **72**(6): 758-759.

2014. Greene, W. R., et al. (2010). "Insurance status is a potent predictor of outcomes in both blunt and penetrating trauma." American journal of surgery **199**(4): 554-557.

BACKGROUND: Patients with penetrating injuries are known to have worse outcomes than those with blunt trauma. We hypothesize that within each injury mechanism there should be no outcome difference between insured and uninsured patients., METHODS: The National Trauma Data Bank version 7 was analyzed. Patients aged 65 years and older and burn patients were excluded. The insurance status was categorized as insured (private, government/military, or Medicaid) and uninsured. Multivariate analysis adjusted for insurance status, mechanism of injury, age, race, sex, injury severity score, shock, head injury, extremity injury, teaching hospital status, and year., RESULTS: A total of 1,203,243 patients were analyzed, with a mortality rate of 3.7%. The death rate was significantly higher in penetrating trauma patients versus blunt trauma patients (7.9% vs 3.0%; P < .001), and higher in the uninsured (5.3% vs 3.2%; P < .001). On multivariate analysis, uninsured patients had an increased odds of death than insured patients, in both penetrating and blunt trauma patients. Penetrating trauma patients with insurance still had a greater risk of death than blunt trauma patients without insurance., CONCLUSIONS: Insurance status is a potent predictor of outcome in both penetrating and blunt trauma.

2015. Greenhalgh, D. G., et al. (2013). "A ten-year experience with pediatric face grafts." Journal of burn care & research : official publication of the American Burn Association **34**(5): 576-584.

The authors reviewed their 10-year experience of performing face grafts in children with burns. They sought to compare different methods for aesthetic outcome and need for reconstruction. In addition, they determined the efficacy of using allograft skin or Integra as temporary covers. They performed a review of 160 pediatric patients who underwent acute facial excision and grafting for burns between 2000 and 2010. Of the 160 patients with a mean age of 5.8 +/- 4.8 years, 96 were males. The mean burn size was 39.4 +/- 24.61%, of which 36.5 +/- 25.4% was third degree. Overall length of stay was 72.1 days, intensive care unit length of stay was 44.2 days, and the mortality rate was 13.75%. Ninety patients had their entire face burned, 42 burned half, 15 burned their foreheads, and seven had other combinations. The interval between injury and grafting was 13.9 +/- 13.19 days. Sixty-three percent patients required one face graft, 23% had two, 8% had three, and 6% four or more. For their initial procedure, 105 patients underwent autografting, 28 had allografting, and 23 received Integra. The authors performed a two-stage procedure in 20.4% and a 1-day procedure in 79.6%. Ten patients had a contiguous "U-shaped" graft wrapped around the face. At least partial regrafting was performed in 21.1%. Allograft and Integra were used for massive burns (69.9 +/- 14.5%, 62.6 +/- 18.3%, respectively). Of these, 39% died, 17% developed an Integra infection, and 43% required regrafting before autografting. Overall, 24.5% of patients underwent facial reconstruction during their first admission, and 57.1% during subsequent admissions. No difference in the rate of reconstructive surgery was noted between patients receiving Integra or autografting. Autografting face burns as an initial, one-stage procedure works well. The "wrap-around" autograft leads to excellent cosmetic results. When there is a shortage of autograft, allograft or Integra are good options but Integra does not reduce the need for reconstructive surgery.

2016. Grela, M., et al. (2021). "Post-mortem analysis of gunshot wounds to the head and thorax in dogs by computed tomography, radiography and forensic necropsy." Medicine, science, and the law **61**(2): 105-113.

In view of the scarcity of literature data on the use of radiological imaging techniques in forensic veterinary medicine, while at the same time the number of reported crimes against animals involving the use of firearms is rising, this paper attempts to assess the usefulness of radiography and computed tomography (CT) in the post-mortem diagnosis of gunshot wounds (GSW) in comparison to classic necropsy. The design of the experiment was as follows: preparation of the research material (13 dog carcasses), shooting of the material from different distances (1.5 and 12 m, plus one contact shot to the head) and using different types of ammunition, followed by X-rays and CT scans in each case to examine the injuries resulting from the shot. The final steps of the experiment were photographic documentation and autopsy by the Virchow method. In the examined material, post-traumatic bone lesions and the presence of metallic foreign bodies were successfully imaged by both radiography and CT. GSW analysis using CT provided much better data quality and some additional information. Two general conclusions can be drawn from the results of the experiment. First, damage caused by gunshots is correlated with the calibre, initial velocity and kinetic energy of the projectile, as well as the distance from the muzzle of the gun to the object shot. Second, radiological examination is useful in preparing forensic veterinary opinions. Used as a complement to classic necropsy, they increase the possibility of an accurate post-mortem diagnosis of shooting victims.

2017. Grellner, W., et al. (2019). "Model cannons causing lethal traumata." Forensic science international **302**: 109853.

Model cannons are usually considered to be harmless toys; therefore no legal regulations are required. Nevertheless, suicidal intentions or playful experimentation can turn this toy into a lethal weapon. This paper describes two cases of misuse of model cannons, leading to severe injuries and consequently death: the first case was the result of a suicidal intention, where the cannon caused a bullet injury into the forehead with marked signs of close-firing and intensive brain damage. The second case was an accidental event, where the cannon induced an entry wound at the left chest wall with surrounding carbonization and a fatal rupture of the heart. Circumstances of the lethal situations and mechanisms of the cannons leading to fatal injuries including ballistic considerations are described. The report is supported by a thorough literature research.

2018. Gressot, L. V., et al. (2014). "Predictors of outcome in civilians with gunshot wounds to the head upon presentation." Journal of neurosurgery **121**(3): 645-652.

OBJECT: Prediction of outcome from initial presentation after a gunshot wound to the head (GSWH) is essential to further clinical decision making. The authors' goals are to report the survival and functional outcomes of these patients, to identify prognostic factors, and to propose a scoring system that can predict their outcome., METHODS: The records of 199 patients admitted with a GSWH with dural penetration between 1990 and 2008 were retrospectively reviewed. The inclusion criterion was a CT scan available for review. Patients declared brain dead on presentation were excluded, which yielded a series of 119 patients. Statistical analysis was performed using a logistic regression model., RESULTS: Fifty-eight (49%) of the 119 patients died. Twenty-three patients (19%) had a favorable outcome defined as a 6-month Glasgow Outcome Scale (GOS) score of moderate disability or good recovery, 35 (29%) had a poor outcome (GOS of persistent vegetative state or severe disability), and 3 (3%) were lost to follow-up. Significant prognostic factors for mortality were age older than 35 years, nonreactive pupils, bullet trajectory of bihemispheric (excluding bifrontal), and posterior fossa involvement compared with unihemispheric and bifrontal. Factors that were moderately associated with higher mortality included intracranial pressure (ICP) above 20 mm Hg and Glasgow Coma Scale (GCS) score at presentation of 3 or 4. Upon multivariate analysis, the significant factors for mortality were bullet trajectory and pupillary response. Variables found to be significant for good functional outcome were admission GCS score greater than or equal to 5, pupillary reactivity, and bullet trajectory of unihemispheric or bifrontal. Factors moderately associated with good outcome included age of 35 years or younger, initial ICP 20 mm Hg or lower, and lack of transventricular trajectory. In the multivariate analysis, significant factors for good functional outcome were bullet trajectory and pupillary response, with age moderately associated with improved functional outcomes. The authors also propose a scoring system to estimate survival and functional outcome., CONCLUSIONS: Age, pupils, GCS score, and bullet trajectory on CT scan can be used to determine likelihood of survival and good functional outcome. The authors advocate assessing

patients based on these parameters rather than pronouncing a poor prognosis and withholding aggressive resuscitation based upon low GCS score alone.

2019. Grewal, A. M., et al. (2021). "Long-term ophthalmic anatomical and functional outcomes after surgical removal of intraorbital foreign bodies." European journal of ophthalmology **31**(1): 263-270.

PURPOSE: To analyze the anatomical and functional ophthalmic parameters after the surgical removal of various intraorbital foreign bodies., METHODS: A retrospective analysis of medical records was performed featuring detailed history, ophthalmic examination, orbital computed tomographic scans, treatment details, and outcomes. The analyzed anatomical factors included extraocular movements, the position of the eyeball (proptosis, dystopia, and enophthalmos), and fullness of orbital sulci. The functional assessment was based on visual acuity, pupillary reactions, and diplopia. The outcomes were defined as complete, partial, and failure after a minimum follow-up of 1 year., RESULTS: Of 32 patients, the organic and inorganic intraorbital foreign bodies were surgically removed from 18 (56.25%) and 14 (43.75%) orbits, respectively. At presentation, anatomically the extraocular movement restriction, proptosis/dystopia/enophthalmos, and orbital sulcus fullness were noted in 26 (81.25%), 24 (75%), and 15 (46.88%), respectively. Functionally, diminished visual acuity, diplopia, and pupil abnormalities were seen in 27 (84.38%), 14 (43.75%), and 8 (25%), respectively. After intraorbital foreign body removal at a mean follow-up of 14 months, the improvement of anatomical factors (same sequence) were observed in 8 (30.77%), 20 (83.33%), and 12 (80%), respectively. In functional factors (same sequence), the improvement was noted in none (0%), 13 (92.86%), and 5 (62.5%), respectively. Hence, the majority of patients (n = 20, 62.5%) achieved partial success, while 8 (25%) had complete success. Four (12.5%) had treatment failure despite similar management protocols., CONCLUSION: The anatomical outcomes are better than the functional outcomes after surgical removal of the intraorbital foreign bodies. The visual acuity does not improve considerably after the surgical removal of intraorbital foreign bodies. Overall, the wooden intraorbital foreign bodies have poorer anatomical and functional prognosis.

2020. Griepp, R. B., et al. (1971). "The cardiac donor." Surgery, gynecology & obstetrics **133**(5): 792-798.

2021. Grieve, A. W. (2010). "Phineas P Gage - 'The man with the Iron bar'." Trauma **12**(3): 171-174.

Phineas P Gage was a railway construction workman who, in 1848, received a devastating penetrating head injury. A 4 ft long tamping iron was fired by accident through his skull destroying both frontal lobes. He survived the accident through luck, the care he received from colleagues at the scene and through medical care received from doctors. This article examines closely the injury pattern, prehospital care, trauma care and medical and psychiatric sequelae Gage received. © The Author(s), 2010.

2022. Griffin, A. T. and F. W. Arnold (2013). "An unusual etiology of post-traumatic meningitis." The American journal of the medical sciences **346**(4): 331-333.

Clostridium perfringens and related species are well-known culprits of post-traumatic soft tissue and bone infection. However, central nervous system involvement with these organisms spontaneously or subsequent to trauma is unusual. The authors reported a case of post-traumatic meningitis in which both C perfringens and Enterococcus faecium were isolated.

2023. Griffin, L. J. and J. V. Hickey (2012). "Penetrating head injury." Critical care nursing quarterly **35**(2): 144-150.

Traumatic brain injury affects more than 1 million civilians annually. Functional outcomes in this population are less than favorable. This case report describes a patient with a penetrating injury to the head and brain from a gunshot wound including the pathophysiology of injury and outlines evidence-based management guidelines to provide comprehensive care.

2024. Griffith-Ball, D. (2003). "Life-threatening fall." Pediatric nursing **29**(5): 372-374.

2025. Grigoras, I., et al. (2010). "Functional improvement between brain death declaration and organ harvesting." Transplantation proceedings **42**(1): 147-149.

INTRODUCTION: The quality of harvested organs is crucial for graft survival and for posttransplant evolution. This study sought to investigate the evolution of the functional status of brain death (BD) patients during the period between declaration and organ harvesting (BD duration)., MATERIALS AND METHODS: The study included all BD patients who underwent organ harvesting between January 2006 and June 2009. We compared the functional status regarding hemodynamics, respiration, kidney and liver function, coagulation, water, electrolytes, and acid-base balance evaluated at the moment of BD declaration (P1) and just before organ harvesting (P2). The results of the comparison were expressed as improvement, stable, or aggravation. We calculated mean values of the functional parameters in P1 and P2 and the statistical significance of the differences., RESULTS: Twelve BD patients were included in the study. The time interval between P1 and P2 was 16.08 +/- 8.54 hours (range, 6-32). The number of patients with vasopressor support was 9/12 at P1 and 0/12 at P2, oxygenation disturbances 1/12 in P1 and 0/12 in P2, renal dysfunction 9/12 in P1 and 2/12 in P2, liver dysfunction 7/12 in P1 and 1/12 in P2, coagulopathy 4/12 in P1 and 0/12 in P2, hypernatremia 8/12 in P1 and 3/12 in P2, and metabolic acidosis 9/12 in P1 and 1/12 in P2. The overall assessment showed improvement in all patients. The most statistically significant improvement was registered in the cardiovascular, respiratory, renal, liver, and acid-base status ($P < .05$)., CONCLUSION: With early, aggressive, protocolized donor management, functional improvement may be achieved during BD duration.

2026. Grigorian, A., et al. (2019). "Increased risk of head injury in pediatric patients with attention deficit hyperactivity disorder." Journal of child and adolescent psychiatric nursing : official publication of the Association of Child and Adolescent Psychiatric Nurses, Inc **32**(4): 171-176.

OBJECTIVE: The prevalence of attention deficit hyperactivity disorder (ADHD) in the general pediatric population is 7%, whereas the prevalence in trauma is unknown. We hypothesized pediatric patients with ADHD would have a higher risk of involvement in a mechanism of injury (MOI) requiring constant attention to surroundings, such as a bicycle collision., METHODS: The Pediatric Trauma Quality Improvement Program (2014-2016) was queried for patients with ADHD. Patients, less than 16 years of age, with ADHD were compared to those without ADHD., RESULTS: The prevalence of ADHD was 2.5% (2,866). ADHD patients had higher risk for bicycle collision (odds ratio [OR], 1.85; 95% confidence interval [CI], 1.59-2.15; $p < .001$). ADHD bicyclists were less likely to wear a helmet (9.4% vs. 18.2%, $p = .003$) and had a higher rate of traumatic brain injury (TBI; 55.6% vs. 39.7%, $p < .001$), compared to non-ADHD bicyclists., CONCLUSIONS: Pediatric ADHD patients have a 60% higher risk of being involved in a bicycle collision. ADHD patients that are involved in a bicycle collision are less likely to wear a helmet with a higher rate of TBI. Increased public awareness, education, and supervision may help reduce risk of bicycle collisions and TBI in this population.

2027. Grimes, W. R., et al. (1988). "Shotgun wounds involving the head and neck." American journal of surgery **155**(6): 776-779.

Since limited information is available on the management and spectrum of injuries sustained by patients with shotgun wounds to the head and neck, we reviewed the records of 26 patients with shotgun wounds involving the head and neck region. Fifty-four percent of these patients had associated injuries involving the trunk or extremities, and 43 percent of these patients required repair of these associated injuries. Overall, 23 percent of patients with shotgun wounds of the head and neck region had injuries of other anatomic areas that required operative treatment. In these patients, the major life-threatening injuries were not related to the head and neck region but were related to injuries of other anatomic areas. By stratifying the patients according to the anatomic pattern of injury (point blank, close range, or long range) and their hemodynamic status on presentation to the emergency room, it was possible to predict the need for surgery as well as the risk of death.

2028. Grindlinger, G. A., et al. (1987). "Acute paranasal sinusitis related to nasotracheal intubation of head-injured patients." Critical care medicine **15**(3): 214-217.

One hundred eleven head-injured patients were examined for paranasal sinusitis during early convalescence. Glascow coma scale (GCS) was less than 8 in 79 patients. Ninety-three patients had sustained blunt injuries, and 18 had penetrating ones. Sixty-five orotracheal intubations (OTI) and 31 nasotracheal intubations (NTI) were performed at the

scene or on hospital arrival. Fifteen patients were not tracheally intubated. Paranasal sinus air fluid levels (AFL) were present in 30 patients on their admitting computerized tomography scans. Paranasal sinusitis developed in 19 patients with a mean GCS of 5.4 +/- 3.3 (SD). Sixteen of the 19 had NTI, and three had OTI (p less than .05). Of 30 patients with AFL, sinusitis occurred in 13. Ten of these 13 had NTI, and three had OTI (p less than .05). Penetrating injury did not increase the risk of sinusitis (p greater than .1). Seventeen of the 19 infections were polymicrobial. Sinusitis after head trauma is related to NTI, AFL, and severity of head injury.

2029. Grindlinger, G. A., et al. (2016). "Decompressive craniectomy for severe traumatic brain injury: clinical study, literature review and meta-analysis." SpringerPlus **5**(1): 1605.

OBJECTIVE: To examine the clinical and neurological outcome of patients who sustained a severe non-penetrating traumatic brain injury (TBI) and underwent unilateral decompressive craniectomy (DC) for refractory intracranial hypertension., DESIGN: Single center, retrospective, observational., SETTING: Level I Trauma Center in Portland, Maine., PATIENTS: 31 patients aged 16-72 of either sex who sustained a severe, non-penetrating TBI and underwent a unilateral DC for evacuation of parenchymal or extra-axial hematoma or for failure of medical therapy to control intracranial pressure (ICP)., INTERVENTIONS: Review of the electronic medical record of patients undergoing DC for severe TBI and assessment of extended Glasgow Outcome Score (e-GOS) at 6-months following DC., MEASUREMENTS AND MAIN RESULTS: The mean age was 39.3y +/- 14.5. The initial GCS was 5.8 +/- 3.2, and the ISS was 29.7 +/- 6.3. Twenty-two patients underwent DC within the first 24 h, two within the next 24 h and seven between the 3rd and 7th day post injury. The pre-DC ICP was 30.7 +/- 10.3 and the ICP was 12.1 +/- 6.2 post-DC. Cranioplasty was performed in all surviving patients 1-4 months post-DC. Of the 29 survivors following DC, the e-GOS was 8 in seven patients, and 7 in ten patients. The e-GOS was 5-6 in 6 others. Of the 6 survivors with poor outcomes (e-GOS = 2-4), five were the initial patients in the series., CONCLUSIONS: In patients with intractable cerebral hypertension following TBI, unilateral DC in concert with practice guideline directed brain resuscitation is associated with good functional outcome and acceptable-mortality.

2030. Griva, F., et al. (2000). "Spontaneous movement of a metallic intracranial foreign body: case report." Surgical neurology **54**(3): 267-269.

2031. Grobbelaar, A. and J. D. Knottenbelt (1991). "Retained knife blades in stab wounds of the face: is simple withdrawal safe?" Injury **22**(1): 29-31.

A retained knife blade following a stab wound to the face is an uncommon injury that may give anxiety to the doctor managing the case. In 11 patients presenting with retained blades, simple withdrawal was associated with no untoward effect. In two patients the blade was not visible from the outside. The authors recommend that patients presenting with stab wound of the face are radiographed before discharge.

2032. Grocott, H. P. (2014). "Cerebral Oximetry: Better monitoring, improved patient outcomes, both or neither?" Applied Cardiopulmonary Pathophysiology **17**(2): 15-20.

Utilizing some of the same general principles as ubiquitously available and standard of care pulse oximetry, cerebral oximetry is increasingly becoming adopted into cardiovascular (and non-cardiovascular) anaesthetic and critical care practice. Though far from becoming a standard of care itself, the increasingly available information outlining its potential utility in optimizing peri-operative management warrants a careful examination of both its current status and future directions. Cerebral oximetry had its early beginnings in the 1980s with the work of Jöbsis and colleagues. By using multi-wavelength light sources in the near infrared range, these investigators demonstrated the utility of exploiting the ability of the differential absorption of oxygenated and de-oxygenated haemoglobin of these wavelengths in brain (and possibly other) tissue. Differing from pulse oximetry, that discriminates between the pulsatile (i.e. arterial) from non-pulsatile (venous) components in order to calculate arterial saturation, tissue oximetry integrates both signals to give a mixed (in an approximately 3:1 ratio of venous to arterial blood) overall tissue oximetric signal. As opposed to pulse oximetry, this provides a signal regardless of the presence of any pulsatility (ideal in low flow conditions, as well as the relatively non-pulsatile situation of CPB) resulting in an overall oxygen saturation signal of all the blood contained within the interrogated tissue. In the case of the brain, the penetration of photons is likely limited to within 15-20 mm of

the brain surface. This does significantly limit the spatial resolution of the device by only providing information in the most superficial area of the frontal lobe. By integrating this oximetric data and comparing it to validated direct measurements of jugular venous saturation, these devices (with now at least 4 commercial devices on the market worldwide and 3 available in North America), produce a continuous output of tissue (i.e. brain) oxygen saturation. This saturation information can then be integrated with our understanding of oxygenation delivery and utilization conditions to allow modifications to made in peri-operative physiologic conditions with the aim of optimizing overall tissue oxygenation, and ideally, corresponding end-organ function and outcome. However, despite extensive publications (now numbering in the hundreds) highlighting various case reports, observational studies and a few very modestly sized randomized trials, we are far from understanding how this technology can influence neurologic outcome, yet alone overall peri-operative outcomes. A few of these publications are highlighted further on in this text and in the suggested readings at the end of this summary. This list is by no means comprehensive, but it does outline some of the more influential papers in the field. Despite approval by regulatory authorities, the FDA (and other national regulatory bodies) does not require these devices (as opposed to pharmaceuticals) to be linked to an improvement in patient outcome. These devices need only be shown to validly determine the measurements that they claim to measure. That is, they only need demonstrate that they validly measure actual tissue oxygenation, with no proof required that by measuring this (and/or intervening to modify it) that they can improve outcome. This is the irony of the technology approval pathway (as opposed to pharmaceutical approval). That said, those who intermittently (and many who routinely) utilize these devices repeatedly have developed their own understanding of the potential utility of cerebral oximetry and provide case after case of anecdotal evidence of how these devices have averted certain catastrophe. However, these sorts of endorsements are clearly insufficient to confidently warrant wide-scale adoption of this technology. However, proponents of a more wide spread adoption, point to other technologies that we currently cannot do without (such as pulse oximetry) that have never undergone the same scrutiny for which cereb al oximetry is now being considered. It is clear that pulse oximetry has never been demonstrated in a large randomized double blind controlled clinical trial to improve outcome, yet none of us could advocate not using it. The same type of grandfathering process that led to the current use of pulse oximetry will not be afforded to other technologies and it is now in the hands of clinicians, academics, researchers, and device companies to prove the true worth of these devices. We have a history in peri-operative medicine and anaesthesia, of failing to properly examine clinical utility of the devices we now integrate into our everyday practice although we as a specialty are not unique since other specialties also lack the timely yet rigorous evaluation of technologies and interventions. No better an example of this is with BIS technology. Despite its wide availability for almost 15 years, we have only recently undertaken the needed large-scale clinical trials to truly evaluate the utility of its initial stated purpose. If we don't learn from these examples, we will soon be in the same position with cerebral oximetry. In fact, in many respects we are already there, as commercially available oximetric devices have been available since the mid to late 1990s. Complicating the issue of technology utility is the apparent differences in the various devices that are now available. Extrapolating information (and utility) derived from one device, is not necessarily applicable to similar, though subtly different devices. Arguing against this device specific evaluation is again the example of the pulse oximeter where none of us could confidently dismiss a saturation signal from one pulse oximeter manufacturer over the other. Clearly there are subtle differences in these pulse oximetry devices (such as how they deal with artifact induced by movement and low flow states), but essentially pulse oximetry is pulse oximetry, despite which manufacturer has his name on it. It is likely too early, however, to say the same for the 4 devices (and likely more to come) that are now on the market. This makes the design of clinical trials somewhat difficult as until equivalency is determined, we are handicapped in designing trials that should probably have uniformity of technology. As compelling an argument one can make at the present moment for the use of these devices (I personally would not like to do a case without the information that it provides me, though this is clearly an opinion not based on solid scientific grounds), we need hard scientific data to definitely prove this point and outline how best to manage patients. A further handicap is that no technology can improve outcome without being linked to a management strategy. We are still in our relative infancy in understanding how to intervene based on the information that these devices provide for us. Although interventional algorithms (such as the one proposed by Denault et al) have been suggested, they have not yet been subjected to the rigor of corroborative clinical trials. The rationale for using cerebral oximetry developed from multiple sources, an example of which was data from Croughwell et al based on the relationship between jugular bulb desaturation and clinical outcome. However, the invasiveness of jugular bulb saturation and other logistical difficulties have limited its use, making a non-invasive option that can capture some of the same information highly desirable. Cerebral oximeter devices were first used to focus on brain injury after cardiac surgery. As there had been well described pattern of brain injury in this area since the advent of cardiac surgery, to have a monitor to determine when these injurious events occurred was clearly advantageous. What followed in the literature was a logical time course and

pattern with observational and anecdotal case reports of the use of these devices. One of the first of many observational studies published was by Yao et al who reported an observational trial focusing on the relationship between the degree of cerebral desaturation a d functional brain outcome. Specifically, they examined the integral accounting for the amount of time and degree of cerebral desaturation compared to the postoperative mental status examination (MMSE) and other indices of frontal lobe function. What these investigators demonstrated was that the more severe the desaturation the patients experienced, the more impaired their cognitive function was. Numerous case reports continued the discussion of potential overall clinical utility of this device. Because of its fast signal response time, it rapidly became a user friendly (as compared to invasive jugular venous saturation and tedious TCD) monitor of cerebral perfusion, in particular, being excellent at interrogating the symmetry of perfusion across the brain. Without doubt, numerous catastrophic intra-operative events were avoided by the use of this device by the early recognition of perfusion abnormalities in the brain. Both in the adult as well as in the paediatric literature, these types of anecdotal case reports are increasingly prevalent. However, it has only been relatively recently that randomized controlled data specifically defining the utility of cerebral oximetry have been published. Murkin et al published a trial of 200 patients in which an interventional strategy was utilized to maintain the cerebral saturation signals within 75% of their baseline reading. This interventional strategy was based upon optimizing both oxygen supply and utilization in the brain. For example, following establishment of the baseline reading (an initial step in utilizing cerebral oximetry), the investigators instituted an interventional algorithm if the patient's saturation dropped 20% from their baseline. This intervention included ruling out mechanical causes such as cannula malplacement or jugular venous impingement due to head position, and followed with techniques to optimize oxygen supply to the brain. For example, if patients were hypocapnic, PaCO2 was returned to a normal level. In addition, the mean arterial pressure (MAP) was increased modestly, and as well, there were increases in FiO2. If these parameters failed to return the saturation to normal, and if there was significant anaemia, the patients were transfused to improve oxygen carrying capacity. If these efforts to improve oxygen delivery failed, additional methods to suppress cerebral oxygen metabolism were used including administration of additional propofol and modest cooling. This management strategy has been further elucidated by Denault and colleagues. Although the Murkin et al study was not adequately powered to examine neurological outcome (i.e. stroke) the results did demonstrate a trend toward the stroke reduction in patients that were managed with the interventional algorithm. However, what was unique about the study was that not only was there a trend toward an improvement in neurologic outcome, but that there was an improvement in an overall organ outcome as identified by reduction in major organ morbidity. Indeed, this study described that the use of these technologies may have come full circle from only examining brain perfusion (as a means to improve neurologic outcome) to the point of monitoring brain perfusion as an index organ for overall organ function. Interestingly, Murkin et al suggested that the brain simply represents an index organ for overall tissue perfusion. This is partly correct as it is the only major organ that is within reach of the light sources that these devices utilize. However, in some respects its unique protective mechanisms (i.e. autoregulation) make it the last organ to be compromised in a situation of impaired blood flow and oxygenation. It is exactly the opposite of the 'canary in the coal mine' in that its oxygenation status is maintained long after other organs (such as those perfused by the splanchnic vasculature) have been compromised. Thus, although it is probably important to maintain its saturation, covert tissue compromise is likely occurring frequently despite our confidence that we are doing all the right th ngs. This probably accounts for the lack of robust correlation to overall outcome. More recently, Slater et al have also studied the use of cerebral oximetry in cardiac surgery. 265 patients undergoing cardiopulmonary bypass were randomized to either be blinded to cerebral oximetry or unblinded with the aforementioned interventions if cerebral saturations (rSO2) dropped below 20% of baseline. Neurocognitive testing was performed pre-operatively, prior to hospital discharge, and at 3 months. Although the incidence of neurocognitive dysfunction was not decreased in the treatment group (59% vs. 61%), they did find a correlation between prolonged cerebral desaturation below 50% (i.e. 25% below baseline) and increased risk of neurocognitive decline. An rSO2 desaturation score was calculated as the length of time each patient's rSO2 was below 50%. An rSO2 score greater than 3,000%-second below 50% was seen in 33% of patients with postoperative cognitive decline compared to 20% of patients with no decline (P = 0.024). When multivariate analyses were performed, there was a trend towards decreased cognitive decline in the intervention group (OR = 0.81, 95% C.I. 0.46-1.43), but this was not statistically significant (P = 0.47). The authors suggest that the failure to see a treatment effect may have been the result of poor compliance with the protocol when an intraoperative rSO2 desaturation was encountered. Although the study was not powered to study length of hospital stay, they found a significant correlation between prolonged rSO2 desaturation and hospital stay greater than 6 days (OR 2.71, 95% C.I. 1.31-5.60, P = 0.07), which may also add to the data that cerebral oximetry may be a surrogate marker for overall end organ perfusion/oxygenation. There are probably a limited number of clinical situations where there is a distinctly robust relationship of oximetric data to outcome. One of these is in the use of cerebral oximetry for monitoring the

symmetry of brain blood flow during antegrade selective cerebral perfusion (such as during hypothermic circulatory arrest for aortic arch surgery). I would argue that this is the best, most user friendly (certainly compared to transcranial Doppler) and pertinent monitor one can use in this situation. However, due to the limited numbers of these cases, it is unlikely that his will be proven in a large-scale clinical trial. However, it remains an essential monitoring apparatus for these cases. Although most of the studies reported have been in cardiac surgical patients, Casati et al studied cerebral oximetry in an elderly general surgical population, again demonstrating that improvements in neurologic outcome (i.e. postoperative cognitive dysfunction) could be reduced if this type of monitor was used with a similar type interventional strategy. So where are we now, and where do we need to go? We have such compelling data that at this point, I contend that it would do our patients a disservice to abandon (due to the lack of definitive supportive data) this technology. Similarly, it would be a great disservice not to do the work to definitely prove its overall utility. Getting there, however, will take a very well defined and progressive approach that needs to answer in a step-wise fashion, a number of smaller, but contributory questions. I believe that despite its wide availability, we are in the relative infancy in the life of cerebral oximetry as a peri-operative monitor.

2033. Groh, E. M., et al. (2018). "Temporal variations in pediatric trauma: Rationale for altered resource utilization." American Surgeon **84**(6): 820-825.

Trauma is a major cause of morbidity and mortality in the pediatric population. However, temporal variations of trauma have not been well characterized and may have implications for appropriate allocation of hospital resources. Data from patients evaluated at an ACS-verified Level I pediatric trauma center between 2011 and 2015 were retrospectively analyzed. Date and time of injury, type of injury (blunt vs penetrating), and postemergency department disposition were reviewed. To assess temporal trends, heatmaps were constructed and a mixed poisson regression model was used to assess statistical significance. Pediatric trauma from blunt and penetrating injuries occurred at significantly higher rates between the hours of 1800 and 0100, on weekends compared with weekdays, and from May to August compared with November to February. These data provide useful information for hospital resource utilization. The emergency department, operating room, and intensive care unit should be prepared for increased trauma-related volume between May and August, weekends, and evening hours by appropriately increasing staff volume and resource availability.

2034. Grondin, C., et al. (2018). "[Chorioretinis sclopetaria]." Chorioretinite sclopetaria. **41**(5): e197-e199.

2035. Grossbach, A. J., et al. (2014). "Impalement brain injury from steel rod causing injury to jugular bulb: case report and review of the literature." Brain injury **28**(12): 1617-1621.

BACKGROUND: The management of impalement penetrating brain injuries (IPBI) from non-missile objects is extremely challenging, especially when vascular structures are involved. Cerebral angiography is a crucial tool in initial evaluation to assess for vascular injury as standard non-invasive imaging modalities are limited by foreign body artifact, especially for metallic objects., CASE STUDY: This study reports a case of an IPBI caused by a segment of steel rebar resulting in injury to the left jugular bulb and posterior temporal lobe. It describes the initial presentation, radiology, management and outcome in this patient and reviews the literature of similar injuries.

2036. Grosse Perdekamp, M., et al. (2008). "Patterned imprint mark due to the folded shoulder stock: a possible finding in contact shots from submachine guns." Forensic science international **178**(1): e1-5.

The muzzle imprint (barrel mark) is a pressure abrasion typically associated with contact shots. Apart from the contours of the actual muzzle profile, other constructional parts such as the front sight and/or the recoil spring guide of semiautomatic pistols may be imprinted next to the bullet entrance wound. In some types of submachine guns the shoulder stock can be folded forward so that its end partly encircles the muzzle. If such a weapon was in contact with the skin at the instant of discharge, a corresponding contusion mark is to be expected. The imprint configuration may point to the type of weapon and to the way in which the gun had been held when firing the shot. The paper presents the injury pattern in a 36-year-old man who committed suicide with a Scorpion SA Vz 61 submachine gun cal. 7.65mm Browning from former Czechoslovakia.

2037. Grosse Perdekamp, M., et al. (2011). "Two-gun suicide by simultaneous shots to the head: interdisciplinary reconstruction on the basis of scene investigation, autopsy findings, GSR analysis and examination of firearms, bullets and cartridge cases." International journal of legal medicine **125**(4): 479-485.

Suicidal shots fired simultaneously to the head from two handguns are rare. The authors report about a recent case in which a Smith & Wesson cal. 9 mm pistol and a Smith & Wesson cal. .357 Magnum revolver were used. Sitting on a sofa, a 33-year-old man (member of a shooting club) fired two simultaneous shots to the head; the pistol held in the left hand was discharged into the left temple, and the revolver held in the right hand was fired into the mouth. Both weapons remained in the respective hands. An upside-down muzzle imprint in the left temporal region and recoil injuries of a mandibular incisor, and the lower lip indicated that both the pistol and the revolver had been held in an inverted manner at the time of discharge. Blood stains (backspatter) and gunshot residues were present on both firing hands, whereas forward spatter originating from the exit wounds was deposited on the wall behind the suicide's head.

2038. Grosse Perdekamp, M., et al. (2001). "[Mandibular fracture caused by absolute close-range gunshot with a blank cartridge fright weapon]." Unterkieferfraktur durch absoluten Nahschuss mit einer Schreckschusswaffe. **208**(3-4): 88-95.

Bony injuries caused by starter's pistols were repeatedly observed in the form of fractures of the temporal squama and other thin osseous lamellae; in experiments rib fractures could also be produced. In the presented case a contact shot from a blank cartridge pistol caused a fracture of the lower jaw (transverse fracture with a bone fragment split off in reg. 46). The friend of the 17-year-old victim had fired a shot to the right mandibular region during an argument. In the depth of the gunshot entrance wound, which communicated with the oral cavity, intense soot deposits were found as signs of the contact shot.

2039. Grossman, A., et al. (2006). "PET scan as an aid for the return of a head-injured aviator to flying duty." Aviation, space, and environmental medicine **77**(10): 1080-1082.

Head injury is not a rare event in aviators, and poses a difficult dilemma for the flight surgeon regarding return to flying duty due to the fear of post-traumatic epilepsy. Positron emission tomography (PET) is a functional neuroimaging modality that provides additional localizing data in epileptic patients in the interictal phase. We describe a case of penetrating head trauma with no loss of consciousness in a military jet fighter pilot in which the magnetic resonance imaging revealed a minimal brain contusion. PET scan was used as an additional tool for predicting the epileptogenic potential of this finding, thus aiding the decision regarding the return of the aviator to flying duty.

2040. Grossman, R., et al. (2012). "Persistent region-dependent neuroinflammation, NMDA receptor loss and atrophy in an animal model of penetrating brain injury." Future neurology **7**(3): 329-339.

Dynamic changes in neuroinflammation and glutamate NMDA receptors (NMDAR) have been noted in traumatic and ischemic brain injury., AIM: Here we investigate the time course and regional distribution of these changes and their relationship with atrophy in a rat model of penetrating brain injury., MATERIALS METHODS: Quantitative autoradiography, with the neuroinflammation marker [3H]PK11195 and the NMDAR antagonist [125I]iodoMK801, was performed on brains of animals subjected to a unilateral wireknife injury at the level of striatum and killed 3 - 60 days later. Regional atrophy was measured by morphometry., RESULTS: The injury produced large increases in [3H]PK11195 binding density in cortical and septal regions adjacent to the knife track by day 7, with modest increases in the striatum. [125I]iodoMK801 binding was reduced in cor tical and hippocampal regions showing marked neuroinflammation, which showed marked atrophy at subsequent time points., CONCLUSION: These results indicate that neuroinflammaton and loss of NMDAR precede and predict tissue atrophy in cortical and hippocampal regions.

2041. Grosso, A. (2021). "The Influence of Extrinsic Variation in Gunshot Wounds in a U.S. Civil War Skeletal Sample." FASEB Journal **35**(SUPPL 1).

Most gunshot studies focus on the propagation of fractures on the cranium or the midshaft of a long bone. However, bone closer to the joint is structurally different from the shaft. Here, I analyzed the morphology of fracture patterns from gunshot wounds to the distal femora of U.S. Civil War soldiers. The individual sample (n=34) of distal femora was obtained from the Civil War Skeletal Collection at the National Museum of Health and Medicine (Silver

Spring, MD). Variables collected included fracture counts, average fracture lengths, combined fracture lengths, location on the femur, registered age of the soldier, and their epiphyseal fusion status. The value in a U.S. Civil War skeletal sample is that the individuals it contains are relatively homogenous in terms of age, sex, ancestry, diet, and lifestyle. The projectiles involved were most commonly “minni balls;” many of which are preserved with the associated skeletal remains. Most of the variation in injury pattern is primarily related to extrinsic variables, such as distance from shooter, interruptions in projectile trajectory, and size, shape, or velocity of the impacting projectile at the time of contact. Intrinsic variables may still play a role, such as the amount of soft tissue present and impact location (indirect or direct contact). All measured individuals were male, with an average age of 24.18±6.84yrs. There was no correlation between age and combined fracture length. The average number of bone fragments and fractures counted were 3.59±2.89 and 7.26±3.94, respectively. The average fracture length was 44.80±19.95mm, with an average combined fracture length of 339.68±207.36mm. A limitation here is that these samples were collected via limb amputation, so some of the fractures extending proximally are incomplete. Interestingly, 7 individuals had an epiphyseal fusion score of 1 or 2 (with 4 being completely fused), with 2 instances in individuals aged 23 and 24yrs. In instances of unfused epiphyses, fractures that initiated in the epiphysis did not propagate into the diaphysis. The results of this study contribute to the understanding of how extrinsically introduced variation may affect what we see and interpret in gunshot wounds as more and longer fractures are usually associated with “higher velocity projectiles.” This study also noted the importance of epiphyseal fusion on ballistic analysis to long bones, but continued research is needed in this area to fully understand this phenomenon.

2042. Groswasser, Z., et al. (2002). "Quantitative imaging in late TBI. Part II: cognition and work after closed and penetrating head injury: a report of the Vietnam head injury study." Brain injury **16**(8): 681-690.

CONTEXT: Functional outcome in relation to CT findings in traumatic brain injured (TBI) patients is not well established in relation to cognitive and vocational outcome., OBJECTIVE: To investigate the possible correlation between relatively simple quantitative radiological measurements and cognitive and vocational outcome., DESIGN: Retrospective analysis of quantitative assessment of CT studies in relation to post-injury cognitive changes and vocational outcome., SETTING: US Army Medical Centre., PATIENTS: 74 penetrating head injured (PHI) and 37 closed head injured (CHI) Vietnam war veterans., OUTCOME MEASURES: The Armed Forces Qualification Test (AFQT); Disability score; Return to work., RESULTS: Total brain volume loss, third ventricle width (3VW), ventricular score (VS), and septum-caudate distance (SCD) were significantly related to cognitive change and return to work in PHI patients. Volume loss and 3VW were the most valuable radiologic predictors of outcome in multivariate linear and logistic regression models for both CHI and PHI., CONCLUSION: 3VW on late CT scans following traumatic brain injury is a powerful predictor of overall long-term cognitive outcomes and potential for return to work.

2043. Grove, A. S., Jr. (1982). "Computed tomography in the management of orbital trauma." Ophthalmology **89**(5): 433-440.

Computed tomography (CT scanning) is a valuable aid in the management of orbital trauma because it provides a method of visualizing tissues and objects of many different densities. CT scanning can be used to study orbital fractures in order to suggest the prognosis for improvement of ocular malpositions after surgery. The extent of fractures and the etiology of many soft tissue abnormalities can be determined by this technique. Foreign bodies can be accurately localized so that the approach to their removal can be planned.

2044. Grove, A. S., Jr. (1982). "Orbital trauma evaluation by computed tomography." International ophthalmology clinics **22**(4): 133-153.

2045. Gruen, M. B., et al. (1999). "Civil war head injury and twentieth-century treatment." The Journal of trauma **47**(1): 151-153.

2046. Grumme, T. and E. Kazner (1986). "[Penetrating craniocerebral injuries]." Penetrierende Schadel-Hirn-Verletzungen. **57**(11): 674-678.

2047. Grundfast, K. M., et al. (1990). "Diverse etiologies of facial paralysis in children." International journal of pediatric otorhinolaryngology **19**(3): 223-239.

Facial paralysis (FP) in children is most often idiopathic, however, many diverse and identifiable etiologies exist. Twenty-five cases of children admitted consecutively to the Children's National Medical Center over 8.5 years for the evaluation of FP were reviewed retrospectively. In 21 (84%) of the patients the FP was discovered to be secondary to a specific etiology or associated with a recognizable syndrome. In 7 cases, the FP was an initial manifestation of a serious underlying disorder. Causes of the FP in this series include: otitis media, mastoiditis, temporal lobe abscess, osteopetrosis, both blunt and penetrating trauma, iatrogenic surgical injury, facial burns, cerebellar astrocytoma, leukemia rhabdomyosarcoma, intracerebral arteriovenous malformation, Goldenhar syndrome, and Melkersson-Rosenthal syndrome. Four (16%) patients were diagnosed as having Bell's palsy. Methods of management, including the use of electrodiagnostic testing are described.

2048. Grunsfeld, A. A. and I. S. Login (2006). "Abulia following penetrating brain injury during endoscopic sinus surgery with disruption of the anterior cingulate circuit: case report." BMC neurology **6**: 4.

BACKGROUND: It is common knowledge that the frontal lobes mediate complex human behavior and that damage to these regions can cause executive dysfunction, apathy, disinhibition and personality changes. However, it is less well known that subcortical structures such as the caudate and thalamus are part of functionally segregated fronto-subcortical circuits, that can also alter behavior after injury. CASE PRESENTATION We present a 57 year old woman who suffered penetrating brain injury during endoscopic sinus surgery causing right basal ganglia injury which resulted in an abulic syndrome., CONCLUSION: Abulia does not result solely from cortical injury but can occur after disruption anywhere in the anterior cingulate circuit--in the case of our patient, most prominently at the right caudate.

2049. Grusha, I. O., et al. (2006). "[Air-gun wound of the orbit (a clinical case)]." Vestnik oftalmologii **122**(4): 45-46.

2050. Gruss, J. S., et al. (1991). "Early definitive bone and soft-tissue reconstruction of major gunshot wounds of the face." Plastic and reconstructive surgery **87**(3): 436-450.

The use of craniofacial surgical techniques, extended open reduction, rigid fixation with plates and screws, and the replacement of severely damaged or missing bone with immediate bone grafting in the treatment of complex facial fractures has been applied to the management of severe gunshot wounds of the face. Early definitive bone and soft-tissue reconstruction has been performed in 37 patients. One-hundred and seventy-seven primary bone grafts were utilized in 33 patients for orbital, nasal, zygomatic, and maxillary reconstruction. Twenty-six patients required mandibular repair with compression or reconstruction plates. Soft-tissue reconstruction was provided by a combination of flaps. Four patients had extensive soft-tissue loss replaced by free vascularized omental flaps. The omentum provided circumferential coverage of the mandibular reconstruction and reconstruction of the floor of the mouth and was then tunneled in a circle through both cheeks into the middle and upper face. The omentum reconstructed deficits in the hard palate and upper buccal sulcus and was then wrapped around all zygomatic, orbital, and midfacial bone grafts and used to fill in dead space in the maxillary, ethmoid, and frontal sinuses. The omentum is not used to provide contour and bulk, but to cover bone grafts and plates and fill in dead space. Carefully shaped bone grafts provide the correct craniofacial scaffold. Early restoration of a midfacial bony scaffold and the prevention of soft-tissue contraction facilitate secondary reconstruction. Four late total nasal reconstructions with tissue-expanded forehead skin wrapped around bone grafts were performed.

2051. Guazzo, E. P. (1994). "Spontaneous migration of airgun pellet in the brain." Journal of neurology, neurosurgery, and psychiatry **57**(4): 404.

2052. Guckel, C. (1988). "[Possible computed tomographic and magnetic resonance tomographic detection of wood foreign bodies following perforating eye injuries]." Computertomographische und kernspintomographische Nachweismoglichkeit holzerner Fremdkorper nach perforierender Augenverletzung. **28**(7): 334-337.

After perforating eye injury the retention of a foreign body in the orbits has to be excluded. Wooden foreign bodies mostly have negative density on CT, which increases later as a result of granulomatous changes. On MRI, pieces of wood appear with low signal intensity, and only in some cases is a collar-shaped structure recognizable, allowing differentiation from gas. Soon after orbital trauma with splinters of wood, therefore CT allows better differentiation of pieces of wood from intraorbital gas by measurement of their density, whereas MRI, makes it possible to demonstrate wooden foreign bodies in older injuries in spite of granulomatous changes.

2053. Guehl, N. J., et al. (2021). "Evaluation of the potassium channel tracer [18F]3F4AP in rhesus macaques." Journal of cerebral blood flow and metabolism : official journal of the International Society of Cerebral Blood Flow and Metabolism **41**(7): 1721-1733.

Demyelination causes slowed or failed neuronal conduction and is a driver of disability in multiple sclerosis and other neurological diseases. Currently, the gold standard for imaging demyelination is MRI, but despite its high spatial resolution and sensitivity to demyelinated lesions, it remains challenging to obtain specific and quantitative measures of molecular changes involved in demyelination. To understand the contribution of demyelination in different diseases and to assess the efficacy of myelin-repair therapies, it is critical to develop new in vivo imaging tools sensitive to changes induced by demyelination. Upon demyelination, axonal K+ channels, normally located underneath the myelin sheath, become exposed and increase in expression, causing impaired conduction. Here, we investigate the properties of the K+ channel PET tracer [18F]3F4AP in primates and its sensitivity to a focal brain injury that occurred three years prior to imaging. [18F]3F4AP exhibited favorable properties for brain imaging including high brain penetration, high metabolic stability, high plasma availability, high reproducibility, high specificity, and fast kinetics. [18F]3F4AP showed preferential binding in areas of low myelin content as well as in the previously injured area. Sensitivity of [18F]3F4AP for the focal brain injury was higher than [18F]FDG, [11C]PiB, and [11C]PBR28, and compared favorably to currently used MRI methods.

2054. Guekht, A., et al. (2012). "Disorders of brain nitrergic system in the mechanisms of early seizures after ischemic and hemorrhagic stroke." Epilepsy Currents **12**(1).

Rationale: Early poststroke seizures (EPS) occur in 5-10% of stroke patients, more commonly after intracerebral hemorrhage than infarction. EPS are thought to result from cellular biochemical dysfunction leading to electrically irritable tissue. The molecular mechanisms of EPS remain obscure. Pleiotropic effects of nitric oxide proved to be important in stroke. We hypothesized that disorders of brain nitrergic system may play a role in the development of EPS. Methods: In 48 patients with the first-ever stroke (hemorrhagic/ ischemic: 22/26, in each group 50% with EPS) and 10 age-and gender matched controls we studied CSF levels of nitric oxide metabolites, nitrates, and nitrites (NOx), nitric oxide synthase (NOS) activity, products of nitrosative stress, immunoglobulins, and autoantibodies to nitrated proteins in the CSF of patients during the first day after stroke onset. NOS activity was assayed by conversion of radiolabeled arginine to citrulline, NOx levels - using a fluorescent probe diaminonaphtalene. The activity of lactate dehydrogenase (LDH) was assayed by a fluorometric method. Binding of nitrotyrosine-BSA with liquor proteins was assayed by ELISA with the use of a monoclonal antinitrotyrosine antibody. Results: There was a significant increase of NOx level in CSF of ischemic stroke (IS) patients without EPS (5,5±0,64 vs. 2,2±0,43 μmol/l in controls, P<0.01). This phenomenon is believed to reflect compensatory activation of endothelial NOS (eNOS) in cerebral vessels to ensure vasodilatation. Since patients with EPS did not demonstrate NOx increase (2,6±0,40 μmol/l,), we hypothesized that an eNOS defect can underlie EPS after ischemic event. Hemorrhagic stroke (HS) patients with and without EPS demonstrated NOx levels similar to the controls. However, the activity of NOS, virtually absent in the control group, was significant in CSF of patients with HS (p<0.001 vs controls, p< 0.05 in patients with EPS vs without EPS). As release of LDH into the CSF after HS was also significantly higher as compared to controls and correlated with NOS activity (r=0.72, p<0.05) we suggested that NOS is released into CSF from damaged brain cells or cells penetrating damaged blood-brain barrier. In the CSF of stroke patients, the content of immunoglobulins (Ig) of G, M, and A classes was significantly elevated. This increase was more pronounced in patients with HS. Binding to nitrotyrosine-BSA was increased in IS and was substantially higher in HS. Structural modifications of proteins induced by nitrosative stress stimulate the immune response, which develops in the CSF at the early stage of stroke. Conclusions: The mechanisms of EPS are different in IS and HS. Early seizures in IS are

related to the impaired ability to urgently increase eNOS activity in response to an ischemic situation and to provide an effective vasodilatation. Mechanisms of EPS in HS are associated with the BBB damage. Nitrosative stress and stimulation of the immune response might contribute to both mechanisms and should be further investigated.

2055. Guekht, A., et al. (2015). "TBI study in Moscow-predictors of seizures and outcomes." Epilepsy Currents **15**: 218-219.

Rationale: Traumatic brain injury (TBI) is a major cause of acquired epilepsy (Annegers et al., 1998). Epidemiological studies (Guekht et al., 2010) revealed that TBI was the main identified cause of epilepsy in Russia. The purpose of the present study was to evaluate incidence, risk factors for early and late seizures and outcomes after TBI in the prospective study of the consecutive cohort of patients. Methods: A prospective study of consecutive cohort of adult patients hospitalized with TBI in 2 centers in Moscow. Persons with preexisting cognitive decline and/or epilepsy were excluded. Patients were followed from admission (within 24 hours after TBI) for 2 years or until death. Clinical evaluation, CT or MRI, Glasgow coma scale (GCS) assessment were performed in the hospital; clinical, MMSE and HADs assessment -in the follow- up. Severity of TBI has been categorized by the GCS values into mild (13-15), moderate (9-12) and severe (low GCS - 8 or less) Results: 237 patients (178 men, 59 women, age 42.2 (SD 15.2) were included; 49 (20.7%) experienced seizures. 43 (18.1%) had early seizures (ES, up to 7 days after TBI), 15 (6.3%) - late seizures (LS). 9 out of 43 (20%) with ES also experienced LS compared to 0.03% of those who had no ES (p=0.0000). ES was the significant predictor of LS (OR 8.3, 95%CI 2.76 -24.9, p=0.0002). There was significantly higher proportion of patients with low GCS in the ES group (34.9% vs 13% without seizures). In univariate logistic regression low GSC values on admission were significant (p< 0.00001) risk factor of seizures. OR for any seizures was 6.6 (95%CI 2.6- 16.7), for ES - 8.4 (95%CI 3.2-21.5), ES were associated with bilateral lesions or lesion in the left hemisphere (Kruskal-Wallis test, p =0.04). Any seizures and ES were significantly associated with contusions and the volume of hematoma. In multivariate logistic regression, the following parameters were significant predictors of any seizures: depressed skull fracture (OR 25.4, 95%CI 6.1 - 105.7, p=0.0000), midline shift (OR 19.3, 95%CI 4.5 - 82.0, p=0.0000), alcohol at admission (OR 12.2, 95%CI 3.8-39.5, p=0.0000). Penetrating injury was borderline significant (OR 3.3, 95%CI 0.9 - 11.2, p=0.06). For ES only, significant risk factors were: depressed skull fracture (OR 8.4, 95%CI 2.3- 29.9, p=0.0009), midline shift (OR 8, 95%CI 2.1-30.1, p=0.002), alcohol at admission (OR 8.8, 95%CI 2.9 - 26.1, p=0.0000). ES (but not LS) were the important predictor of mortality. 18/43 (41.9%) of patients with ES died vs 8/194 (4.1%) of patients without ES (p=0.0000). MMSE values were significantly lower and HADs anxiety and depression scale values were higher (p<0.01) in the groups of patients with seizures. Conclusions: The occurrence of seizures is a medically and functionally important complication of TBI. Seizures are frequent in patients with TBI. Early seizures are associated with increased risk of mortality. Seizures after TBI are associated with cognitive decline and depression/anxiety.

2056. Guerra Martinez, A. and G. Pino Sanz (2011). "[Penetrating head injury in a pediatric patient]." Traumatismo craneoencefalico con objeto penetrante en paciente pediatrico. **58**(2): 135.

2057. Guerrero, C., et al. (2017). "Intraoral transmucosal rigid fixation to treat severely infected mandibular fractures." International journal of oral and maxillofacial surgery **46**: 80.

Objectives: To combine incision and drainage of facial infections and treat mandibular fractures in a singular surgical stage Methods: Eight patients (aged 16-42 years, five males and three females) with severe multi-spaces facial infections after mandibular fractures secondarily to gun-shot wounds or trauma were treated by Erich arch bars to obtain an ideal occlusion and physiotherapy post surgery, bone reduction was performed either open or closed, transmucosal rigid fixation was apply to avoid internal plates colonisation. The arch bars and plating system were removed 8-12 weeks after, according to bone healing. The infections were treated by incision and drainage with drains installation and removal, either 24 or 48 h after surgery. Results: All infections were cured; the fractured bones were aligned and fixated without complications, ideal dental occlusion, aesthetics and function were obtained. Conclusions: This new method allows the combination of facial infections and fractures treatments in one surgical stage, with major economical savings and less time away from work.

2058. Guerrero, C. A., et al. (2017). "Maxillofacial reconstruction by bone transport and multiple dental implants." International journal of oral and maxillofacial surgery **46**: 22.

Objective: To reconstruct the maxilla or the mandible using pedicled osteotomised segments for major continuity defects. Methods: 10 patients were treated for maxillofacial continuity defects, ranged from 2 to 16 cm, as a result of tumour resection, gunshot wound or trauma. Utilising local osteotomies and bone transport, the bony segments maintained the soft tissue attachments and were mobilised and fixated in position to a reconstruction plate. For minor defects up to 4 cm local osteotomies and immediate fixation to a reconstructive plate were performed, combined with internal bone transport for major defects. Clinical analysis, photographs and radiographs (panoramic, lateral and P-A cephalic) were used to evaluate the bone continuity, facial aesthetics, occlusion and mandibular function. Results: All patients were adequately reconstructed intraorally with radiographic evidence of bony continuity. No soft tissue dehiscence, infection or necrosis of the segments was observed after 2 years of follow up. Conclusions: All reconstruction were successful, and full bony continuity was obtained, using pedicled osteotomised segments. Furthermore, the use of osseointegrated implants allowed functional dental rehabilitation anchorage.

2059. Guerrero-Dominguez, R., et al. (2015). "[Trans-oral intracranial stab wound with airway invasion]." Herida por arma blanca intracraneal transoral con invasion de la via aerea. **39**(7): 451-453.

2060. Guevara, A. B., et al. (2016). "Association Between Traumatic Brain Injury-Related Brain Lesions and Long-term Caregiver Burden." The Journal of head trauma rehabilitation **31**(2): E48-58.

OBJECTIVE: To investigate the association between traumatic brain injury (TBI)-related brain lesions and long-term caregiver burden in relation to dysexecutive syndrome., SETTING: National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, Maryland., PARTICIPANTS: A total of 256 participants: 105 combat veterans with TBI, 23 healthy control combat veterans (HCv), and 128 caregivers., OUTCOME MEASURE: Caregiver burden assessed by the Zarit Burden Interview at 40 years postinjury., DESIGN: Participants with penetrating TBI were compared with HCv on perceived caregiver burden and neuropsychological assessment measures. Data of computed tomographic scans (overlay lesion maps of participants with a penetrating TBI whose caregivers have a significantly high burden) and behavioral statistical analyses were combined to identify brain lesions associated with caregiver burden., RESULTS: Burden was greater in caregivers of veterans with TBI than in caregivers of HCv. Caregivers of participants with lesions affecting cognitive and behavioral indicators of dysexecutive syndrome (ie, left dorsolateral prefrontal cortex and dorsal anterior cingulate cortex) showed greater long-term burden than caregivers of participants with lesions elsewhere in the brain., CONCLUSION AND IMPLICATION: The TBI-related brain lesions have a lasting effect on long-term caregiver burden due to cognitive and behavioral factors associated with dysexecutive syndrome.

2061. Gueye, E. M., et al. (1998). "[Spinal cord injuries in Senegal: 16 cases]." Les plaies vertebro-medullaires au Senegal: a propos de 16 cas. **43**(2): 238-242.

Penetrating spinal cord injuries (P.S.C.I.) are rarely described in Sub Saharian countries in spite of an increasing number of wars. To study epidemiology management and prognosis of P.S.C.I. in Senegal, population of 16 patients collected from Fann Hospital in Dakar has been studied. 9 cases were related on gunshot or shrapnel injuries and 6 were stab-wounded. 8 came from war practice and 7 from civilian practice. The point of entry was at the posterior or lateral part of the body and continuous leaking of cerebral spinal fluid from this point was founded only in one patient. Patients showed a clinical picture of a complete spinal cord section syndrome, 3 spinal cord hemisection Brown Sequard syndromes, 3 cauda equina syndromes and 1 monoradicular syndrome. Spinal X-rays or myelography may lead to an accurate evaluation of the extent of bone tissue destruction. Anatomical evaluation of roots and spinal cord lesions were more difficult when C.T. scan or R.M.I. is not available. Penetrating spinal cord injury with foreign body included or myelography stop or showing cauda equina syndrome should be operated on. 9 of our patients has benefited of spine surgical posterior approach (laminectomy). Immediate vital prognosis is good regarding the fact that visceral associated lesions were rare (2 cases). Functional recovery is fair only 46.6% of patients expressed partial or complete recovery. Prognosis factors such as injuring agent and initial neurological status has been discussed. Prognosis of penetrating spinal cord injuries could be improved by immediate and multidisciplinary management.

2062. Guglieri-Lopez, B., et al. (2018). "Rifampin dose optimization in children with tuberculous meningitis using dynamic PET imaging data." Journal of Pharmacokinetics and Pharmacodynamics **45**: S11.

Objectives: Tuberculous meningitis (TBM) is the most devastating form of tuberculosis (TB). Key TB antimicrobials have restricted brain penetration. The objective of this analysis was to optimize rifampin dosing in children with TBM to achieve brain exposures above the target for M. tuberculosis. Methods: A micro-dose (ng) of 11C-rifampin was injected to New Zealand white rabbits (n = 12) and dynamic PET imaging was performed. After imaging, a 30 mg/kg dose of unlabeled rifampin was administered and blood samples were analyzed using mass-spectrometry. A published pharmacokinetic model for rifampin after oral administration in humans 1 was scaled down and used to describe the pharmacokinetics of both rifampin and 11C-rifampin in plasma in rabbits. Then, the pharmacokinetic model was expanded to describe the brain distribution of 11C-rifampin. This pharmacokinetic-brainbiodistribution model was used to perform Monte Carlo simulations of different doses in children in order to predict rifampin exposure in brain. Probability of target attainment curves were generated. The target value for rifampin was assumed to be Cmax[4 times the minimum inhibitory concentration (MIC) (MIC = 1 lg/mL). Results: The developed pharmacokinetic-brain-biodistribution model described the distribution of 11C-rifampin into brain, including a decrease in penetration over time. This decrease, which may represent a return to homeostasis due to decreased infection and improved blood brain barrier integrity, had an estimated half-life of approximately 3 weeks. In children, only an oral dose of C 30 mg/kg would achieve the target exposure in the brain lesions at the initiation of treatment and sustained Cmax[1 lg/mL during the first 6 weeks of TBM treatment. Conclusion: Our integrated pharmacokinetic-brain-biodistribution model predicts that rifampin doses C 30 mg/kg are required to achieve adequate concentrations in brain lesions in children.

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2063. Gui, H., et al. (2013). "Image-guided surgical navigation for removal of foreign bodies in the deep maxillofacial region." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **71**(9): 1563-1571.

PURPOSE: Most trauma surgeons encounter numerous penetrating injuries. Some foreign bodies can cause pain, infection, and discomfort to the patient. Serious functional disorders also are likely to occur. Foreign bodies in critical areas must be removed. This report describes the use of image-guided technology for the removal of foreign bodies deep in the maxillofacial region., PATIENTS AND METHODS: From 2008 through 2011, 5 patients with foreign bodies in the maxillofacial area underwent image-guided removal at the authors' department. The STN navigation system (Stryker-Leibinger, Freiburg, Germany) was used for surgical planning and intraoperative navigation. Preoperatively, computerized tomography and digital subtraction angiography were used to create 3-dimensional views of the region to aid surgeons in more accurately defining the spatial location of the foreign object. During surgery, the foreign objects and surgical instruments were visualized on the screen., RESULTS: In all 5 cases, the foreign bodies were removed by minimally invasive access without any complications. Surgical time was approximately 40% shorter compared with the conventional technique of not using image-guided navigation. A 1-year postoperative evaluation showed that the patients' complaints and symptoms had resolved, function was restored, and esthetics were remarkably improved., CONCLUSION: Navigation-guided removal of foreign bodies in the complex, deep maxillofacial region in proximity to vital areas can be regarded an ideal and valuable option for these potentially complicated procedures.

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2064. Guilburd, J. N. and A. Rakier (2012). "Reversal of brain herniation in children by dural fenestrations." Child's Nervous System **28**(5): 773.

Object: Decompressive craniectomy is perceived as a last resort for treating uncontrollable intracranial pressure. The role of dural fenestrations in the treatment of Acute Subdural Hematoma was proved to be efficient as a new surgical technique in thirty one patients to avoid abrupt disruption of cerebral tissue during the classical wide opening of the dura, owing to dramatic diminution of ICP. We adopted the same technique in the treatment of desperate situations in children, as the ultimate step of decapitation of increased ICP, in order to try reversal of brain herniation. We consider that “classical” decompression with wide dural opening could be in some cases more deleterious for the patient owing to further deterioration. We stress the importance of keeping intact as much as possible the natural covering of the brain. Methods: 25 patients with GCS 3to5 on admission (13 with severe closed head injuries and 4 with penetrating injuries) were brought to the operating room on emergency for a wide uni or bilateral decompressive craniotomy/ ectomy and multiple fenestrations of the dura (MFD). All the patients were admitted to the emergency department and received primary care as usually recommended by advanced trauma life support guidelines and immediately transferred

to the Pediatric Intensive Care Unit after insertion of ICP monitoring via a subdural catheter or a Codman intraparenchymal device .In all the cases, uncontrolled increased intracranial pressure developed. The surgical technique consisted of elevation of a wide bone flap, multiple small openings of the exposed dura in order to allow brain decompression and reposition of the bone immediately or lately. Results: Twenty one patients survived. Fifteen of them are conscious (five neurologigally normal, eight with mild and two with marked neurological deficit). Five children remained in persistent vegetative state. In all the patients, the ICP became controllable with usual medical measures and the pupils turned smaller and reactive. Conclusions: In spite of disappointing trends of surgical reversal of brain herniation in the past, we think that this simple surgical technique, especially in children could still play an important role to save irreversible situations. The “classical approach” of decompressive craniectomy with wide dural opening and free periosteal graft is not only “unappropriate but even deleterious” in cases of severe increased ICP owing to lower recovery scores and increased immediate and late morbidity.

2065. Guilford, F. R. (1970). "Surgical consideration in disorders of the horizontal and vertical portions of the facial nerve." The Annals of otology, rhinology, and laryngology **79**(2): 241-251.

2066. Guilliard, M. J., et al. (2010). "Corns in dogs; signalment, possible aetiology and response to surgical treatment." The Journal of small animal practice **51**(3): 162-168.

OBJECTIVES: To describe the signalment and response to surgical treatment, and to propose aetiopathogenetic mechanisms for the development of paw pad corns in dogs., METHODS: A combined retrospective and prospective study was conducted on 30 dogs that presented with paw pad corns. The age, breed and gender of the dogs, together with anatomical positions of the corns were recorded. Surgical treatments involved either excision (n=27) or distal digital ostectomy (n=3). The minimum follow-up period was one year., RESULTS: The age at presentation was from two to 15 years. All the breeds in this study were either greyhounds or sighthounds. Males were over-represented. Ninety percent of the corns were found in the digital pads of digits three and four, and 90% were found in the thoracic limbs. The evidence suggests a mechanical aetiology or foreign body penetration. Long-term response to surgical excision resulted in a recurrence rate of more than 50% (n=27). Distal digital ostectomy gave good results in selective cases (n=3)., CLINICAL SIGNIFICANCE: Corns can cause severe chronic lameness in greyhounds and related breeds. Long-term response to surgical treatments is disappointing but it is recommended as an initial treatment as it can be curative.

2067. Gujral, I. B., et al. (2006). "Sex differences in mortality after traumatic brain injury, Colorado 1994-1998." Brain injury **20**(3): 283-291.

PRIMARY OBJECTIVE: The purpose of this study was to assess the relationship between sex and traumatic brain injury (TBI) mortality., METHODS AND PROCEDURES: A total of 20,465 persons with TBI were identified from a Colorado population-based surveillance system for 1994-1998. Case fatality ratios were calculated to identify sex differences for selected risk factors. Unconditional logistic regression was used to determine the relationship between TBI mortality and sex controlling for risk factors., MAIN OUTCOMES AND RESULTS: Adjusting for age, race, metropolitan residence and penetrating injury, the estimated odds of TBI mortality for males compared to females was 1.21 (95% CI 1.10, 1.34) for pre-hospital fatalities and 1.19 (95% CI 1.05, 1.37) for hospital fatalities., CONCLUSION: Results indicate differences in TBI mortality comparing males and females. Future studies are warranted to identify if behaviour and physiological responses are associated with TBI outcomes among males and females.

2068. Gul, A., et al. (2014). "Radiographic localization of a periorbital gunshot-pellet: technical note." Ophthalmic plastic and reconstructive surgery **30**(5): 443-444.

2069. Gulati, A., et al. (2010). "Penetrating knife injury to the frontal lobe--a case report." Annals of the Royal College of Surgeons of England **92**(6): W41-42.

Penetrating injuries of the craniofacial region are increasing and have the potential to cause severe vascular and neurological deficit. We present our management of a case with a knife stab injury to the infra-orbital region, traversing

the orbit and penetrating into the anterior cranial fossa, the tip lying in close proximity to the anterior cerebral circulation.

2070. Gulsen, S., et al. (2010). "Rapid Development of Brain Abscess Caused by Streptococcus Pyogenes Following Penetrating Skull Injury via the Ethmoidal Sinus and Lamina Cribrosa." Journal of Korean Neurosurgical Society **48**(1): 73-78.

OBJECTIVE: Streptococcus pyogenes is a beta-hemolytic bacterium that belongs to Lancefield serogroup A, also known as group A streptococci (GAS). There have been five reported case in terms of PubMed-based search but no reported case of brain abscess caused by Streptococcus pyogenes as a result of penetrating skull injury. We present a patient who suffered from penetrating skull injury that resulted in a brain abscess caused by Streptococcus pyogenes., METHODS: The patient was a 12-year-old boy who fell down from his bicycle while cycling and ran into a tree. A wooden stick penetrated his skin below the right lower eyelid and advanced to the cranium. He lost consciousness on the fifth day of the incident and his body temperature was measured as 40. While being admitted to our hospital, a cranial computed tomography revealed a frontal cystic mass with a perilesional hypodense zone of edema. There was no capsule formation around the lesion after intravenous contrast injection. Paranasal CT showed a bone defect located between the ethmoidal sinus and lamina cribrosa., RESULTS: Bifrontal craniotomy was performed. The abscess located at the left frontal lobe was drained and the bone defect was repaired., CONCLUSION: Any penetrating lesion showing a connection between the lamina cribrosa and ethmoidal sinus may result in brain abscess caused by Streptococcus pyogenes. These patients should be treated urgently to repair the defect and drain the abscess with appropriate antibiotic therapy started due to the fulminant course of the brain abscess caused by this microorganism.

2071. Gunasena, P., et al. (2010). "Clinical outcome following decompressing craniectomy with minimal brain exploration for ballistic injuries to the brain." Brain injury **24**(3): 182-183.

Objectives: Method of surgery for ballistic brain injuries have been changing from Second World War up to now. At the beginning aggressive decompression and evacuation of hematoma was the practice. However according to the data from the second Iraq war the practice has been changed to less aggressive decompression to deal with hematomas and foreign bodies. A prospective study was conducted to evaluate the clinical outcome following decompressing craniectomy with minimal exploration of the brain for penetrating Brain Injury sustained in a war situation. Method: 150 patients brought to Teaching Hospital Anuradhapura Sri Lanka with penetrating brain injuries during the recently ended civil war over a period of 8 months have been evaluated to assess the clinical outcome. Patients who had ICH, acute SDH, and cerebral contusions due to penetrating Brain Injury with mass effect were included in the study. All patients had decompressing cranictomy with removal of bone flap. Total evacuation of acute SDH were done while only the easily accessible haematomas, bone fragments and contusions were allowed to come out. All patients had fascia lata on lay dural graft and creation of SCF fistula before closure. Clinical outcome was evaluated using Glasgow outcome scale and Glasgow coma scale at the end of 2 weeks and 6 months time. Results: 30% of the patients had bullet injuries and 70% had shrapnels.6 patients died due to injuries. 80% of patients had ICH, 70% had contusions and 55% had acute SDH. 40% of the patients had GCS 6/15- 8/15, 50% had GCS 9/15-11/15, and 10% had GCS 12/15- 13/15. At the end of 2 weeks 5% of the of patients had GOS 1/5, 95% GOS 3/5. At the end of 6 months 40% of patients had GOS 5/5, 45% had 4/5, 10% had 3/5. Conclusions: Minimal damage surgery with decompressing craniectomy is a satisfactory way to manage penetrating brain injuries during war situation. Clinical outcome was evaluated using Glasgow outcome scale and Glasgow coma scale at the end of 2 weeks and 6 months time. Results: 30% of the patients had bullet injuries and 70% had shrapnels.6 patients died due to injuries. 80% of patients had ICH, 70% had contusions and 55% had acute SDH. 40% of the patients had GCS 6/15- 8/15, 50% had GCS 9/15-11/15, and 10% had GCS 12/15- 13/15. At the end of 2 weeks 5% of the of patients had GOS 1/5, 95% GOS 3/5. At the end of 6 months 40% of patients had GOS 5/5, 45% had 4/5, 10% had 3/5. Conclusions: Minimal damage surgery with decompressing craniectomy is a satisfactory way to manage penetrating brain injuries during war situation.

2072. Gunasena, P., et al. (2010). "Evaluation of risk of developing EDH associated with large craniectomy closure without hitching the dura." Brain injury **24**(3): 129.

Objectives: Since Walter Dandy described tenting suture to the dura before craniotomy closure to prevent post operative development of EDH has been practiced over many decades. Many authors in the past have described the

incidence of developing EDH has not been higher though the dura has not been hitched. Method: A prospective study has been conducted during the recently concluded civil war in Sri Lanka to evaluate the incidence of developing EDH following decompressive craniectomy for Acute SDH and intracerebral hematomas due to penetrating brain injuries. 300 patients brought to a single unit over a period of two years have been evaluated. Patients who had craniectomies more than 8cm in its largest diameter were included in the study. All these patients had bulging brain at the time of closure. No patients had tenting suture to the dura to prevent post op extradural hematomas. All the patients had post operative CT scanning from 24 hours to 72 hours post operatively. Results: Not a single patient developed an extradural hematoma. Two patients out of 300 developed intracerebral hematomas and underwent reoperation. Conclusions: Closure of large craniectomy in the presence of brain bulging does not require Dural tenting sutures to prevent post operative Extradural hematomas.

2073. Gunasena, P., et al. (2010). "On lay dural graft without suturing and creation of CSF fistula to prevention of CSF leak following decomprssive craniectomy for penetrating brain injury in a war setting." Brain injury **24**(3): 128.

Objectives: CSF leak through the surgical incision or through air sinuses is a significant problem association with penetrating brain injuries where arachnoid and pia mater is injured. It has been reported as high as 28% in the Korean War. Method: A prospective study has been conducted during the recently ended civil war in Sri Lanka to evaluate the incidence of CSF leaks following decompressive craniectomies for penetrating brain injury. Patients arrived at a single station for a period of one and half years from January 2008 have been evaluated. Out of 995 patients 650 patients underwent decommpressive craniectomies. All patients having had the definitive procedure underwent dural plasty using facia late as an on lay graft between the brain and the dura without suturing to the dura. A CSF fistula has been created using a suction drain. The drain was removed around the 14th post operative day. Results: Only 12 patients had CSF leak through the surgical wound no patients had CSF ottorrhoea or rhinorrhoea. All 12 patients required reoperation and managed successfully. 8 patients had confirmed intracranial sepsis. The incidence of CSF leak with our technique was 1.8%. Conclusions: Creation of CSF fistula and on lay dural graft without suturing is a successful way of preventing CSF leak following decompressive craniectomies for penetrating brain injuries done in a war situation where the time and the resources are limited factors.

2074. Gund, V. A. and B. Hammer (1975). "[A rare type of transorbital brain injury]." Eine seltene Art der transorbitalen Hirnverletzung **36**(2): 101-107.

Case report of transorbital brain injury from a mortar shot. A bolus of powder particles and iron had penetrated the right orbit and then the roof of the orbit and led to the formation of an intracerebral abscess. Diagnostic and therapeutic approach is described.

2075. Gundogmus, U. N., et al. (2013). "[Residual pellet in fetal brain tissue following a gunshot injury to a pregnant woman: a case report]." Gebe bir kadinda av tufegi yaralanmasi sonucu fetus beyin dokusunda reziduel sacma tanesi: Bir olgu sunumu. **19**(4): 371-374.

Vital functions and the effect of injuries on quality of life are important from a viewpoint of causation in willful injury crimes committed against a pregnant woman. In such conditions, which should be evaluated separately in criminal law and compensation law, permanent losses of organ function that may negatively affect the woman's fertility, the features of permanent functional impairments and premature birth of the fetus can be additive factors for the indemnification amount. In scientific literature, case reports addressing the morphological and physiological changes to the fetus due to firearm injury are rare. In the presented case, we aimed to evaluate the fetus's situation, following firearm injury to a 41-year-old woman at 27 weeks gestation. While the mother was living a healthy life, the significant problem of the child in the first four-year period of his development was hyperactivity. Evaluating the effect of the frontal lobe lesion on the psychiatric findings of the child is important.

2076. Gunkel, S., et al. (2009). "[Facial perforation trauma: an unusual injury in a skiing accident]." Perforatationstrauma im Gesichtsschadel : Eine ungewohnliche Verletzung beim Skifahren. **112**(12): 1075-1078.

Facial perforation injuries are very rare. We describe a case of a 48-year-old man who sustained a perforation trauma from an 11 cm long wooden tree branch in the middle of the face in a skiing accident. He suffered from

additional injuries, such as fractures of the ribs and hand, but was neurologically without pathologic findings and was cardiopulmonary stable. The branch penetrated the head from the sinus maxillaris through the maxilla just missing the internal and external carotid arteries and ending just short of the cervical vertebra. The patient was transported to a center for oral and maxillofacial surgery and underwent several operations.He could return to his normal social and professional life 8 months after the accident.

2077. Gunther, M., et al. (2015). "Neuroprotective effects of N-acetylcysteine amide on experimental focal penetrating brain injury in rats." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **22**(9): 1477-1483.

We examined the effects of N-acetylcysteine amide (NACA) in the secondary inflammatory response following a novel method of focal penetrating traumatic brain injury (TBI) in rats. N-acetylcysteine (NAC) has limited but well-documented neuroprotective effects after experimental central nervous system ischemia and TBI, but its bioavailability is very low. We tested NACA, a modified form of NAC with higher membrane and blood-brain barrier permeability. Focal penetrating TBI was produced in male Sprague-Dawley rats randomly selected for NACA treatment (n=5) and no treatment (n=5). In addition, four animals were submitted to sham surgery. After 2 hours or 24 hours the brains were removed, fresh frozen, cut in 14 mum coronal sections and subjected to immunohistochemistry, immunofluorescence, Fluoro-Jade and terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) analyses. All treated animals were given 300 mg/kg NACA intraperitoneally (IP) 2 minutes post trauma. The 24 hour survival group was given an additional bolus of 300 mg/kg IP after 4 hours. NACA treatment decreased neuronal degeneration by Fluoro-Jade at 24 hours with a mean change of 35.0% ($p<0.05$) and decreased TUNEL staining indicative of apoptosis at 2 hours with a mean change of 38.7% ($p<0.05$). Manganese superoxide dismutase (MnSOD) increased in the NACA treatment group at 24 hours with a mean change of 35.9% ($p<0.05$). Levels of migrating macrophages and activated microglia (Ox-42/CD11b), nitric oxide-producing inflammatory enzyme iNOS, peroxynitrite marker 3-nitrotyrosine, NFkappaB translocated to the nuclei, cytochrome C and Bcl-2 were not affected. NACA treatment decreased neuronal degeneration and apoptosis and increased levels of antioxidative enzyme MnSOD. The antiapoptotic effect was likely regulated by pathways other than cytochrome C. Therefore, NACA prevents brain tissue damage after focal penetrating TBI, warranting further studies towards a clinical application.

2078. Günther, M., et al. (2013). "COX-2 Regulation differs between sexes in the secondary inflammatory response following experimental penetrating brain injury in rats." Journal of neurotrauma **30**(15): A93-A94.

Introduction Traumatic brain injury (TBI) is followed by a secondary inflammatory response. Females are better protected from adverse effects of this process in animal models and human epidemiological studies. The reason for this is not fully known. We examined the inflammatory response following experimental TBI in male and female rats. Methods Parietal contusions using a penetrating brain injury model were produced in male and female rats (n = 5). The rats were placed in a stereotactic frame and positioned with a probe directly above the exposed dura mater. A pin with a tip radius of 1mm and depth of penetration 5mm was accelerated into the brain. After 24 h and 72 h the brains were removed, cut in 14 lm coronal and transversal sections and subjected to immunohistochemical analyses for protein expression and in situ hybridization for mRNA detection. We analyzed the expression of the proinflammatory enzymes Cox-2 and iNOS, markers of astrogliosis (GFAP), microgliosis (Osteopontin), peroxynitrite levels by surrogate measure 3-Nitrotyrosine, and neuronal degeneration (Fluoro Jade). Results The region of interest (ROI) was in coronal sections defined medially by the interhemispheric fissure, basally by the inferior border of corpus callosum, and laterally by the lateral border of the right hemisphere. ROI was in transversal sections defined by the interhemispheric fissure and the lateral borders of the ipsilateral hemisphere. GFAP mRNA was upregulated in the ROI at 24 h and 72 h. Minor upregulation was seen on the contralateral side. No difference was seen between sexes. Osteopontin was upregulated in the ROI at 24 h. No upregulation was seen on the contralateral side. No difference was seen between sexes. Cox-2 mRNA was elevated in the cortical areas of the ROI. Minor upregulation was seen on the contralateral side. mRNA levels were significantly upregulated in male rats in the ROI at 24 and 72 h ($p < 0.05$). iNOS mRNA levels and protein expression was upregulated in the ROI at 24 h. No upregulation was seen on the contralateral side. No difference was seen between sexes. 3-Nitrotyrosine was upregulated in the ROI after 24 h. No upregulation was seen on the contralateral side. No difference was seen between sexes. Fluoro Jade stained neuronal degeneration was upregulated in the ROI at 24 h. No upregulation was seen on the contralateral side. No difference was seen between sexes. Conclusions We found that the Cox-2 mediated inflammatory response differed between female and male rats following TBI. Cox-2 is partly expressed

under physiological conditions in the brain but mainly induced by proinflammatory mediators. It is suspected to be involved in various neurodegenerative diseases, and the regulation of Cox-2 and iNOS has been shown to be interconnected. The nitric oxide producing enzyme iNOS is induced following trauma, leading to oxidative stress through the creation of peroxynitrite. iNOS and peroxynitrite expression did not differ between sexes. Astrogliosis and microgliosis was found in the perilesional area with a similar expression between sexes. Our findings from this pilot study indicate that the sex specific trait of the secondary inflammatory response may be connected to prostaglandin regulation. The difference did not lead to altered neuronal death at 24 h. This heterogeneity may in part explain sex dependent variances in outcome after TBI.

2079. Gunther, M., et al. (2015). "COX-2 regulation and TUNEL-positive cell death differ between genders in the secondary inflammatory response following experimental penetrating focal brain injury in rats." Acta neurochirurgica **157**(4): 649-659.

INTRODUCTION: Traumatic brain injury is followed by secondary neuronal degeneration, largely dependent on an inflammatory response. This response is probably gender specific, since females are better protected than males in experimental models. The reasons are not fully known. We examined aspects of the inflammatory response following experimental TBI in male and female rats to explore possible gender differences at 24 h and 72 h after trauma, times of peak histological inflammation and neuronal degeneration., METHODS: A penetrating brain injury model was used to produce penetrating focal TBI in 20 Sprague-Dawley rats, 5 males and 5 females for each time point. After 24 and 72 h the brains were removed and subjected to in situ hybridization and immunohistochemical analyses for COX-2, iNOS, osteopontin, glial fibrillary acidic protein, 3-nitrotyrosine, TUNEL and Fluoro-Jade., RESULTS: COX-2 mRNA and protein levels were increased in the perilesional area compared to the uninjured contralateral side and significantly higher in males at 24 h and 72 h ($p < 0.05$). iNOS mRNA was significantly increased in females at 24 h ($p < 0.05$) although protein was not. TUNEL was increased in male rats after 24 h ($p < 0.05$). Glial fibrillary acidic protein, osteopontin, 3-nitrotyrosine and Fluoro-Jade stained degenerating neurons were increased in the perilesional area, showing no difference between genders., CONCLUSIONS: COX-2 regulation differed between genders after TBI. The increased COX-2 expression in male rats correlated with increased apoptotic cell death detected by increased TUNEL staining at 24 h, but not with neuronal necrosis measured by Flouro-Jade. Astrogliosis and microgliosis did not differ, confirming a comparable level of trauma. The gender-specific trait of the secondary inflammatory response may be connected to prostaglandin regulation, which may partially explain gender variances in outcome after TBI.

2080. Guo, Y., et al. (2022). "Characteristics and Visual Prognosis of Pediatric Open Globe Injury in Shanghai, China." Ophthalmic research **65**(3): 328-334.

INTRODUCTION: The aim of the study was to describe the characteristics of open globe injury (OGI) and the relationship between the complications and visual outcomes in children with this type of injury., METHODS: This was a retrospective chart review of 1,664 children, under the age of 16 years, who were hospitalized for OGI between January 1, 2007, and December 31, 2015. Each patient's age, sex, cause and agent of injury, complications, visual acuity, and classification of ocular trauma were collected for review and analysis., RESULTS: The mean age was 5.6 +/- 3.4 years. Right eyes were particularly vulnerable to injury (right eye:left eye ratio = 1.2:1). Traumatic cataract was the most common complication. The average initial and final best corrected visual acuity were logarithm of the minimum angle of resolution (logMAR) 2.04 +/- 0.78 and logMAR 1.74 +/- 0.88, respectively. Logistic regression analysis showed that hyphema (odds ratio [OR] = 1.850), iris prolapse (OR = 1.702), vitreous hemorrhage (OR = 9.703), retinal detachment (OR = 11.938), endophthalmia (OR = 5.377), intraocular foreign body (OR = 3.346), and initial visual acuity <0.05 (OR = 9.017) were risk factors for visual acuity <0.05 at hospital discharge., CONCLUSION: OGI was most frequent in preschool children and boys. Right eyes were more vulnerable than left eyes. Poor visual outcomes were associated with hyphema, iris prolapse, vitreous hemorrhage, retinal detachment, endophthalmia, intraocular foreign body, and an initial visual acuity <0.05.

2081. Guo, Y. W., et al. (2004). "Vital signs changes and survival curve analysis of cats after craniocerebral injury under different environments of temperature and humidity." Chinese Journal of Clinical Rehabilitation **8**(1): 76-78.

Aim: To investigate the changing characteristic of vital signs and survival time of cats after craniocerebral injury in the environment of high temperature and humidity. Methods: Thirty-two cross-bred cats were randomly divided into

four groups and put into the following environments respectively after fire-arm injury: A (25 °C, relative humidity 50%); B(35 °C, relative humidity 85%); C(38 °C, relative, humidity 90%); D(40 ° C, relative humidity 95%). The blood pressure, heart rate, respiratory frequency and body temperature were recorded every 10 minutes until 6 hours later. Results: The vital signs in the gunshot wound under normal temperature group observed in the experiment were stable, and along with the increase of temperature and humidity, the body temperature and respiratory frequency and heart rate of cats in each group were significantly different at the same point of time ($P < 0.05$). The cats in group A and B were survival in 6 hours, while the cats in group C began to die after 1.5 - 2.0 h and all died 5 hours later, and the mean survival time was (3.4 ± 0.8) h. The cats in group D began to die 0.5 - 1 h later and all died after 2.5 hours, and the mean survival time was (2.0 ± 0.5) h. Conclusion: The environment of high temperature and humidity can significantly affect the changes of vital signs and survival time of the cats with craniocerebral injury.

2082. Guo, Y.-w., et al. (2004). "Bacterial growth characteristics in craniocerebral gunshot wound of cat in a hot and humid environment." Di 1 jun yi da xue xue bao = Academic journal of the first medical college of PLA **24**(2): 201-203.

OBJECTIVE: To investigate the growth behavior of characteristics in craniocerebral gunshot wound of cats in a hot and humid environment., METHODS: Twenty-three cross-bred cats were randomly divided into 4 groups: group A, the gunshot wound control group at normal temperature, in which tissue sampling was performed immediately after the wounding; group B, another gunshot wound control group at normal temperature, in which the samples were taken 6 h after the wounding; group C, the gunshot wound group subjected to a hot and humid environment, in which the tissue samples were obtained 6 h after the wounding; group D, the control group without undergoing the wound. The tissues from the wound tract and the surrounding tissues were sampled for bacterial culture and counting., RESULTS: The bacterial counts of the tissues from the wound tract, the tissues within 5 mm and within 5-10 mm from wound tract varied insignificantly between groups A, B and C ($P>0.05$). In each group, the bacterial counts declined in the tissues as the distance of the sampling sites from the wound tract increased ($P<0.01$). The bacterial counts of the tissues from the wound tract and within 5 mm from the wound tract in group A, B and C were significantly different from those in group D ($P<0.01$)., CONCLUSION: Hot and humid environment does not significantly affect the bacterial growth in the craniocerebral gunshot wound within the first 6 h, which is a safe period against rapid bacterial growth and suitable for debridement.

2083. Guo, Z., et al. (2013). "Bone augmentation in a titanium cap with a porous surface modified by microarc oxidation." The International journal of oral & maxillofacial implants **28**(3): 767-773.

PURPOSE: To compare bone augmentation on pure titanium-machined surfaces and surfaces that have been modified by microarc oxidation (MAO) using titanium caps., MATERIALS AND METHODS: Twenty caps were manufactured from rods of commercially pure titanium. The control group (CG) consisted of 10 titanium caps with machined inner walls. The test group (TG) consisted of 10 titanium caps that were modified by MAO in an electrolyte solution containing calcium phosphate ions. The two types of titanium caps were fixed on the calvaria of 10 New Zealand rabbits. Each rabbit received two different caps. Although each cap was unfilled, the marrow and blood from the wound of the rabbit skulls could penetrate into the caps. After 4 weeks, the rabbits were sacrificed, and the skulls were removed for observation. The zenith of new bone was measured directly after the caps were removed from the skulls; subsequently, the bone volume was calculated by microcomputed tomography., RESULTS: Little bone augmentation could be observed in the CG caps, and the new bone height of the CG group was inconspicuous. In contrast, the new bone extended along the inner walls of the TG caps. The mean height of new bone of the TG group was 2.3 +/- 0.28 mm. The mean volume of new bone in the TG group was 18.63 +/- 3.80 mm(3)., CONCLUSIONS: New bone formation in a titanium cap surface modified by MAO was greater than that of a nonmodified cap. A titanium cap allowed new bone formation on the MAO surface to be observed and is a promising device for bone augmentation. Additionally, this finding suggests that observation through a titanium cap is a feasible method for biomaterial testing in hard tissue.

2084. Guppy, K. H. and C. Ochi (2018). "Self-Inflicted Drywall Screws in the Sagittal Sinus." World neurosurgery **110**: 323-325.

A 30-year-old right-handed man with a history of schizophrenia presented with 2 self-inflicted drywall screws in the skull. The patient was sleepy but easily arousable; blood tests showed he had taken methamphetamines. Computed

tomography and computed tomography angiography of the head showed the frontal screw abutted left of the superior sagittal sinus, and the posterior screw went through the superior sagittal sinus with no extravasation of contrast material at either site. Both screws were removed with exposure of the sagittal sinus using U-shaped craniectomies. There was no bleeding on the removal of the screws. It appears the posterior screw entered between the leaflets of the sagittal sinus dura mater. The patient had returned to work without any sequelae 1 month after injury.

2085. Gupta, A., et al. (2011). "Pencil in the brain: a case of temporal lobe abscess following an intracranial penetrating pencil injury." Pediatric neurosurgery **47**(4): 307-308.

The case of a 7-year-old girl with an intracranial penetrating injury due to a pencil is presented. The difficulties in diagnosis and the need for a high degree of suspicion and for prompt adequate surgical treatment are highlighted.

2086. Gupta, A. K., et al. (2005). "High-flow traumatic carotico-jugular fistula manifesting as venous hypertensive encephalopathy. A case report." Interventional Neuroradiology **11**(3): 261-268.

We report the clinical and angiographic findings in a patient who presented with venous hypertensive encephalopathy secondary to a traumatic carotico-jugular fistula. Endovascular entrapment of the fistula by occluding the common carotid artery and internal jugular vein at the base of the skull resulted in near total improvement of the patient's neurological status.

2087. Gupta, B., et al. (2011). "Facial and spinal impalement injury: An airway challenge." Indian Journal of Critical Care Medicine **15**(4): 236-237.

2088. Gupta, M., et al. (2010). "Accidental deaths due to coffee making machine blast: Two unusual case reports." Journal of Forensic Medicine and Toxicology **27**(1): 4-6.

In these reports the authors present two separate rare incidents of accidental explosion of country made coffee making machines. These machines maintain steam under pressure, which is used to make coffee. These machines which were old and not well maintained could not support the high steam pressure inside, resulting in explosion. Two persons died and five others were injured in the explosions. Such cases are of interest as a number of devices, which work on similar principles, are in use in the market. In this case report, we discuss the circumstances leading to the explosion of machines, the autopsy findings, brief review of the literature and methods of prevention of such incidents.

2089. Gupta, N., et al. (2018). "Results of simple limbal epithelial transplantation in unilateral ocular surface burn." Indian journal of ophthalmology **66**(1): 45-52.

PURPOSE: This study aimed to report the long-term outcomes of autologous Simple Limbal Epithelial Transplantation (SLET) performed for unilateral limbal stem cell deficiency (LSCD) following chemical burn at a tertiary eye center in North India., METHODS: This was a single-center prospective interventional case series of patients who developed unilateral LSCD after suffering from ocular surface burns and who underwent SLET between October 2012 and May 2016 with a follow-up period of at least 6 months. The primary outcome measure was restoration of a completely epithelized, stable, and avascular corneal surface. The secondary outcome measure was percentage of eyes, which reported visual gain., RESULTS: The study included 30 eyes of 30 patients, 18 adults and 12 children, at a median follow-up of 1.1 years (range: 6 months to 3.5 years), 21 of 30 eyes (70%; 95% confidence interval, 53.6%-86.2%) maintained successful outcome. Visual acuity gain was seen in 71.4% of successful cases. The clinical factors associated with failure were identified as acid injury, severe symblepharon at the time of presentation, and SLET combined with penetrating keratoplasty (PK)., CONCLUSION: Autologous SLET is an effective limbal cell transplantation technique for the treatment of unilateral LSCD. It is especially beneficial for centers where cell cultivation laboratory is unavailable. Presence of severe symblepharon, which requires PK peroperatively , has poor outcome.

2090. Gupta, P. K., et al. (2008). "Penetrating intracranial injury due to crochet needle." Pediatric neurosurgery **44**(6): 493-495.

Penetrating head injury is uncommon and is always a curiosity in terms of the mechanism involved. The complete extent of the damage can only be known with CT scan of the brain, which at times may be difficult to get, due to the large size of the foreign body. The management of such patients is always a challenge and requires innovative planning. A case of crochet needle injury is described in which the needle entered through the mouth and passed through the jugular foramen into the cerebellum. This patient, fortunately, escaped without any neurological deficit and complications. The principles of management are highlighted. Copyright 2008 S. Karger AG, Basel.

2091. Gupta, P. P., et al. (2017). "Patterns of Injury and Mortality in Pediatric Patients Attending Emergency Department in a Tertiary Care Center in Eastern Nepal." JNMA; journal of the Nepal Medical Association **56**(207): 331-334.

INTRODUCTION: Trauma is a major and increasing global health concern in the recent world. It is now the leading cause of death among people less than 18 years old. The aim of this study is to analyze all injuries from trauma-related causes among children and adolescents under 18 years old of age., METHODS: This is a retrospective cross sectional study done in Emergency Department of B.P. Koirala Institute of Health Sciences. Patients aged less than 16 years were included with history of trauma from January 1st 2013 to 31st December 2013. The details of patient were taken from computerized medical records of the hospital. The demographic data, pattern of injury, mode of injury, diagnosis and outcomes were tabulated in Microsoft Excel., RESULTS: Total 3958 pediatrics patient were enrolled in this study with Male: Female=3.6:1 and Mean age 9.6+/-3.2 years. The common modes of injury were fall injury 2596 (65.6%) and RTAs 1176 (29.7%). Whereas the commonest patters were Fractures 1385 (35%) and Soft Tissue Injuries 784 (19.8%)., CONCLUSIONS: Fall Injury and Road Traffic Accidents are major and serious problem for children in Low Income countries like Nepal.

2092. Gupta, S., et al. (2019). "Firearm injuries cause disproportionate mortality in pediatric traumatic brain injury." Clinical neurosurgery **66**: 85.

INTRODUCTION: Traumatic brain injury is a major cause of mortality and long-term morbidity in the pediatric population. Given renewed legislative efforts aimed at reducing firearm violence and harm, we sought to investigate the impact of firearms on mortality associated with TBI. METHODS: Amulticentric, retrospective cohort analysis of pediatric patients with TBI was conducted using the National Trauma Data Bank from 2011 to 2014. The primary outcome was mortality within the hospital; the primary exposure was firearm-related vs. non-firearmrelated TBI. RESULTS: Pediatric patients with firearm-related TBI (n = 1,417; median [IQR] age 16 [13-17]) and non-firearm-related TBI (n = 123,740; median [IQR] age 11 [5-15]) were included. Firearm injuries included intentional harm by others (56%), suicide attempts (29%), and accidental harm by others (15%). The majority of African- American firearm-related TBIs presented after assault (79.6%), whereas the majority of White cases presented after suicide attempts (55.6%). Firearm-related cases presented with an average adjusted GCS 3.4 points lower than non-firearm-related TBI. 50.0% of firearm-related cases died while in the hospital compared to 2.8% of non-firearm cases. The firearm injury type with the highest rate of mortality was self-harm/suicide attempts (69.8%). Relative to non-firearm cases, firearm injuries were identified to be an independent predictor of in-hospital mortality (OR 8.3; 95% CI 7.1-9.7); firearm suicide attempt injuries were the most lethal (OR 13.0; 95% CI 9.9-17.0). Although firearm injuries comprised only 1.1% of all TBIs, they were the cause of injury in 16.7% of all deaths. Male sex, Black race, and public and self-pay insurance predicted firearm injuries. CONCLUSION: Firearm-related injuries are associated with disproportionately high mortality in pediatric TBI, especially in suicide attempts. African-Americans are at disproportionately high risk of firearm assault relative to Whites. Public health and policy interventions could target youth firearm injuries and potentially prevent a significant portion of TBI deaths.

2093. Gupta, S. K. and A. A. Umredkar (2012). "Juxtapontine abscess around a retained wooden fragment following a penetrating eye injury: surgical management via a transtentorial approach." Journal of neurosurgery. Pediatrics **9**(1): 103-107.

Penetrating injury through the orbit with a retained intracranial wooden foreign body is rare. The authors report the case of a child with a juxtapontine brain abscess secondary to a retained foreign body. The pitfalls in diagnosis and the surgical management for removal of the wooden fragment and drainage of the abscess are discussed.

2094. Guranda, A. I., et al. (1994). "[Experience of anesthesiology and intensive care services in mass admission of victims with fight injuries]." Opyt anesteziologo-reanimatsionnogo obespecheniia massovogo postuplenia postradavshikh s boevymi travmami.(1): 44-47.

In mass admission of wounded patients quick rational medical sorting is of primary importance. Anesthesiology and intensive care service performs organization and specific medical work. Gun-shot peritonitis is characterized by initial multiorgan insufficiency and instability of central hemodynamic index. We used planned neuroplegia and sedatives of benzodiazepine type in severe craniocerebral trauma. In fat embolism of cerebral vessels we used lipostabil and heparin. There were also cases of heart wounds and injuries.

2095. Gurunluoglu, R. and J. Gatherwright (2019). "Microsurgical reconstruction of complex maxillofacial gunshot wounds: Outcomes analysis and algorithm." Microsurgery **39**(5): 384-394.

BACKGROUND: Satisfaction with appearance, functional outcomes (speech, swallowing), work status after microsurgical reconstruction for maxillofacial gunshot wounds (GSW) remain largely unknown. The purpose of this study is to report these parameters. By investigating these outcomes, we also aimed to provide microsurgical algorithms for complex maxillofacial GSW., METHODS: Forty-two consecutive maxillofacial GSW patients between 2006 and 2014 were analyzed for outcomes. Mean age was 41.3 years ranging 14 to 77 years. There were 33 males and 9 females., RESULTS: Twenty-four patients received 36 free flaps for early reconstruction in 1 to 2 weeks, two patients in a delayed manner. Fifteen fibula flaps for mandible reconstruction, five fibula, there radial forearm (RF), and two scapular osteocutaneous (OC) flaps for maxilla reconstruction, two RF flaps for palate reconstruction, one RF for cheek reconstruction were used. Four patients underwent innervated gracilis flap for total lower lip and one for cheek reconstruction. Rectus abdominis myocutaneous flap was used for mid-face defects in two patients. One anterolateral thigh flap was used for lower lip/chin reconstruction. Nine free flaps were performed to treat a complication and/or to improve function. All flaps survived except for three partial skin paddle loss to fibula flaps. Mean follow-up was 17.2 months. Return to work/school was 70%. Surveys noted 58% "satisfied". All patients but two achieved perceptible speech, the majority had no difficulty with swallowing, all patients had oral competence., CONCLUSIONS: Favorable outcomes were obtained in most maxillofacial GSW. After investigating these outcomes, microsurgical algorithms were developed for clinical practice for reconstruction of composite mandible and total-lower lip defects, and maxilla/mid-face defects.

2096. Gurunluoglu, R., et al. (2012). "Functional reconstruction of total lower lip defects using innervated gracilis flap in the setting of high-energy ballistic injury to the lower face: preliminary report." Journal of plastic, reconstructive & aesthetic surgery : JPRAS **65**(10): 1335-1342.

BACKGROUND: Reconstruction of total full-thickness lower lip defects combined with extensive composite mandibular defects particularly in the setting of close-range high-energy ballistic injury presents a formidable challenge for the reconstructive plastic surgeon. While the fibular flap has been widely accepted for its usefulness in the reconstruction of composite mandibular defects, to date, there is no definitive widely established method of total lower lip reconstruction. The article presents authors' approach using innervated gracilis muscle flap for total lower lip reconstruction in the setting of high-energy gunshot injuries to the face., METHODS: Three patients underwent composite mandibular defect reconstruction using fibular osteocutaneous flap and functional lower lip reconstruction using innervated gracilis muscle flap. Lip lining was reconstructed using the skin paddle of the fibular flap. The external surface of the gracilis muscle was skin-grafted. Facial artery myomucosal flap provided vermilion reconstruction in two patients., RESULTS: All fibular (n=3) and gracilis flap transfers (n=3) were viable. An electromyographic study at 1 year postoperatively demonstrated successful re-innervation of the gracilis muscle. Starting at about 10 weeks postoperatively, patients exhibited voluntary lip movements and oral competence. In addition, all patients achieved near-normal speech, evidence of recovered protective sensitivity and satisfactory appearance. The mean follow-up was 16.1 months., CONCLUSIONS: Our preliminary report in three patients demonstrated that innervated gracilis muscle transfer combined with fibular flap provides a successful reconstruction of extensive composite mandibular and total lower lip defects resulting from gunshot injuries to the face. Oral continence was achieved by combination of regained tonicity and voluntary movement of the gracilis muscle following re-innervation and assistance of the cheek muscles on

the gracilis muscle. The described technique was reliable and the results were promising.

2097. Gussack, G. S. and G. J. Jurkovich (1988). "Penetrating facial trauma: a management plan." Southern medical journal **81**(3): 297-302.

Penetrating wounds of the face present a spectrum of injuries and multiple management dilemmas. The surgeon's first concern remains the establishment of a proper airway and control of life-threatening injuries. Selected ancillary diagnostic procedures should be used to confirm vascular, aerodigestive, or central nervous system injuries. Diagnosis of injuries may require arteriography, endoscopic examination, barium studies, computerized tomography, and detailed ophthalmologic examination. We review 16 cases of penetrating facial trauma treated at the University of South Alabama Trauma Center over a one-year period. The injuries resulted from 13 gunshot wounds and three stab wounds. Injuries of the central nervous system occurred in three patients, mandibular fractures in four, optic nerve or globe injury in three, and maxillary sinus fracture in seven. Our experience with these patients demonstrates the spectrum of injuries and serves as a basis for a management algorithm.

2098. Guthrie, E., et al. (1999). "Traumatic brain injury in children and adolescents." Child and adolescent psychiatric clinics of North America **8**(4): 807-ix.

Traumatic brain injury is an insult to the brain caused by an external force that results in an impairment (transient or permanent) of cognitive, behavioral, emotional, or physical function. Traumatic brain injury encompasses shearing injury, which might be seen in a shaken infant, as well as penetrating injury from a foreign body, such as a bullet. This article addresses the recovery phase and functional sequelae following traumatic brain injury. Research and clinical experience over the past decade have led to a better understanding of the pathophysiology of head injury and, in turn, improved management.

2099. Gutierrez, A., et al. (1983). "Unusual penetrating craniocerebral injury." Surgical neurology **19**(6): 541-543.

We report a 29-year-old patient who was operated on for a penetrating craniocerebral injury caused by an underwater fishing harpoon. It had penetrated through the roof of the left orbit, upward toward the calvaria. The patient was immediately operated upon and the foreign body was easily removed through a small left parietal craniectomy. In spite of the spectacular appearance of the injury on admission to the hospital, neurological impairment before and after the operation was minimal.

2100. Gutierrez-Aceves, G. A., et al. (2018). "Posterior bi-parietal decompressive craniectomy in refractory intracranial hypertension secondary to civilian gunshot wound. Case report and review of literature." International journal of surgery case reports **53**: 291-294.

Background: Decompressive craniectomy is recommended as second tier therapy for unresponsive intracranial hypertension in Traumatic Brain Injury. There have been reports of a Bi-Occipital craniectomy in cases where the focal injury is posterior. Case description: The work has been reported in line with the SCARE criteria. There is a 56-year-old male with Traumatic brain injury secondary to gunshot and intracranial hypertension, managed with biparietal craniectomy, after place a intracranial pressure monitor, whit good response to surgical and medical treatment, even with good outcome after hospitalization. Conclusions: In selected cases a posterior bi-parietal craniectomy can be performed in a safe way with acceptable results to treat refractory Intracranial hypertension. We propose that this neurosurgical technique can be used in patients with posterior focal injuries.

2101. Gutierrez-Gonzalez, R., et al. (2008). "Penetrating brain injury by drill bit." Clinical neurology and neurosurgery **110**(2): 207-210.

Non-missile low velocity penetrating brain injuries are unusual among civilian population. They show specific characteristics different from missile wounds. In this paper we describe a rare case of self-inflicted penetrating head trauma by electric drill. We document neuroimaging studies and review the management concerning this pathology. To our knowledge, this is the first case of intracranial retained drill bit with such radiological findings reported in the

literature. An 80-year-old male with no previous psychiatric disorder presented at our hospital after suffering an accident while working with an electric drill. Physical examination revealed right lower extremity plegia and three penetrating scalp wounds to the left parasagittal region. Skull X-ray and computed tomography demonstrated an intracranial metallic foreign body located in the left parietal lobe and an intraparenchymal hematoma with no mass effect close to the foreign body. The patient was taken to the operating room to remove the drill bit fragment. Antibiotic and antiseizure prophylaxis were administered. Postoperative computed tomography confirmed no residual metallic fragments and functional recovery was excellent. After psychiatric assessment, suicide attempt was confirmed and antidepressive therapy was then started. On follow-up, no complication was documented. It is essential to exclude penetrating brain trauma whenever a scalp wound is noticed in order to provide proper treatment and prevention care. The permanent neurological deficit in low velocity injuries is related to the degree and location of the primary injury. It also depends on an early diagnosis and treatment and the absence of delayed complications.

2102. Guven, S. and A. H. Durukan (2018). "Terroristic sniper shot ocular injuries: military and police casualties: case series." Journal of the Royal Army Medical Corps **164**(5): 318-321.

INTRODUCTION: Sniper shot ocular injuries (SSOI) are rare and result in poor ocular outcomes due to high energy transfer both to the eye and the adjacent brain. To our knowledge, no reports of such injuries in terms of outcomes have been previously described in the literature. The aim of this case series was to describe the treatment performed and ocular outcomes of such injuries., METHODS: Five cases of terroristic SSOIs referred to Gulhane Military Medical Academy Department of Ophthalmology between 22 July 2015 and 30 January 2017 were reviewed. Comparisons were made between the location and mechanism of injury, initial and final ocular signs, interventions and additional extraocular injuries., RESULTS: Two cases were of police officers and the remaining were Turkish military soldiers. All of our cases were injured in urban district by terrorist snipers hidden in apartments. Four individuals were injured in the right eye and the other was injured bilaterally. Initial visual acuities (VA) ranged from no light perception (NLP) to 0.0 with logMAR. Final VA raised to 0.0 in three patients whereas in two of NLP patients it remained the same. Mean Ocular Trauma Score was 2.2. Two eyes necessitated evisceration and the others underwent vitrectomy surgery., CONCLUSIONS: The prognosis of SSOI is unpredictable and is highly dependent on the trajectory and energy deposition. Primary evisceration or enucleation should be reserved to severely ruptured globe cases with no chance of globe-saving procedures. If the globe remains intact, retinal and vitreal damage should be repaired. Due to risk of associated intracranial injury, all patients should be referred for neurosurgical opinion.

2103. Guvenc, Y., et al. (2021). "Penetrating Craniocerebral Injury by the Hook of a School Desk." Pediatric neurosurgery **56**(2): 152-156.

INTRODUCTION: Although penetrating cranial injuries are rare in pediatric patients, these injuries can lead to morbidity and mortality. Removal of a gigantic foreign body from the cranium requires proper management as it has high risk of further brain damage and seizures., CASE PRESENTATION: We report the case of a patient with cranial injury caused by hitting the head to the hook of a school desk. Due to the extreme nature of the injury, the following additional steps were necessary: taking help from a local firefighter team to cut the desk, surgical removal of the foreign body, and cranioplasty after 6 months. Following this, he was discharged without neurological deficits., DISCUSSION/CONCLUSION: Neurotrauma is one of the major causes of death in children. The damage and effect of the injuring foreign body depends on its size, shape, velocity, trajectory, and entry point. It should be kept in mind that any high-frequency processes applied on the extracranial parts of conductive objects, such as metal bars, may trigger seizures. Preoperative extracranial intervention for huge penetrating foreign bodies should be performed under anticonvulsant administration and intubation to decrease the risk of epileptic seizures and its complications.

2104. Guzman-Almagro, E., et al. (2021). "Open-globe-injury: A single center Spanish retrospective 5-year cohort study." European journal of ophthalmology **31**(5): 2710-2716.

PURPOSE: To review and analyze the epidemiological profile, clinical characteristics and visual outcomes in patients attended for traumatic open globe injury (OGI) at our hospital over a 5-year period., DESIGN: Retrospective chart review study., METHODS: Retrospective analysis of all patients attended at Fundacion Jimenez Diaz University Hospital for OGI between 2011 and 2015. Data from 104 patients including demographics, ocular examination, medical

and surgical treatment, visual outcomes, and complications were analyzed., RESULTS: Most patients were male (79.8%) and the median age at the time of injury was 41 years (interquartile range 31.5-58 years). Work-related accidents represent more than half of the cases and their main mechanism was penetrating trauma or foreign body. This type of accident had good prognosis (median final visual acuity in decimal scale 0.8; interquartile range 0.4-1). Falls were the second most common cause of OGI, predominantly affecting senior women (50%), with a high incidence of ocular rupture (50%) and associating a poor visual prognosis (median final visual acuity 0.01; interquartile range 0-0.5). There was a strong correlation (0.75; $p < 0.001$) between ocular trauma score (OTS) and final best corrected visual acuity., CONCLUSIONS: Two different patterns of OGI were identified in our sample. Work-related trauma in young males was the most common form of OGI and was associated with good prognosis. However, falls in senior women were associated with poor prognosis.

2105. Haas, B., et al. (2009). "Survival advantage in trauma centers: expeditious intervention or experience?" Journal of the American College of Surgeons **208**(1): 28-36.

BACKGROUND: Trauma patients who receive care at designated trauma centers have a decreased risk of death, but the processes of care that lead to improved outcomes are unknown. We set out to examine the relationship between trauma center care, rapidity of assessment and intervention, and mortality among trauma patients with indications for immediate operative intervention., STUDY DESIGN: Data were collected from a multicenter prospective cohort study of adult patients cared for in trauma centers (TC) and nondesignated centers (NTC). From this cohort, we identified patients with two patterns of injury: hypotensive penetrating trauma (PT) and blunt traumatic brain injury (TBI) with mass effect. Times from admission to relevant interventions were assessed, as were relative risks of in-hospital death in TC compared with NTC. Relative risks were adjusted for differences in case mix using propensity analysis., RESULTS: Among 1,331 patients who met inclusion criteria, 23.5% died in hospital. Relative risk of death was 0.61 (95% CI, 0.43 to 0.86) among patients managed at TC compared with those admitted to NTC. This survival advantage was greatest among patients in the PT group managed at TC (relative risk: 0.43; 95% CI, 0.19 to 0.94). Relative risk of death at TC among patients in the TBI group was 0.72 (95% CI, 0.50 to 1.0). Within the first 24 hours of admission, however, there was no statistically significant difference between median times to radiographic assessment or operative intervention at TC as compared with other hospitals., CONCLUSIONS: Risk of death is considerably lower among patients requiring early operative intervention if they are treated at a designated Level I trauma center. These outcomes are not a result of more rapid assessment and intervention alone, and emphasize the complex factors that contribute to the survival benefit of trauma center care.

2106. Habal, M. B. and R. A. Rasmussen (1993). "Osseointegrated implants in cranial bone grafts for mandibular reconstruction." The Journal of craniofacial surgery **4**(1): 51-57.

Branemark osseointegrated implants were used in combination with a cranial bone graft that was harvested from the outer table of the skull in a patient with a discontinuity defect of the anterior aspect of the mandible. First, a staged procedure allowed reconstruction of the defect. The second stage was placement of the Branemark osseointegrated implant fixtures, followed by contouring the interior genial area by adding more bone grafts. The initial stabilization was done with an adoption plate that was used to stabilize the mandibular fragments during the healing phase. This plate was subsequently removed when the osseointegrated implants were placed. The patient had a full course of oral rehabilitation and a satisfactory final outcome.

2107. Haberkamp, T. J., et al. (1995). "Gunshot injuries of the temporal bone." The Laryngoscope **105**(10): 1053-1057.

Despite an increasing incidence of gunshot wounds to the temporal bone, there is little in the literature regarding management of survivors of these serious injuries. Twelve patients were treated for such wounds between 1986 and 1994. The most frequent presentations were cranial nerve injury, especially facial paralysis (9 patients), hearing loss (7), vascular injury (4), and vestibular dysfunction (3). Persistent cerebrospinal fluid otorrhea was uncommon (1 patient) in this series. Computed tomography and audiovestibular testing were helpful in evaluating the severity of injury and guiding the surgical approach when necessary. Electroneurography was helpful in evaluating facial nerve function; however, documented disruption of the facial nerve canal in itself was considered an indication for surgical exploration. Other indications for surgical intervention included evidence of dural tear, vascular injury, and severe disruption of the external auditory canal.

2108. Hachemi, M., et al. (2007). "Delayed rupture of traumatic aneurysm after civilian craniocerebral gunshot injury in children." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **23**(3): 283-287.

BACKGROUND: There are few published large series on civilian craniocerebral gunshot injuries in children. Traumatic intracranial aneurysms (TICAs) are rare and highly unstable lesions. They represent less than 1% of all aneurysms and can either rupture within minutes after formation or remain quiescent for several weeks or years, manifesting with delayed hemorrhage and neurologic deterioration., CASE HISTORY: We report the case of a 10-year-old girl who was referred for coma after high-velocity craniocerebral gunshot wound and neurological deterioration 7 days after the initial injury. A massive right posterior occipital hematoma caused by the rupture of an unsuspected right posterior cerebral artery TICA was discovered. TICA was treated by coil embolization, with a good neurological recovery at 6-month follow-up., DISCUSSION: We discuss the pathogenesis and the management of TICA in a child after civilian craniocerebral gunshot injuries., CONCLUSIONS: TICAs should be suspected in patients with civilian craniocerebral gunshot injuries, presenting with secondary neurological deterioration, to carry out emergent CT scan and angiographic exploration before contemplating definitive endovascular treatment. Endovascular management may be a prompt safe-to-use technique and a valuable option, especially when surgery is highly risky.

2109. Hackett, M. J., et al. (2015). "In situ biospectroscopic investigation of rapid ischemic and postmortem induced biochemical alterations in the rat brain." ACS chemical neuroscience **6**(2): 226-238.

Rapid advances in imaging technologies have pushed novel spectroscopic modalities such as Fourier transform infrared spectroscopy (FTIR) and X-ray absorption spectroscopy (XAS) at the sulfur K-edge to the forefront of direct in situ investigation of brain biochemistry. However, few studies have examined the extent to which sample preparation artifacts confound results. Previous investigations using traditional analyses, such as tissue dissection, homogenization, and biochemical assay, conducted extensive research to identify biochemical alterations that occur ex vivo during sample preparation. In particular, altered metabolism and oxidative stress may be caused by animal death. These processes were a concern for studies using biochemical assays, and protocols were developed to minimize their occurrence. In this investigation, a similar approach was taken to identify the biochemical alterations that are detectable by two in situ spectroscopic methods (FTIR, XAS) that occur as a consequence of ischemic conditions created during humane animal killing. FTIR and XAS are well suited to study markers of altered metabolism such as lactate and creatine (FTIR) and markers of oxidative stress such as aggregated proteins (FTIR) and altered thiol redox (XAS). The results are in accordance with previous investigations using biochemical assays and demonstrate that the time between animal death and tissue dissection results in ischemic conditions that alter brain metabolism and initiate oxidative stress. Therefore, future in situ biospectroscopic investigations utilizing FTIR and XAS must take into consideration that brain tissue dissected from a healthy animal does not truly reflect the in vivo condition, but rather reflects a state of mild ischemia. If studies require the levels of metabolites (lactate, creatine) and markers of oxidative stress (thiol redox) to be preserved as close as possible to the in vivo condition, then rapid freezing of brain tissue via decapitation into liquid nitrogen, followed by chiseling the brain out at dry ice temperatures is required.

2110. Hada, M., et al. (2016). "An unusual case of protruding retro-orbital metallic foreign body." Indian journal of ophthalmology **64**(8): 604-606.

A 34-year-old female presented with firecracker injury with curved metallic foreign body embedded in the left orbit and protruding out through the upper eyelid. The report highlights notable aspects in diagnosis, decision-making, and successful removal of this unusual case of retro-orbital foreign body.

2111. Hadas, N., et al. (1990). "Tangential low-velocity missile wound of the head with acute subdural hematoma: case report." The Journal of trauma **30**(3): 358-359.

Tangential missile wounds of the head without skull fracture are a known entity. Usually, references in the literature indicate that this type of injury results from a high-velocity missile impact. We present a case of a tangential missile head wound caused by a low-velocity missile. As the range of fire was short, the quantity of energy that might be released could be equated with that released by a high-velocity missile fired from a much longer range. This possibility

should be brought to the attention of clinicians as an essential element in this pre-treatment clinical evaluation. We propose a pathomechanical explanation for the development of the clinical state.

2112. Haddad, A. (1993). "Ethics in action. What should you do?" RN **56**(5): 25-27.

2113. Haddad, F. S. (1978). "Nature and management of penetrating head injuries during the civil war in Lebanon." Canadian Journal of Surgery **21**(3): 233-240.

During the recent war in Lebanon, at one hospital one fifth of all casualty admissions were patients with skull injuries associated with penetrating brain damage. Wounds inflicted by high velocity missiles carried the greatest mortality. The patient's state of consciousness afforded the best guide to prognosis. Craniotomy, when feasible, was found preferable to the accepted technique of craniectomy in the management of these cases. Thorough debridement and complete hemostasis are essential, and when these have been accomplished, deeply placed bony fragments may be left in situ with impunity. Traumatic aneurysm develop by no means rarely and therefore postoperative arteriography is advisable.

2114. Haddad, F. S. (1978). "Wilder Penfield Lecture: nature and management of penetrating head injuries during the Civil War in Lebanon." Canadian journal of surgery. Journal canadien de chirurgie **21**(3): 233-240.

During the recent war in Lebanon- at one hospital one fifth of all casualty admissions were patients with skull injuries associated with penetrating brain damage. Wounds inflicted by high velocity missiles carried the greatest mortality. The patient's state of consciousness afforded the best guide to prognosis. Craniotomy, when feasible, was found preferable to the accepted technique of crainectomy in the management of these cases. Thorough debridement and complete hemostasis are essential, and when these have been accomplished, deeply placed bony fragments may be left in situ with impunity. Traumatic aneurysms develop by no means rarely and therefore postoperative arteriography is advisable.

2115. Haddad, F. S. (2002). "Penetrating missile head injuries: Personal experiences during the Lebanese conflict." Neurosurgery Quarterly **12**(4): 299-306.

This is an overview of the experience of the author during 18 years of civil strife in Lebanon. What can be worse than brain missile injury is the psychologic effect on the people caused by such wars. Unfortunately, these wars are common and have been going on uninterruptedly since World War II. With an experience of more than 1,000 cases, the author has attempted to give a simple classification of these injuries and presents the essence of their treatment. Four main topics are discussed: 1) craniotomy versus craniectomy; 2) the importance of retained fragments in the brain; 3) traumatic aneurysms; and 4) a rapid, easy, and helpful grading system.

2116. Haddad, F. S., et al. (1991). "Traumatic intracranial aneurysms caused by missiles: their presentation and management." Neurosurgery **28**(1): 1-7.

Only 30 cases of traumatic intracranial aneurysm (TICA) secondary to missile injury have been reported to date. To these we add 15 more cases. Missile TICAs are often seen on a secondary branch of the middle cerebral artery and are usually accompanied by a intracerebral hematoma (80%) or by an acute subdural hematoma (26%). Fourteen of our cases were secondary to shrapnel injuries and only one was secondary to a bullet. None of the injuries was through-and-through. TICAs may enlarge in time and, seemingly inoffensive, may rupture and lead to death. All seven TICAs studied histologically proved to be false aneurysms. TICAs are best treated through trapping and excision. The outcome depends on the patient's status and level of consciousness before surgery. Indications for angiography are discussed.

2117. Haddad, F. S., et al. (1996). "Penetrating head injuries: a trap for the unwary." Injury **27**(1): 72-73.

2118. Hadjizacharia, P., et al. (2009). "The impact of intoxication on the number of organs available for transplantation after brain death." The American surgeon **75**(5): 416-420.

A significant number of head-injured trauma patients are likely to present with a positive toxicology. The purpose of this study is to investigate whether intoxication with substances such as cocaine, amphetamine, alcohol, and opiates on admission has any influence on the number of organs that are recovered after brain death in these patients. We conducted a retrospective review of all organ donor patients admitted to a Level I trauma center over a 4-year period (2002 to 2005). Patients with positive toxicology screens on admission were compared to counterparts with negative screens with regard to the number of organs harvested. There were 90 organ donor patients during the 4-year period. There were 63 (70%) patients to negative toxicology screens. The remaining 27 (30%) were found to be intoxicated with a variety of substances, including alcohol (18%), cocaine (4%), amphetamines (9%), benzodiazepines (4%), opiates (4%), and polysubstances (10%). A comparison of total organs and individual organs donated by both intoxicated and nonintoxicated patients showed no overall statistical difference in the number or type of organs donated between the two groups. Thus, the prospect of organ procurement should not be overlooked in intoxicated patients.

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2119. Haegen, T. W., et al. (2005). "Use of image-guided systems in the reconstruction of the periorbital region." Archives of facial plastic surgery **7**(4): 266-271.

The conflict in the Middle East has led to an increase in the incidence and severity of facial trauma evaluated at tertiary military medical facilities. The Naval Medical Center San Diego, San Diego, Calif, has treated 5 patients with penetrating injuries to the orbit with associated comminuted fractures. We have used the technology of image-guided surgery to assist in reconstructing these injuries. Image-guided surgery has many applications in the head and neck. This review consists of a series of traumatic applications of the image-guided system with a focus on orbital and midfacial trauma. We will discuss the benefits and drawbacks of this technique compared with previously described techniques.

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2120. Haeren, R. H. L., et al. (2012). "Posttraumatic skull hemangioma: case report." Journal of neurosurgery **117**(6): 1082-1088.

Intraosseous cavernous hemangiomas of the skull are rare lesions for which the origin is unclear. The authors present a case in which there was a radiologically documented history of trauma preceding the development of a hemangioma in the frontal bone. In a review of the literature the authors found 83 cases of skull hemangiomas, and 43% of the lesions were located in the frontal bone. In 25% of these lesions, previous trauma was reported anamnestically. The present case and radiological findings related to it suggest a causal relationship between trauma and the development of intraosseous hemangioma.

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2121. Hafezi, F. and D. Paridaens (2007). "[Unusual orbital trauma with diplopia]." Ungewohnliches orbitales Trauma mit Diplopie. Diagnose: Orbitales Trauma durch Hochgeschwindigkeitsprojektil. **104**(2): 163-164.

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2122. Hagai, B., et al. (2014). "Exploring the meaning of the Subthalamic Nucleus's neural signal in Parkinson." Stereotactic and Functional Neurosurgery **92**: s192-s193.

Objective: Exploring the meaning of the Subthalamic Nucleus's neural signal in Parkinson. Methods: We studied the impact of the neurophysiological and surgical properties of DBS of the subthalamic nucleus (STN-DBS) on motor, neuropsychological (NPSY), and speech outcome in Parkinson. We included 48 patients (19 female, 29 male), excluding brain injuries, DBS of other targets, infections, and hardware complications. Presenting symptoms and outcomes were correlated with STN-DBS laterality/dominance, micro-electrode recordings (MER) and surgical properties at 3.8 months before STN-DBS and 16.2 months after respectively. Principle components analysis (PCA) of the pre-/post-DBS scores in the 3 outcome categories was used to design a simplified evaluation protocol. Results: We had a homogenous group of patients in terms of symptoms' types and severity, brain dominance and gender. STN-DBS worsen frontal neuropsychological faculties and speech intelligibility, however in a rather acceptable degree in the scope of the significant improvement in the overall quality of life. In addition to the known impact of laterality, it seems that both STN-dominance and STN-neural-signal have a crucial clinical impact. Pre-DBS analyses showed that UPDRS I-III (Tremor, Rigidity/Bradykinesia, Axial Deficit), duration of PD (10.5±4.3y, p=0.9) and levodopaequivalent drug dosage (LEDD;

1225±611, p=0.9) were indifferent to laterality/dominance. Mean age was lower in the bilateral STN-DBS (Bi-STN) group (54.5y) than the unilateral right-STN (Uni-Rt; 60.7y) and unilateral left-STN (Uni-Lt; 63.8y). Bi-STN patients had worse scores for activities of daily living (ADL) (Bi-STN 58, Uni-Rt 70, Uni-Lt 73, p=0.02) and UPDRS-IV (Bi-STN 7.30, Uni-Rt 5.38, Uni- Lt 3.69, p=0.0037). Voice and neuropsychology scores were normal in all groups. Following DBS, the Uni-Lt group least improved in ADL (Uni-Lt 11.7% <Uni-Rt 20.5% < Bi-STN 48.5%, p<0.05) and LEDD (Uni-Lt -16.9% < Uni-Rt -35% < Bi-STN -43.5%, p<0.05). ADL improvement was explained by the ON/OFF fluctuations (Uni-Lt -1, Uni-Rt -1.2, Bi-STN -4.2, p<0.05) rather than by the absolute scores (both before and after surgery). DBS was associated with a greater improvement in rigidity and bradykinesia than in tremor; the opposite result was for drugs. The ipsilateral effect of DBS was more prominent for bradykinesia than tremor. Axial deterioration was resistant to DBS (2.5, p=0.03). We also showed a trend of better improvement among patients undergoing DBS at earlier PD-stages. Speech intelligibility and NPSY deteriorated from normal before DBS to abnormal after Bi-STN and Uni-Lt DBS (p<0.03) only. Frontal-NPSY properties were more DBS-vulnerable. There was an overall unexplained increase in the use of anti-psychotic/anti-depressive drugs. DBS most significantly improved ON/OFF fluctuations will drugs improved motor symptoms. Last we PCA which yielded six clinically and mathematically independent factors: Bradykinesia-Rigidity, Tremor, Speech-intelligibility, Memory-Language, Executive functioning and Attention-Concentration. Wider STNs (p<0.001), higher normalized-neuronal signal (p=0.03), and presence of active cathodes within the β-oscillatory STN regions (p=0.2) were more common in patients with greater motor improvement and less speech/NPSY deterioration. As for the number of brain penetrations, we found no significant and consistent trend. Conclusion: Within the constraints of the population size and time to survey, it seems plausible to suggest the following. ON/OFF fluctuations are affected by STN laterality and dominance and have a prominent impact on ADL. Not only STN and LEDD impacts differ (bradykinesia and rigidity for the first and tremor for the latter) but moreover Bi-STN showed the most significant effect upon ON/OFF fluctuation (compared with both unilateral groups), possibly suggesting different underlying mechanisms. Besides laterality per se clinicians should consider dominant vs non-dominant STN involvement (which might prominently impact the speech-neuropsychology profiles). On the b sis of our findings, we designed an innovative and simplified evaluation protocol using representative motor, speech, and neuropsychology. We introduce a novel surgical-neurophysiological STN-score (composed of STN width, normalized neuronal signals, and β oscillations) to facilitate the decision- making process during surgery in terms of target selection and the final location of the chronic stimulation cathode.

2123. Hagan, R. E. (1971). "Early complications following penetrating wounds of the brain." Journal of neurosurgery **34**(2 Pt 1): 132-141.

The experience of an evacuation hospital in Japan in treating 506 consecutive patients from Vietnam with penetrating wounds of the brain is reported with particular reference to early complications. Sixty-eight patients were operated on for still retained intracranial foreign bodies. Thirty-five of the 62 patients with retained intracranial bone fragments had positive microbial cultures of the fragment, which in 63% showed Staphylococcus epidermis. All of the metallic fragments cultured revealed microbial growth. Superficial infections were noted in 32 patients. Superficial plus deep infections were found in eight patients with no retained bone fragments. Eighteen patients had meningitis proven by culture, while an additional 12 patients with CSF sugars of less than 40 mg% were assumed to have meningitis. Twelve patients developed CSF leaks requiring surgery. Twenty-three patients (4.54%) died as a result of their wounds. The neurosurgical treatment recommended for these patients is described.

2124. Hage, T., et al. (2020). "Does the type of explosive brain-death correlate with outcome after heart transplantation?" Journal of Investigative Medicine **68**(1): A34.

Purpose of study In heart transplantation, the origin of brain death may have an impact on outcome after heart transplantation. It has been reported that explosive brain death, including head trauma, gunshot to the head, and subarachnoid hemorrhage (SAH), may lead to increased catecholamine surge with damage to the donor heart as well as upregulation of inflammatory markers. Other forms of brain death such as hanging, drowning, and drug overdose may also impact outcome, but this has not been firmly established. Therefore, we sought to evaluate explosive brain death and its relationship to outcomes in the current era. Methods used Between 2010 and 2018, we assessed 823 heart transplant patients and divided them into two groups based on whether the heart donor underwent explosive or non-explosive brain death. Endpoints included 1-year survival, freedom from the development of cardiac allograft vasculopathy (CAV, as defined by stenosis >30% by angiography), non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter

defibrillator/pacemaker implant, stroke), any treated rejection (ATR), acute cellular rejection (ACR), antibody-mediated rejection (AMR), donor specific antibodies (DSA), and severe primary graft dysfunction (PGD). Summary of results Patients from both explosive and non-explosive brain death mechanisms have comparable outcomes in terms of survival and freedom from severe PGD, CAV, NF-MACE, and rejection. Conclusions Explosive brain death does not appear to be associated with less than optimal outcomes after heart transplantation.

2125. Hagemeier, L., et al. (2009). "Extended suicide using an atypical stud gun." Forensic science international **189**(1-3): e9-12.

Suicides with stud guns are uncommon, but are well documented in the literature. On rare occasions, stud guns are also used as a homicide weapon. This case report describes an extended suicide in which a husband killed his wife and their two dogs, which lived on the property. The husband then committed suicide with a shot from the stud gun into his skull. He was a 70-year-old pensioner, a retired butcher, who was found by his son. He was lying in a supine position on a carpet in the living room, with the stud gun stuck in his skull. During autopsy, high concentrations of an antihistamine were found in the blood of each corpse; this drug is used as a soporific. In contrast to the literature, which mainly describes powder deposits due to the use of conventional stud guns, in this case a stud gun was used in which the expanding gases and powder escaped together with the central bolt at the front of the device; powder drains were not involved. Detailed findings of the autopsy are given with reference to this type of stud gun.

2126. Hagen, M., et al. (2020). "Cerebral lipogranuloma: A penetrating traumatic brain injury." Neurology **95**(22): 1019-1020.

2127. Haghi, M. R., et al. (2009). "A penetrating trauma to the temple." Emergency medicine journal : EMJ **26**(10): 746.

2128. Hagos, F., et al. (2014). "Probenecid increases n-acetylcysteine brain levels: Implications for brain-directed therapeutics." Critical care medicine **42**(12): A1511.

Learning Objectives: A major hurdle in the translation of pharmacological therapies for treatment of CNS diseases is penetration of drugs across the blood-brain barrier (BBB) and sustained bioavailability. For example, Traumatic Brain Injury (TBI) is a leading cause of death in children and young adults, yet there are no FDA-approved drugs to treat neuronal damage after TBI. Lack of consideration for pharmacokinetics and penetration into the brain may be one of the reasons for failure of previous TBI drug trials. N-acetylcysteine (NAC) is an antioxidant with limited BBB penetration. Given that oxidative stress contributes to the pathogenesis of TBI, a strategy augmenting brain bioavailability of drugs like NAC could prove efficacious. We hypothesized that the organic acid transporter and multidrug resistance-associated protein inhibitor, probenecid (PB), increases plasma and brain levels of the antioxidant NAC in rats. Methods: Naive 16-18 d.o. male Sprague-Dawley rats (n=4/time point) received NAC (163 mg/kg) with or without PB (150 mg/kg) i.p. Plasma and brain tissue were collected at 0.5, 1, 2, 4, 6 and 8h after injection for analysis. NAC concentrations in plasma and brain homogenate were measured using a validated LC-MS/MS assay. Results: Plasma exposure of NAC was increased by 1.65 fold in the NAC+PB group compared to the NAC only group (AUC0-inf: 2.42 ± 0.2×105 vs 1.46 ± 0.06×105 ng∗h/mL; p=0.0037). Brain exposure of NAC was increased by 2.41 fold in the NAC+PB group (AUC0-inf: 341.1 ± 40.5 vs 822.2 ± 82.1 ng∗h/mL; p=0.0028). PB reduced apparent plasma clearance of NAC by 65% (CL/F: 1113 ± 29 vs 674 ± 8.2 mL/h/ kg). Conclusions: Both plasma and brain exposure of NAC were significantly increased by co-administration of PB. The decrease in apparent plasma clearance of NAC is a novel finding that strongly suggests that NAC is a transporter substrate. PB increased brain exposure by 1.46 fold more than the plasma exposure implying possible transporter-related effects at the BBB. Both NAC and PB are FDA approved and thus provide an attractive therapeutic strategy for CNS diseases including TBI.

2129. Hagos, F. T., et al. (2019). "Membrane transporters in traumatic brain injury: Pathological, pharmacotherapeutic, and developmental implications." Experimental neurology **317**: 10-21.

Membrane transporters regulate the trafficking of endogenous and exogenous molecules across biological barriers and within the neurovascular unit. In traumatic brain injury (TBI), they moderate the dynamic movement of

therapeutic drugs and injury mediators among neurons, endothelial cells and glial cells, thereby becoming important determinants of pathogenesis and effective pharmacotherapy after TBI. There are three ways transporters may impact outcomes in TBI. First, transporters likely play a key role in the clearance of injury mediators. Second, genetic association studies suggest transporters may be important in the transition of TBI from acute brain injury to a chronic neurological disease. Third, transporters dynamically control the brain penetration and efflux of many drugs and their distribution within and elimination from the brain, contributing to pharmacoresistance and possibly in some cases pharmacosensitivity. Understanding the nature of drugs or candidate drugs in development with respect to whether they are a transporter substrate or inhibitor is relevant to understand whether they distribute to their target in sufficient concentrations. Emerging data provide evidence of altered expression and function of transporters in humans after TBI. Genetic variability in expression and/or function of key transporters adds an additional dynamic, as shown in recent clinical studies. In this review, evidence supporting the role of individual membrane transporters in TBI are discussed as well as novel strategies for their modulation as possible therapeutic targets. Since data specifically targeting pediatric TBI are sparse, this review relies mainly on experimental studies using adult animals and clinical studies in adult patients.

2130. Haider, A., et al. (2015). "Orbital Injury From Needlefish Impalement." Ophthalmic plastic and reconstructive surgery **31**(6): e170.

2131. Haider, G., et al. (2020). "Intracranial Hypertension Following Gunshot Wound to the Torcula: Case Report and Literature Review." World neurosurgery **137**: 94-97.

BACKGROUND: Elevation of bone for the treatment of depressed skull fractures overlying venous sinuses is rarely required or performed. The neurosurgical literature only describes a handful of cases of surgical intervention in which the posterior two-thirds of the superior sagittal sinus was involved. Clinical course is variable, signs and symptoms suggest increased intracranial pressure, and all conservative measures should be exhausted before proceeding with the surgical route., CASE DESCRIPTION: A 27-year-old man presented with a self-inflicted gunshot wound to posterior head. On presentation, there were no neurologic complaints. On imaging, the bullet fragment was associated with a comminuted anteriorly displaced fracture over the torcula. Vessel imaging showed tapering of the superior sagittal sinus and transverse sinuses near the torcula, suggesting narrowing due to mass effect. The patient did not respond to initial conservative management and developed worsening diplopia and papilledema concerning for increased intracranial pressure. Occipital/suboccipital craniectomy was performed with elevation of depressed skull fracture, decompression of dural venous sinus, removal of bullet, and mesh cranioplasty. Repeat ophthalmology examination postoperatively showed improvement in optic disc edema and diplopia., CONSLUSIONS: This case confirms that the approach of surgical management of superior sagittal venous sinus injuries associated with skull fractures described in the literature also can be used successfully for injuries over the torcula if conservative management does not help alleviate the symptoms and results in good outcome. It was felt that delayed surgery also plays an important role, as it gives time for scar tissue to form, which may help to protect the sinus from injury during surgery.

2132. Haley, A. C. and C. Abramson (2009). "Traumatic pneumocephalus in a dog." Journal of the American Veterinary Medical Association **234**(10): 1295-1298.

CASE DESCRIPTION: A 17-month-old dog was evaluated because of progressive tetraparesis. The dog had a history of craniofacial trauma at 2 months of age., CLINICAL FINDINGS: Results of a neurologic examination were suggestive of a lesion localized to the medulla. Computed tomography revealed extensive pneumocephalus extending throughout the ventricular system and into the cranial cervical subarachnoid space., TREATMENT AND OUTCOME: Because of the deterioration in the dog's clinical condition, an emergency bilateral transfrontal craniectomy was performed. A large amount of pyogranulomatous material was found intraoperatively. Neurologic and computed tomographic abnormalities were no longer evident during a recheck examination 8 weeks after surgery., CLINICAL RELEVANCE: Findings suggested that pneumocephalus should be considered in the differential diagnosis for dogs with neurologic signs of an intracranial abnormality, particularly if the dog has a history of craniofacial trauma.

2133. Hall, J. R. (2008). "To the editor." Journal of Trauma - Injury, Infection and Critical Care **65**(2): 496-497.

2134. Haller, I., et al. (2019). "Severe craniofacial trauma after multiple pistol shots." Open Medicine (Poland) **14**(1): 629-632.

A 48-year-old woman suffered from life-threatening injuries in head and chest caused by six pistol shots fired at close range in an attempted homicide. We report here on our successful airway management and bleeding control at the scene of crime and the multidisciplinary surgical treatment of the associated head and neurovascular injuries.

2135. Haller, J. R. and C. Shelton (1997). "Medial antebrachial cutaneous nerve: a new donor graft for repair of facial nerve defects at the skull base." The Laryngoscope **107**(8): 1048-1052.

When grafting a facial nerve defect after resection of a skull base cancer, the use of the greater auricular nerve is generally contraindicated because of concern of malignant involvement. In the past, the sural nerve was used as a donor graft for reconstruction of the facial nerve. We have found a sensory branch of the median nerve of the upper arm, the medial antebrachial cutaneous (MAC) nerve, to be a suitable option for facial nerve grafting. The MAC nerve provides a good diameter match for the facial nerve and has branching to allow reconstruction of the distal facial nerve in the parotid bed. The length is adequate to graft from the brainstem to the distal facial branches. Loss of sensation is limited and well tolerated by the patient. The MAC nerve has been used in grafting in 15 patients with skull base disease and facial nerve defects. No complications have been encountered, and the functional return appears to be similar to other grafts. In our practice the MAC nerve is a valuable option for facial nerve repair at the skull base.

2136. Hallock, G. G. (1995). "Self-inflicted gunshot wounds of the lower half of the face: the evolution toward early reconstruction." The Journal of cranio-maxillofacial trauma **1**(3): 50-55.

The self-inflicted gunshot wound of the lower half of the face traditionally has been treated by multistaged and prolonged reconstructive maneuvers that often left significant and uncorrectable secondary deformities. Modern cranio-maxillofacial methods for reduction and rigid fixation of the facial skeleton, using immediate autogenous bone grafts when required, also has been efficacious for the acute management of these severe gunshot injuries. These methods can reduce the previously expected morbidity. Today's improved outcomes also are a consequence of the use of more reliable regional flaps and microsurgical techniques, which permit the early and simultaneous restoration of bone and soft tissue loss once all devitalized tissues have been adequately debrided.

2137. Halloran, L. G. and S. A. Levinson (1973). "Extra-cranial carotid artery injury following non-penetrating cervical trauma." Virginia medical monthly **100**(9): 811-passim.

2138. Halmy, C., et al. (2011). "[Mandibular reconstruction with free osteocutaneous fibula flap using the occipital artery as recipient vessel]." Mandibularekonstrukcio arteria occipitalisra varrt szabad osteocutan fibulalebennyel. **152**(16): 642-645.

Authors performed reconstructive surgery for extensive skin and mandibular bone defect following gunshot injury to the left side of the face. The soft tissue and bone defect was reconstructed with the free osteocutaneous fibula flap harvested from the left lower leg, as suitable local reconstructive flap was not available. The bony continuity was reestablished with a 7 cm long fibula segment. Microvascular anastomoses were performed to the left occipital artery and the left internal jugular vein. The occipital artery was chosen as the external carotid system was completely missing on the right side and was missing several branches on the left side due to the trauma. The fibular segment became fully incorporated and 95% of the flap healed by primary intention.

2139. Hamblin, M. (2014). "Can transcranial low-level laser light therapy induce the brain to repair itself?" Lasers in surgery and medicine **46**: 52.

Background: A multitude of brain disorders could be benefited if the brain could be stimulated to heal and repair itself. Transcranial low-level laser light therapy (LLLT) at near-infrared wavelengths (810 nm) penetrates the scalp and skull and provides many beneficial effects to the brain. These include neuroprotection, anti-apoptosis, anti-

inflammation, angiogenesis, neurogenesis and synaptogenesis. Study: We used mice that had received a traumatic brain injury either by a controlled cortical impact or by a closed head injury to test the beneficial effects of LLLT. Mice were followed with neurological severity score, wire grip test, forced swim test, tail suspension test, Morris water maze, and numerous immunofluorescence studies on brain sections removed at sacrifice. Results: The neurological functioning of mice was improved as demonstrated by the neurological severity score and the wire grip and motion test. Learning and memory was improved as shown by the Morris Water Maze Test. Immunofluorescence studies in brain sections showed increased incorporation of BrdU in the hippocampus and subventricular zone as an indicator of neurogenesis-the formation of new brain cells. The pleiotropic neurotrophin-brain derived neurotrophic factor (BDNF) was increased at early time points while synapsin1 was increased at later time points indicating that new connections were being formed between existing neurons. Conclusion: The beneficial effects in stimulating neurogenesis, synaptogenesis and BDNF after transcranial LLLT suggest the treatment may have wider applications beyond TBI to neurodegenerative diseases such as Alzheimer's and psychiatric diseases such as major depression.

2140. Hamblin, M., et al. (2013). "Transcranial low-level laser (light) therapy in mice: Tramautic brain injury and beyond." Lasers in surgery and medicine **45**: 50-51.

Background: Traumatic brain injury (TBI) has no good treatment at present. Transcranial low-level laser (light) therapy at near-infrared wavelengths (810 nm) penetrates the scalp and skull and provides many beneficial effects to the brain. These include neuroprotection, anti-apoptosis, anti-inflammation, angiogenesis, neurogenesis and synaptogenesis. These effects could also be beneficial in numerous brain disorders. Study: Mice were subjected to two different types of TBI (closed head and controlled cortical impact (CCI)) and treated with LLLT to the head starting at 4 hour post-injury. The wavelength, fluence, power density, pulse structure and treatment repetition were varied. Mice were followed with neurological severity score, wire grip test, forced swim test, tail suspension test, Morris water maze, and numerous immunofluorescence studies on brain sections removed at sacrifice. Results: In the closed head model a single treatment 4-hours post-TBI with CW lasers at 660nm and 810nm were effective, while 730nm and 980nm were not. In the CCI model 810-nm laser pulsed at 10Hz was superior to 810nm laser at CW or pulsed at 100 Hz. In another study we compared a single treatment 4 hours post TBI with three daily treatments and with fourteen daily treatments. Three daily treatments gave best results while 14 treatments gave no benefit. This result was explained by the lack of neurogenesis after 14 treatments that was apparent after 3 treatments. Upregulation of a neurotrophin (BDNF) and markers for synaptogenesis was also seen. Conclusion: The beneficial effects in stimulating neurogenesis, synaptogenesis and BDNF after transcranial LLLT suggest it may have wider applications beyond TBI to neurodegenerative diseases such as Alzheimer's and psychiatric diseases such as major depression.

2141. Hamblin, M., et al. (2012). "Mechanisms of action of transcranial LLLT for traumatic brain injury." Lasers in surgery and medicine **44**: 49.

Background: Low-level laser (or light) therapy (LLLT) is attracting growing interest to treat both stroke and traumatic brain injury (TBI). The fact that near-infrared light can penetrate into the brain allows non-invasive treatment to be carried out with a low likelihood of treatment-related adverse events. It is proposed that red and NIR light is absorbed by chromophores in the mitochondria of cells leading to changes in gene transcription and upregulation of proteins involved in cell survival, antioxidant production, leading to preservation of brain tissue and new brain cell formation. Study: Two models of TBI in mice were developed; a closed head weight drop and an open skull controlled cortical impact. Transcranial 810nm laser therapy consisting of a 36 J/-2 given as single exposure 4-hours post TBI or as 3 or 14 similar daily exposures. Mice were followed by neurological performance tests for 28 days and were sacrificed at various times post-TBI for histological and immunofluorescence studies. Results: A single laser treatment gave a positive benefit in neurological severity score and 3 daily laser treatments a greater benefit, but 14 laser treatments gave no benefit over sham TBI control. Histological studies at necropsy suggested that the cortical lesion was repaired by neural progenitor (stem) cells (BrdU+, NeuN+) from the subgranular zone of the dentate gyrus and the sub-ventricular zone, possibly stimulated by the laser. We also found reduced caspase-3 expression at 4 days suggesting lower brain cell apoptosis, increased BDNF at 7 days suggesting a mechanism of neurogenesis, and increased synapsin-1 at 28 days suggesting formation of new synapses. Increased GFAP was seen after 14 laser treatments suggesting an explanation for the ineffectiveness of that regimen. Conclusion: Transcranial laser therapy is a promising treatment for acute (and chronic TBI) and the lack of side-effects and paucity of alternative treatments encourages early clinical trials.

2142. Hamblin, M., et al. (2011). "In vitro and in vivo studies of lllt for traumatic brain injury." Lasers in surgery and medicine **43**: 951.

Background: Low-level laser (or light) therapy (LLLT) is attracting growing interest to treat both stroke and traumatic brain injury (TBI). The fact that near-infrared light can penetrate into the brain allows non-invasive treatment to be carried out with a low likelihood of treatment-related adverse events. It is proposed that red and NIR light is absorbed by chromophores in the mitochondria of cells leading to changes in gene transcription and upregulation of proteins involved in cell survival, antioxidant production, collagen synthesis, reduction of chronic inflammation and cell migration and proliferation. Study: We cultured primary cortical neurons from embryonic mouse brains and studied the effects of red and near-infra-red laser light on the generation of reactive oxygen species, nitric oxide release, transcription factor activation, intracellular calcium and ATP. Two models of TBI in mice were developed; a closed head weight drop and an open skull controlled cortical impact. Transcranial laser therapy consisting of a single exposure 4-hours post-TBI to 36 J/cm2 of various lasers was delivered. Results: There was a biphasic dose response in cultured cortical neurons for generation of ROS, NO, intracellular calcium, mitochondrial membrane potential and ATP. 810-nm or 660-nm laser significantly improved neurological severity score in TBI up to 4-weeks post-TBI. Laser therapy at 730 or 980nm was ineffective. Histological studies at necropsy suggested that the cortical lesion was repaired by neural progenitor (stem) cells from the subgranular zone of the dentate gyrus, possible stimulated by the laser. Conclusion: Transcranial laser therapy is a promising treatment for acute (and chronic TBI) and the lack of side effects and paucity of alternative treatments encourages early clinical trials.

2143. Hamedani, H., et al. (2022). "Traumatic carotid-cavernous fistula: A case report." Radiology Case Reports **17**(6): 1955-1958.

Direct carotid-cavernous fistulas are a rare complication of craniofacial trauma that often presents with proptosis, chemosis, and other visual symptoms. Disruption of blood flow from a carotid-cavernous fistula can cause cortical and cranial nerve ischemia which requires emergent intervention. Upon clinical suspicion of a carotid-cavernous fistula, patients should undergo computed tomography angiography (CTA) or magnetic resonance angiography (MRA), and digital subtraction angiography (DSA) if no other etiology is suspected. We present a case of a middle-aged patient with a gunshot wound in the posterior pharynx that resulted in a direct carotid-cavernous fistula of the left internal carotid artery.

2144. Hamilton, A., et al. (2014). "An unusual case of intraorbital foreign body and its management." International ophthalmology **34**(2): 337-339.

A 36-year-old aboriginal female presented following an assault with a wooden fence paling. Examination revealed a wooden object protruding lateral to the left eyebrow. CT scan showed a blow-in fracture of lateral orbital wall and a hypodense foreign body causing indentation of the globe and stretching of the optic nerve. The case was managed successfully with complete recovery of the visual acuity on day 1 post-surgery. This case highlights the importance of prompt removal of large lateral wooden intraorbital foreign body to achieve an excellent visual outcome.

2145. Hamilton, J. S., et al. (2007). "Post-traumatic ethmoid mucocele following penetrating craniofacial injury." Ear, nose, & throat journal **86**(8): 452-454.

2146. Hammed, A., et al. (2021). "Spontaneous migration of a falling bullet in the cerebellum reveals the importance of intraoperative skull X-ray." Journal of Surgical Case Reports **2021**(4).

Cranial gunshot wounds (CGSWs) are the most lethal types of the cranial traumas and they are usually mortal. Falling bullets or gravitational bullets are the ones that move under the effect of the gravity force after the muzzle force diminished. CGSWs constitute a major clinical challenge for neurosurgeons dealing with trauma in both the military and civil experience. We report the case of a 21-year-old man with a falling bullet wound to the head. The decision of surgical treatment of a bullet injury is difficult if it is in close proximity to vital structures; removal of the bullet may cause significant neurological damage; however, migration can lead to a worsening of the neurological status of the

patient. Before surgical removal of any intracranial bullet, as valuable information, it is recommended that a plain skull X-ray be obtained after final positioning of the head.

2147. Hammed, A., et al. (2022). "Spontaneous Migration of a Falling Bullet in the Cerebellum Reveals the Importance of Intraoperative Skull X-Ray." Brain injury **36**(SUPPL 1): 1.

Cranial gunshot wounds (CGSWs) are the most lethal types of the cranial traumas and they are usually mortal. Falling bullets or gravitational bullets are the ones that move under the effect of the gravitational force after the muzzle force diminished. CGSWs constitute a major clinical challenge for neurosurgeons dealing with trauma in both the military and civil experience. We report the case of a 21-year-old man with a falling bullet wound to the head-falling bullet wound to the head. In his physical examination, there was a single-entry wound situated on the left side of the parietal bone, about 2 cm left of the midline. Brain tissue was seen through the open wound. In the first neurological examination, the patient was confused and GCS at the time of admission was 14. Pupils were equally reactive, and his vitals were stable. Cranial computerized tomography (CT) revealed a bone defect of 0.5 cm in the left parietal region and a metallic object located between left occipital bone and inferior side of left cerebellar hemisphere. The patient underwent a left unilateral retrosegmoid craniectomy. Intraoperative skull X-ray was obtained and it revealed that the bullet had inversed and migrated upward inside the left cerebellar hemisphere and the bullet was removed. The decision of surgical treatment of a bullet injury is difficult if it is in close proximity to vital structures, removal of the bullet may cause significant neurological damage; however, migration can lead to a worsening of the neurological status of the patient.

2148. Hammon, W. M. (1971). "Analysis of 2187 consecutive penetrating wounds of the brain from Vietnam." Journal of neurosurgery **34**(2 Pt 1): 127-131.

A series of 2187 cases of penetrating wounds of the brain, treated in a U.S. Army Hospital in Vietnam, is analyzed according to operability, wounding agents, sites of cranial penetration, associated organ system injuries, operative and postoperative complications, and mortalities. A detailed description of the operative technique of thorough intracranial debridement and dural repair is presented and stressed. The previously established principles of combat neurosurgery are confirmed and their continued use recommended.

2149. Hammond, F., et al. (2015). "Safety, tolerability, and effectiveness of dextromethorphan/quinidine for pseudobulbar affect in patients with traumatic brain injury: PRISM-II." PM and R **7**(9): S112.

Objective: A multicenter, open label study (PRISM-II) was conducted to assess effectiveness, safety, and tolerability of dextromethorphan and quinidine (DM/Q) combination for the treatment of pseudobulbar affect (PBA) in patients with stroke, dementia, or traumatic brain injury (TBI). Enrollment has now completed for the cohort of patients with PBA secondary to dementia (results already reported), stroke, and TBI; results for the TBI cohort will be presented. Design: 12-week, open-label, single active treatment arm. Setting: U.S. multicenter trial. Participants: Eligible patients had a clinical diagnosis of PBA, a Center for Neurologic Study-Lability Scale (CNS-LS) score ≥13 (range 7-35), and a clinical diagnosis of non-penetrating TBI which was stable and non-evolving. Patients with unstable medical illness or contraindications to DM/Q were excluded. Interventions: Enrolled patients received DM 20 mg/Q 10 mg twice daily for 12 weeks (once daily in week 1). Concomitant mood/behavioral medications were allowed if stable for ≥2 months. Main Outcome Measures: Primary endpoint was change in CNS-LS from baseline to Day 90/early withdrawal. Additional endpoints included the change in PBA episodes/week, QOL VAS, Clinical and Patient Global Impression of Change (CGI-C and PGI-C), MMSE, the TBI Neurobehavioral Functioning Inventory (NFI), patient treatment satisfaction, and the Patient Health Questionnaire (PHQ-9) assessing depressive symptoms. Vital signs and adverse events were monitored throughout. Results or Clinical Course: Enrollment in the PRISM II TBI cohort completed on January 30, 2015, with 120 patients. The last patient will complete the trial in April 2015. Final results will be available July 2015 and will be presented. Conclusion: PRISM-II is the first prospective open-label study to systematically evaluate DM/Q safety, tolerability, and effectiveness in patients with PBA secondary to TBI as well as the impact of symptom relief on other patient reported measures.

2150. Hammoudeh, Z. S. (2012). "Mandibular gunshot wound with bullet aspiration." The Journal of craniofacial surgery **23**(6): e540-541.

Urban violence continues to be an important source of penetrating craniofacial injuries in major trauma centers. Gunshot wounds to the mandible are a commonly treated condition by craniofacial surgeons. Some gunshot wounds are through-and-through injuries, but in many patients, the bullet enters with no visible exit wound. In such situations, the bullet's trajectory and final destination are certainly important to the craniofacial surgeon in the extent of bony damage but may also be of unforeseen consequence to the patient's airway and respiratory condition. We present a case of a patient who had a gunshot wound to the face with comminuted mandibular ramus fracture in which the bullet was unexpectedly found to be aspirated down the right mainstem bronchus. This is the first reported case of a completely intact bullet being aspirated after gunshot wound to the face in an adult patient. We present this case to illustrate a rare possible complication after penetrating mandibular injury and offer a strategy for management of such an occurrence.

2151. Hampton, D. W., et al. (2007). "A potential role for bone morphogenetic protein signalling in glial cell fate determination following adult central nervous system injury in vivo." The European journal of neuroscience **26**(11): 3024-3035.

Bone morphogenetic proteins (BMPs) and their endogenous inhibitors, including noggin, chordin and follistatin, have roles in pattern formation and fate specification of neuronal and glial cells during nervous system development. We have examined their influence on glial reactions in the injured central nervous system (CNS). We show that penetrating injuries to the brain and spinal cord resulted in the upregulation of BMP-2/4, BMP-7, and noggin, with the latter being expressed almost exclusively by reactive astrocytes at the injury site, and we show that astrocytes in vitro produce noggin. As BMPs have been shown to drive cultured NG2-positive oligodendrocyte precursors (OPCs) towards a multipotential phenotype (type II astrocytes), we investigated the effects of inhibiting noggin with a function-blocking antibody (noggin-FbAb). In vitro, BMP-driven conversion of OPCs to type 2 astrocytes was inhibited by noggin, an effect that was reversed by noggin-FbAb. Noggin-FbAb also increased the number of type 2 astrocytes generated from cultured OPCs exposed to an astrocyte feeder layer, consistent with astrocytes producing both BMPs and noggin. In knife cut injuries in vivo, noggin-FbAb treatment resulted in an increase in the number of NG2-positive cells and small GFAP-positive cells in the injury site, and the appearance of glial cells with the morphological and antigenic characteristics of type 2 astrocytes (as generated in vitro), with coexpression of both GFAP and NG2. This potential conversion of inhibitory OPCs to type 2 astrocyte-like cells in vivo suggests that endogenous BMPs, unmasked by noggin antagonism, might be exploited to manipulate cell fate following CNS trauma.

2152. Hampton, J. O., et al. (2015). "A simple quantitative method for assessing animal welfare outcomes in terrestrial wildlife shooting: The European rabbit as a case study." Animal Welfare **24**(3): 307-317.

Shooting is widely used to reduce the abundances of terrestrial wildlife populations, but there is concern about the animal welfare outcomes ('humaneness') of these programmes. Management agencies require methods for assessing the animal welfare outcomes of terrestrial wildlife shooting programmes. We identified four key issues in previous studies assessing the animal welfare outcomes of shooting programmes: (i) biased sampling strategies; (ii) no direct ante mortem observations; (iii) absence of quantifiable parameters for benchmarking; and (iv) no evaluation of explanatory variables that may cause adverse welfare outcomes. We used methods that address these issues to assess the welfare outcomes of a European rabbit (Oryctolagus cuniculus) shooting programme in south-eastern Australia. An independent observer collected ante mortem (distance, timing and outcome of each shot fired) and post mortem (locations of bullet wounds) data. The ante mortem data were used to estimate three critical animal welfare parameters: apparent time to death (ATTD); instantaneous death rate (IDR); and wounding rate (WR). The post mortem data were used to evaluate the location of bullet wounds relative to the Australian national standard operating procedure (SOP). For rabbits, the mean IDR was 0.60, ATTD was 12 s and WR was 0.12. A large proportion of rabbits (0.75) were shot in the cranium or thorax, as required by the SOP. Logistic regression indicated that the proportion of rabbits wounded and missed increased with shooting distance. Hence, reducing shooting distances would increase the humaneness of European rabbit shooting programmes. Our approach enables the animal welfare outcomes of terrestrial shooting programmes to be independently quantified.

2153. Han, Y., et al. (2009). "Endophthalmitis due to inadvertent globe penetration during retrobulbar injection of saline solution for laser in situ keratomileusis." Journal of cataract and refractive surgery **35**(6): 1132-1133.

A 31-year-old woman presented with visual acuity of counting fingers and presumed bacterial endophthalmitis in the left eye 10 days after refractive surgery. During the procedure, a retrobulbar injection of balanced salt solution had been performed to assist with globe suction by the microkeratome. A perforation site was identified in the inferonasal retina. Following intravitreal antibiotic injection and surgical intervention, the visual acuity returned to 20/20. Retrobulbar injection to facilitate laser in situ keratomileusis carries risks. Careful monitoring for signs of infection is recommended if globe perforation is recognized.

2154. Hancock, E. W. (1983). "Slurred QRS complexes after a motorcycle accident." Hospital practice (Office ed.) **18**(7): 61-65.

2155. Hand, W. L. and J. P. Sanford (1970). "Posttraumatic bacterial meningitis." Annals of internal medicine **72**(6): 869-874.

2156. Handlos, P., et al. (2019). "Necessary Defense or Homicide?: The Importance of Crime Scene Reconstruction in Crossbow Injuries." The American journal of forensic medicine and pathology **40**(3): 293-297.

Reconstruction of a criminal offense is a crucial approach in forensics and criminalistics allowing for the verification of the location, the particular method used, or the use of a specific instrument. This report describes the case of a young man who was killed by an arrow shot from a crossbow. The autopsy revealed a penetration of the head and significant damage to the brain stem. Although the cause of death was evident from the outset, it was necessary to clarify whether or not the arrow was shot as necessary self-defense. Ballistic investigation of the seized weapon and reconstruction of the crime was absolutely essential to bring forth conclusive evidence to convict the perpetrators of the murder.

2157. Handlos, P., et al. (2019). "Axe injury pattern in homicide." Forensic science, medicine, and pathology **15**(3): 516-518.

Chop or slash wounds are produced by sharp-edged tools such as an axe, or a machete. This paper presents a case of a violent death of a 57 year-old-man. Autopsy revealed deformation of the right side of the head. A total of 23 slash, stab and cut wounds as well as contused lacerations were identified on the scalp as well as the face and the neck. In addition, superficial abrasions and bruises were identified on the skin. The immediate cause of death was due to extensive brain contusion following fragmentation of the neurocranium. The injuries resulting in the death of the victim were sustained during an assault on the head with an axe, which was used both as a slashing tool and a blunt instrument.

2158. Haney, L. J., et al. (2020). "Characteristics and Distribution of Extremity Vascular Injuries in a Wartime Military Cohort." Journal of vascular surgery **72**(1): e165-e166.

Objectives: Combat-related extremity vascular injuries (EVI) in service members pose a significant challenge to clinicians due to the complex, long-term health care needs of these Veterans after repair and limb salvage. This study determined characteristics of service members, mechanisms of injury and distribution of vascular injuries in Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn veterans. Methods: Veterans with EVI undergoing an initial attempt at repair were identified using the Department of Defense Trauma Registry, validated by chart abstraction and merged with Veterans Administration data. Results: Our cohort of 527 service members with EVI averaged 25.3 ± 6.5 years old (range, 18-56 years) at time of injury, >95% of the service members were male, and 30% were married. The distribution of race was 82% white, 6% African American and 3% Asian; independently, 10% were of Hispanic ethnicity. Cohort members were enlisted (95%) in the Army (68%) or Marines (28%), and most graduated from high school (84%) with 13% reporting some college. Service members were injured in Operation Iraqi Freedom/Operation New Dawn (66%) and Operation Enduring Freedom (33%). Explosive injury mechanism was most common (63%), with gunshot wounds accounting for 32%; 73% were penetrating versus 27% blunt injuries. The composite Injury Severity Score was

15.9 ± 9.2 (range, 1.0-59.0) with a distribution of 60% mild, 25% moderate, and 15% severe injuries. Abbreviated Injury Scale-Extremities distribution included 12% moderate, 67% serious, and 17% severe. The 527 service members experienced 741 vascular injuries: 246 arterial and 38 venous upper and 317 arterial and 140 venous lower extremity injuries with many Veterans also suffering concurrent soft tissue, bone and nerve injuries. Brachial (43%), radial (24%), and ulnar (21%) arteries and brachial (37%) veins were most frequently injured in the upper extremity (Table I). Superficial femoral (29%), tibial (25%), and popliteal (25%) arteries and superficial femoral (28%) and popliteal (23%) veins were the most common lower extremity injuries (Table II). All 527 service members were alive upon discharge with >99% surviving at 5 years of injury. Sixty-five percent were discharged/medically retired for disability, 52% were diagnosed with PTSD at 5 years of injury, and 82% had traumatic brain injury (TBI) including 14% with moderate, severe or penetrating TBI. Conclusions: EVI caused by explosive mechanism represents a large cause of morbidity with high rates of disability and TBI. Many service members undergo successful vascular repair and all survived their EVI, however, the overall health of this cohort requires complex and holistic care beyond initial surgical repair and stabilization. [Formula presented] [Formula presented]

2159. Haney, L. J., et al. (2021). "Persistent Pain, Physical Dysfunction, and Decreased Quality of Life After Combat Extremity Vascular Trauma." Annals of vascular surgery **71**: 167-180.

BACKGROUND: Combat-related extremity vascular injuries (EVI) have long-lasting impact on Iraq/Afghanistan veterans. The purpose of this study is to describe long-term functional outcomes in veterans with EVI using survey measures and identify modifiable factors that may be improved to reduce chronic pain and injury-related dysfunction., METHODS: Veterans with upper and lower EVI undergoing an initial limb salvage attempt were identified using the Department of Defense Trauma Registry and validated with chart abstraction. Surveys measured pain; Short Musculoskeletal Function Assessment (SMFA) for self-reported bother and dysfunction; and Veterans RAND 12-Item Health Survey (VR-12) physical and mental component scores (PCS; MCS) for quality of life, depression, post-traumatic stress disorder, and the potentially modifiable factors of reintegration into civilian life, resilient coping, resilience, and family functioning., RESULTS: Eighty-one patients responded with an average time since injury of 129 months (SD: 31; range 67-180 months). Mechanism of injury included 64% explosions and 31% gunshot wounds; 16% of the respondents were diagnosed with moderate/severe/penetrating traumatic brain injury. Limb salvage rates were 100% and 77% for upper and lower extremities, respectively (P = 0.004). Respondents screened positive for probable depression (55%) and post-traumatic stress disorder (51%). Compared with population norms, SMFA bother and dysfunction indices were higher (worse), MCS was lower (worse), and PCS was similar. The multivariable models adjusted for age, marital status and pain. The higher SMFA is part of the results of the multivariable models. MCS decreased with difficulty reintegrating into civilian life and was positively correlated with increased resilience and resilient coping. SMFA scores were greater for patients with high pain intensity and increased 6-11 points per point increase in difficulty with civilian-life reintegration. SMFA dysfunction was associated with better family functioning., CONCLUSIONS: EVI results in significant long-term disability with lasting deficits in physical function, frequent depressive symptoms, and below average self-reported quality of life. Strengthening modifiable factors including resiliency and resilient coping, and providing ongoing assistance to improve reintegration into civilian life, may ameliorate the functional disabilities and chronic pain experienced by veterans with EVI. Copyright Published by Elsevier Inc.

2160. Hanieh, A. (1971). "Brain injury from a spent bullet descending vertically. Report of five cases." Journal of neurosurgery **34**(2 Pt 1): 222-224.

This is a report of five cases in which a bullet penetrated the vertex of the skull and brain, apparently during its vertical descent after having been fired into the air.

2161. Hanigan, W. C., et al. (1986). "Lawn dart injury in children: report of two cases." Pediatric emergency care **2**(4): 247-249.

Two cases of intracranial penetration by lawn darts are presented in this report. Both patients were children who developed infectious sequelae following primary closure of cutaneous puncture wounds. These injuries suggest that the darts produced a high-energy impact force that resulted in skull fractures and focal cerebral injury. When children present with puncture wounds or lacerations produced by lawn darts, intracranial penetration must be ruled

out, using appropriate medical imaging. Parents should be advised regarding the need for medical reassessment should fever, headache, or local signs of infection occur.

2162. Hanigan, W. C. and C. Sloffer (2004). "Nelson's wound: treatment of spinal cord injury in 19th and early 20th century military conflicts." Neurosurgical focus **16**(1): E4.

During the first half of the 19th century, warfare did not provide a background for a systematic analysis of spinal cord injury (SCI). Medical officers participating in the Peninsular and Crimean Wars emphasized the dismal prognosis of this injury, although authors of sketchy civil reports persuaded a few surgeons to operate on closed fractures. The American Medical and Surgical History of the War of the Rebellion was the first text to provide summary of results in 642 cases of gunshot wounds of the spine. The low incidence of this injury (0.26%) and the high mortality rate (55%) discouraged the use of surgery in these cases. Improvements in diagnoses and the introduction of x-ray studies in the latter half of the century enabled Sir G. H. Makins, during the Boer War, to recommend delayed intervention to remove bone or bullet fragments in incomplete injuries. The civil experiences of Elsberg and Frazier in the early 20th century promoted a meticulous approach to treatments, whereas efficient transport of injured soldiers during World War I increased the numbers of survivors. Open large wounds or cerebrospinal fluid leakage, signs of cord compression in recovering patients, delayed clinical deterioration, or intractable pain required surgical exploration. Wartime recommendations for urological and skin care prevented sepsis, and burgeoning pension systems provided specialized longterm rehabilitation. By the Armistice, the effective surgical treatment and postoperative care that had developed through decades of interaction between civil and military medicine helped reduce incidences of morbidity and dispel the hopelessness surrounding the combatant with an SCI.

2163. Haninec, P., et al. (1996). "Shotgun pellet embolus of the middle cerebral artery treated by emergency embolectomy." British journal of neurosurgery **10**(3): 311-314.

We report a case of traumatic embolization of a shotgun pellet in the middle cerebral artery. The patient was successfully treated by emergency embolectomy performed 12 h after the accident. The literature seems to support the protective role of surgical treatment against cerebral ischaemia and subsequent infarction in such cases.

2164. Hanna, B. C., et al. (2006). "Surgical debridement of craniocervical necrotizing fasciitis: the window of opportunity." The Journal of laryngology and otology **120**(8): 702-704.

Craniocervical necrotizing fasciitis (CCNF) has a potentially high morbidity and mortality. Late presentation, shock and disseminated intravascular coagulation are associated with a particularly poor prognosis. Early recognition and aggressive treatment is advised. A case report is presented of a late presentation of necrotizing fasciitis of the face, neck and anterior thoracic wall. Despite adverse prognostic indicators, surgical debridement was performed. Intensive medical treatment included continuous renal replacement therapy and intravenous immunoglobulin. Survival in this case illustrates that the window of opportunity for surgically treating CCNF extends to the advanced stages of the disease, albeit with increased morbidity.

2165. Hanna, P. J. and M. D. Baker (2014). "Point of care ultrasound identification of an intracranial foreign body." Journal of Investigative Medicine **62**(2): 480-481.

Purpose of Study: To describe how point of care ultrasound was used to describe skull fracture and intracranial foreign body Methods Used: Case Report Summary of Results: A 7 year old male presented to the emergency department 1 day following a gunshot wound to the forehead. Patient was reportedly shot by an air rifle (760 Pump Master ®) at close range by a 4 year old relative. There was no alteration of mental status or loss of consciousness. Vital signs, Glasgow Coma Scale (15), and neurological exam were all normal. A 1 mm puncture wound was noted in the right frontal scalp without palpable foreign body, soft tissue swelling, or bony step off. Plain radiograph revealed a metallic foreign body without evidence for skull fracture. Point of care ultrasound demonstrated a right frontal skull cortical discontinuity with hyperechoic foreign body with ring artifact. Computed tomography revealed small open calvarial frontal skull fracture with frontal cerebral hemorrhage. The patient was admitted to the Pediatric Neurosurgery service and underwent removal of an intracranial, extradural foreign body. The patient had an uneventful recovery and was discharged the following day. Conclusions: Utility of Point of care Ultrasound has been well described for soft tissue

foreign bodies and fractures. Ultrasound is not generally useful for identifying foreign bodies embedded in bone. Bone acts as a strong reflector of sound waves making foreign body identification with ultrasound difficult. We described a case in which a metallic foreign boy was localized immediately beneath a skull fracture. (Figure presented).

2166. Hanna, W. C., et al. (2008). "The current status of traumatic diaphragmatic injury: lessons learned from 105 patients over 13 years." The Annals of thoracic surgery **85**(3): 1044-1048.

BACKGROUND: Our understanding of traumatic diaphragmatic injury (TDI) is based primarily on outdated retrospective series. We sought to reexamine present day patterns of diagnosis, associated injuries, predictors of mortality, and long-term outcomes of this condition., METHODS: A prospectively entered trauma database from the Montreal General Hospital was reviewed for patients admitted with a TDI from 1993 to 2006. Hospital charts were reviewed, and patient characteristics, mechanism of injury, associated injuries, operative management, and postoperative outcomes were recorded. Logistic regression was used to identify predictors for mortality., RESULTS: Identified were 105 patients with TDI consisting of blunt in 37% and penetrating in 63%. Only 23% of TDI were diagnosed on initial chest roentgenogram. External wounds in penetrating TDI cases were found in the abdomen alone in 19%, in the chest alone in 46%, and in both in 35%, which was associated with intraabdominal organ injury in 83%, 55%, and 87%, respectively. Less than half of patients had a diaphragmatic hernia. Lung, chest wall, and thoracic organ injuries were more common in blunt trauma, but there was no significant difference between abdominal injuries in both mechanisms. Overall mortality from TDI was 18%, and there was no difference between blunt and penetrating injury. In blunt trauma, brain injury and an Injury Severity Score (ISS) exceeding 15 were independently associated with increased death. In penetrating trauma, only an ISS exceeding 15 predicted death., CONCLUSIONS: Traumatic diaphragmatic injury remains a challenge to diagnose and treat, primarily due to the presence of associated injuries. The high incidence of intraabdominal organ injury, irrespective of the site of penetrating wound, dictates a transabdominal approach for exploration and repair. Severity of associated injuries (ISS) predicts death.

2167. Hanot, E. M., et al. (2020). "Traumatic orbital ligament avulsion diagnosed with cross-sectional imaging in three dogs." Veterinary Record Case Reports **8**(3).

The aim of the study was to describe the clinical and imaging findings of three dogs diagnosed with orbital ligament avulsion. Three immature dogs presented following a facial bite trauma, including multiple skull fractures and ventral, ventrolateral or rostrolateral displacement of the affected eye. The extent of lesions and orbital ligament avulsion were assessed and diagnosed using CT (n=2) or MRI (n=1). Orbital ligament avulsion was identified as an interruption of the linear structure between the zygomatic process of the frontal bone and the frontal process of the zygomatic bone. One dog was treated surgically to correct a visual axis alteration, while the remaining two dogs were managed conservatively. Orbital ligament avulsion is an uncommon condition that should be considered following a facial trauma. Concurrent lesions might necessitate surgical intervention, but it remains unclear if the avulsion of the orbital ligament itself requires a specific treatment.

2168. Hansen, J. E., et al. (1988). "Penetrating intracranial wood wounds: clinical limitations of computerized tomography." Journal of neurosurgery **68**(5): 752-756.

The case history of a patient with a periorbital penetrating wooden foreign body is presented. The computerized tomography (CT) densities of several different sources of wood were compared using an experimental model. The clinical usefulness and practical limitations of CT in the evaluation of intracranial foreign bodies is discussed, and the management of this type of injury is reviewed.

2169. Hansen, M. L. U., et al. (2020). "Penetrating Orbital Sphenoid Sinus Trauma with a Wooden Stick: A Challenging Case Report." Case Reports in Ophthalmology **11**(3): 540-545.

Transorbital and intra-sphenoidal traumas are relatively uncommon, can be challenging to manage, and are associated with a high risk of complications and potentially fatal outcome. Transorbital and intra-sphenoidal trauma pose a medical challenge due to close relationship to delicate and critical anatomical structures, such as the globe, optic nerve, the ophthalmic internal carotid arteries, and central nervous system. Rapid admission to a level 1 trauma center with a high surgical expertise level is essential to ensure the best possible treatment and outcome. We present a case of

a 75-year-old man who had a severe orbital trauma, where a wooden foreign object penetrated the orbit into the sphenoid sinus without penetrating its posterior wall. This case is important because of the rare trauma presentation with a wooden foreign object, which can easily be missed on computed tomography. The case also illustrates the importance of close collaboration between ophthalmologists and rhinologists when challenged with severe orbital sphenoid sinus trauma.

2170. Hanson, E. K. and J. Ballantyne (2013). "Highly specific mRNA biomarkers for the identification of vaginal secretions in sexual assault investigations." Science & justice : journal of the Forensic Science Society **53**(1): 14-22.

The inability to definitively determine the tissue source of origin of forensically relevant biological fluids could result in a failure to provide crucial information necessary to the investigation and prosecution of the case. For example, in instances of sexual assault with a foreign object or digital penetration, the identification of vaginal secretions (VS) transferred to such objects or the perpetrators might be critical in establishing the circumstances of the assault. Conventional serological and immunological methods for body fluid identification can confirm the presence of human blood and semen. However, currently none of the routinely used biochemical tests can definitively identify the presence of human saliva or VS. It has been demonstrated that mRNA (or miRNA) profiling of body fluid stains can provide a degree of identification specificity of tissue and body fluids heretofore unattainable by conventional means. Early promising VS candidate RNA biomarkers, however, failed to exhibit the required degree of specificity or sensitivity and thus, at present, it is not possible for the forensic scientist to definitively identify VS using molecular genetics techniques. The aim of this work was to find novel highly specific RNA biomarkers for the identification of VS. Whole transcriptome profiling (RNA-Seq) of vaginal swab samples from different donors resulted in the identification of a number of putative VS-specific mRNA candidates. After detailed evaluation of >200 candidates from the tens of thousands of mRNA species found in VS, six promising candidates were identified. From these, two gene transcripts, namely CYP2B7P1 and MYOZ1, consistently demonstrated high specificity and sensitivity for VS when used in a qualitative capillary electrophoresis-based assay. Importantly these two biomarkers are able to differentiate between VS and other body fluids containing significant numbers of epithelia, particularly saliva and skin. Significantly, CYP2B7P1 is exceedingly specific with no detectable cross reactivity with other forensically relevant body fluids/tissues noted to date. The other four putatively specific biomarkers are expressed at higher levels in VS compared with saliva and will be more suitable for use with a quantitative (i.e. qRT-PCR) assay format.

2171. Hanson, H. R., et al. (2019). "Trends of ED visits, admissions, and deaths for pediatric traumatic brain injury comparing sport and non-sport mechanisms." Injury Epidemiology **6**.

Background: Traumatic brain injuries (TBI) in children result in significant morbidity and mortality. There are many mechanisms, both sport and non-sport related, which cause these injuries. Studies have reported that Emergency Department (ED) visits for pediatric TBI caused by sports are increasing; however, no subsequent study has evaluated the trend in non-sport TBI. The objective of this study was to evaluate ED visits, admissions, and deaths for non-sport TBI compared to those caused by sports. Methods: A retrospective study of children 5-19 years of age was performed at a pediatric, level 1 trauma center from 2002 to 2012. Subjects with a primary or secondary diagnosis of TBI were identified from the hospital's trauma registry, and mechanism of injury, disposition, injury severity score, and length of stay were recorded. Frequencies were used to characterize the population, Chi-square analysis was performed to determine differences between groups, and linear trend lines were calculated for sport-related and non-sport TBI by year. Results: Thirteen thousand two hundred ninty one subjects were seen in the ED between 2002 and 2012 for a TBI; 9527 (72%) were from a non-sport mechanism, and 3764 (28%) were from a sport mechanism. Subjects with a non-sport TBI were more likely to be younger ($p < 0.001$), African American ($p < 0.001$), and have Medicare/Medicaid ($p < 0.001$). Subjects with a non-sport TBI were admitted to the hospital 15% of the time, and subjects with a sport-related TBI were admitted 10% of the time ($p < 0.001$). When evaluating all TBI by mechanism of injury, sport had the lowest injury severity score (mean 4.4) and the shortest length of stay (mean 1.6 days) of any mechanism. There were six deaths reported from non-sport TBI and none from sport-related TBI. ED visits for sport-related TBI increased 92%, and non-sport TBI increased 22% over 10 years. There was a peak in TBI, in both groups, seen in 2009. Conclusions: ED visits for both sport and non-sport TBI have increased over the past 10 years. TBI from a non-sport mechanism was more likely to result in hospitalization or death. Prevention efforts should be expanded to include all high-risk TBI mechanisms, not just sports.

2172. Harada, K., et al. (2014). "An unusual case of suicide by handcrafted shotgun and slug." Legal medicine (Tokyo, Japan) **16**(2): 95-97.

Injuries by handcrafted firearms are uncommon, and those by handcrafted shotguns are very rare. We present an unusual case of suicide using a handcrafted shotgun and slug. A 73-year-old male, who was a glass-grinding artisan, was found dead at a workshop on the premises of his residence. Autopsy showed a contact shotgun wound to the forehead, which perforated the cranium and caused extensive damage to the brain. The handcrafted shotgun was found in the proximity of the body. The shotgun consisted of metal pipes fixed to the vise and did not take the form of a conventional gun. The recovered slug was also found to be manufactured manually. It appeared that the handcrafted shotgun was only intended for committing suicide using his ballistics knowledge, skills, and resources.

2173. Harada, T. (2004). "Y-shaped vein grafting to Stensen duct defect." Annals of plastic surgery **53**(3): 299-300.

2174. Harat, M., et al. (2000). "[Facial-cerebral gunshot wounds]." Postrzaly twarzowo-mozgowe. **34**(3): 487-500.

The current frequency increase of gunshot wounds to the head is directly proportional to the access to firearms and to amount of firearm-related crimes. This risk is increasing especially in population groups that have not been threatened before. Hence the aim of this study was to analyse and resume our experiences in the management of faciocerebral gunshots. We retrospectively reviewed a series of 9 consecutive patients who were treated in the Department of Neurosurgery, Military Clinical Hospital in Bydgoszcz with the diagnosis of gunshot wound to the head from 1994 to 1999. All the cases were young males (mean, 26 yr). There were six suicidal attempts and three accidents at firearm service. KbkAK, that is a standard machine gun in the Polish Army, was most frequently related to gunshots in the analysed series. All the patients were assessed according to Glasgow Coma Scale (GCS) at arrival to hospital. Average of admission GCS Score was 6.1. The patients were also assessed after treatment using Glasgow Outcome Scale (GOS). One patient was dead (GOS Score 1), and 7 (78%) improved to good, independent functional status (GOS Score 4 or 5). The authors emphasize the necessity of multispecialistic initial operative management of faciocerebral gunshots wounds and aggressive pre- and postoperative care (tracheostomy, gastrostomy, treatment of encephalitis), which makes it possible to obtain good and very good outcomes. Furthermore, we stress the role of minimal primary debridement for the sake of frequent secondary reconstructive operations.

2175. Hardman, J. M. (1979). "The pathology of traumatic brain injuries." Advances in neurology **22**: 15-50.

2176. Hardy, T. L. and J. Aldridge (1981). "Traumatic transient Kluver-Bucy syndrome." Surgical neurology **15**(5): 338-340.

A case of transient Kluver-Bucy syndrome after a gunshot wound through the head is presented. We have found no other case of posttraumatic Kluver-Bucy syndrome described in the literature. The original criteria for the syndrome are reviewed and compared with findings in previously reported human cases.

2177. Hargrave, K., et al. (2016). "Accidental Transorbital Penetrating Brainstem and Carotid Injury with CB Antenna: A Case Report." The Journal of the Louisiana State Medical Society : official organ of the Louisiana State Medical Society **168**(3): 95-98.

The authors present an unusual case of a transorbital penetrating injury of the internal carotid artery and brainstem. A young man accidentally ran into a 10-foot long citizens band (CB) antenna, and presented to the emergency department with nausea, dizziness and right periorbital ecchymosis. The nature and full extent of the injury were not appreciated at the time of initial examination and computed tomography scan. Magnetic resonance imaging subsequently demonstrated an unusual brainstem lesion. Neurology consultation was obtained. The neurologist and neuroradiologists reviewed the neurological and imaging findings together. This collaboration proved critical to understanding the true nature and extent of the injury and planning evaluation and treatment. Cerebral angiography

revealed a traumatic internal carotid artery dissection and pseudoaneurysm, which was treated by placement of a covered stent. The clinical symptoms remained mild and 7-year follow up shows clinical and angiographic stability.

2178. Harmon, L. A. (2020). "Response to "Letter to the Editor"-Infection after penetrating brain injury-An Eastern Association for the Surgery of Trauma multicenter study oral presentation at the 32nd annual meeting of the Eastern Association for the Surgery of Trauma, January 15019, 2019, Austin, Texas." The journal of trauma and acute care surgery **88**(3): e119-e120.

2179. Harmon, L. A., et al. (2019). "Infection after penetrating brain injury-An Eastern Association for the Surgery of Trauma multicenter study oral presentation at the 32nd annual meeting of the Eastern Association for the Surgery of Trauma, January 15-19, 2019, in Austin, Texas." The journal of trauma and acute care surgery **87**(1): 61-67.

BACKGROUND: Fatality rates following penetrating traumatic brain injury (pTBI) are extremely high and survivors are often left with significant disability. Infection following pTBI is associated with worse morbidity. The modern rates of central nervous system infections (INF) in civilian survivors are unknown. This study sought to determine the rate of and risk factors for INF following pTBI and to determine the impact of antibiotic prophylaxis., METHODS: Seventeen institutions submitted adult patients with pTBI and survival of more than 72 hours from 2006 to 2016. Patients were stratified by the presence or absence of infection and the use or omission of prophylactic antibiotics. Study was powered at 85% to detect a difference in infection rate of 5%. Primary endpoint was the impact of prophylactic antibiotics on INF. Mantel-Haenszel chi and Wilcoxon's rank-sum tests were used to compare categorical and nonparametric variables. Significance greater than p = 0.2 was included in a logistic regression adjusted for center., RESULTS: Seven hundred sixty-three patients with pTBI were identified over 11 years. 7% (n = 51) of patients developed an INF. Sixty-six percent of INF patients received prophylactic antibiotics. Sixty-two percent of all patients received one dose or greater of prophylactic antibiotics and 50% of patients received extended antibiotics. Degree of dural penetration did not appear to impact the incidence of INF (p = 0.8) nor did trajectory through the oropharynx (p = 0.18). Controlling for other variables, there was no statistically significant difference in INF with the use of prophylactic antibiotics (p = 0.5). Infection was higher in patients with intracerebral pressure monitors (4% vs. 12%; p = <0.001) and in patients with surgical intervention (10% vs. 3%; p < 0.001)., CONCLUSION: There is no reduction in INF with prophylactic antibiotics in pTBI. Surgical intervention and invasive intracerebral pressure monitoring appear to be risk factors for INF regardless of prophylactic use., LEVEL OF EVIDENCE: Therapeutic, level IV.

2180. Harna, B., et al. (2020). "Epidemiology of trauma patients admitted to a trauma center in new delhi, india." Indian Journal of Critical Care Medicine **24**(12): 1193-1197.

Introduction: The rapid economic and automobile growth in India leads to a rapid increase in road traffic accidents (RTAs) and factors affecting it. This study evaluates the epidemiology of trauma patients' reports to the major trauma center in New Delhi, India. Materials and methods: The 1,583 patients over 6 months reporting to the casualty of the trauma center attached to Lok Nayak Hospital, New Delhi were included in the study. The patients reporting to the outpatient department as follow-up visits were not included in the study. The data were collected with the help of a structured pro forma. Results: The data depicted the RTAs as the most common cause affecting adults between 20 years and 40 years. The study reports other risk factors like alcohol intoxication and motorcycle riders. Mostly, the patients present in a semiconscious and disoriented state requiring fluid resuscitation. Abrasions and bruises in the extremities stand out as the most common injury pattern. The fractures suffered were the most common injury suffered by the patients. Conclusion: Our study shows that RTAs and workplace injuries are the predominant causes of trauma affecting mostly the adults. This study defines the correlation of various parameters with causation and distribution of the trauma in the sample population. This study was performed to improve the understanding of the mode of trauma, severity of injuries, and outcome in our hospital, so that effective prevention and comprehensive management strategies could be made. Clinical significance: This study signifies the fundamental study for the occurrence, distribution, and prevention of trauma in the society. The acquisition of knowledge of different patterns of trauma patients along with other descriptive factors helps to understand the causation of this disease as well as development of preventive measures. This can form the basis of hospital and regional trauma management strategies.

2181. Harnish, C., et al. (2015). "An alarming presentation of Creutzfeldt-Jakob disease following a self-inflicted gunshot wound to the head." Injury **46**(5): 926-928.

Transmissible spongiform encephalopathies (TSE), also known as prion diseases, are characterized by rapid and fatal neurological decline. They not only detrimentally affect the patient, but also present additional challenges to healthcare systems due to the infectivity of the tissues and the difficulty of inactivating the prion. The most common TSE is Creutzfeldt-Jakob disease (CJD), which can occur after familial, spontaneous or acquired transmission. TSEs received more attention after the development of variant CJD (vCJD), also known as Mad Cow Disease, in the UK during the mid-1990s. Unlike familial or spontaneous CJD, this variant was connected to consumption of cattle contaminated with the prion disease, bovine spongiform encephalopathy. This development increased interest in the etiology of CJD and other TSEs and the risk it presents as an infectious disease. The following details the case of a 59-year-old male infected with CJD presented to our level II trauma center for treatment following a self-inflicted gunshot wound to the head.

2182. Harputluoglu, M., et al. (2018). "Endoscopic treatment of biliary complications after living donor liver transplantation in a high volume transplant center in Turkey; a single-center experience." Acta gastro-enterologica Belgica **81**(2): 283-287.

BACKGROUND AND AIM: Biliary complications are an important cause of mortality and morbidity after living donor liver transplantation (LDLT). We present our endoscopic treatment results after LDLT as a single center with high volume., METHODS: Patients who underwent endoscopic retrograde cholangiopancreatography (ERCP) after LDLT between 2005 and 2015 were included. Clinical data included patient demographics, ERCP indications (stricture or leak), and treatment outcomes, including need for percutaneous and surgical interventions., RESULTS: ERCP was performed in 446 (39.2%) patients with duct-to-duct anastomosis of 1136 LDLT patients. The most common biliary complication was stricture +/- stone (70.6%, 315/446). Stricture and leak occurred in 60 (13.4%) patients. Only biliary leak was found in 40 (8.9%) patients. Our endoscopic treatment success rate in patients with biliary stricture after LDLT was 65.1%. Overall endoscopic success rates in our patients were 55.0% in patients with both leak and stricture, and only leak. In all, our percutaneous transhepatic biliary interventions (PTBI) and ERCP success rate was 90.6% in patients with biliary complications after LDLT., CONCLUSIONS: Endoscopic treatments are highly effective for biliary complications after LDLT. Effective use of percutaneous interventions in collaboration with endoscopic treatments significantly reduces the need for surgical treatment.

2183. Harrahill, M. (2011). "An unusual case of cerebral venous sinus thrombosis in a trauma patient." Journal of emergency nursing **37**(2): 203-204.

2184. Harrar, D. B., et al. (2019). "Clinical Determination of Brain Death in Children Supported by Extracorporeal Membrane Oxygenation." Neurocritical care **31**(2): 304-311.

BACKGROUND/OBJECTIVE: Children supported by extracorporeal membrane oxygenation (ECMO) are at risk of catastrophic neurologic injury and brain death. Timely determination of brain death is important for minimizing psychological distress for families, resource allocation, and organ donation. Reports of successful determination of brain death in pediatric patients supported by ECMO are limited. The determination of brain death by clinical criteria requires apnea testing, which has historically been viewed as challenging in patients supported by ECMO. We report eight pediatric patients who underwent a total of 14 brain death examinations, including apnea testing, while supported by veno-arterial ECMO (VA-ECMO), resulting in six cases of clinical determination of brain death., METHODS: We performed a retrospective review of the medical records of pediatric patients who underwent brain death examination while supported by VA-ECMO between 2010 and 2018 at a single tertiary care children's hospital., RESULTS: Eight patients underwent brain death examination, including apnea testing, while supported by VA-ECMO. Six patients met criteria for brain death, while two had withdrawal of technical support after the first examination. During the majority of apnea tests (n = 13/14), the ECMO circuit was modified to achieve hypercarbia while maintaining oxygenation and hemodynamic stability. The sweep flow was decreased prior to apnea testing in ten brain death examinations, carbon dioxide was added to the circuit during three examinations, and ECMO pump flows were increased in response to hypotension during two examinations., CONCLUSIONS: Clinical determination of brain death, including apnea testing,

can be performed in pediatric patients supported by ECMO. The ECMO circuit can be effectively modified during apnea testing to achieve a timely rise in carbon dioxide while maintaining oxygenation and hemodynamic stability.

2185. Harrington, B. M., et al. (2020). "Complications, outcomes, and management strategies of non-missile penetrating head injuries." Journal of neurosurgery **134**(5): 1658-1666.

OBJECTIVE: While high-velocity missile injury (gunshot) is associated with kinetic and thermal injuries, non-missile penetrating head injury (NMPHI) results in primary damage along the tract of the piercing object that can be associated with significant secondary complications. Despite the unique physical properties of NMPHI, factors associated with complications, expected outcomes, and optimal management have not been defined. In this study, the authors attempted to define those factors., METHODS: Consecutive adult patients with NMPHI who presented to Tygerberg Academic Hospital (Cape Town, South Africa) in the period from August 1, 2011, through July 31, 2018, were enrolled in a prospective study using a defined treatment algorithm. Clinical, imaging, and laboratory data were analyzed., RESULTS: One hundred ninety-two patients (185 males [96%], 7 females [4%]) with 192 NMPHIs were included in this analysis. The mean age at injury was 26.2 +/- 1.1 years (range 18-58 years). Thirty-four patients (18%) presented with the weapon in situ. Seventy-one patients (37%) presented with a Glasgow Coma Scale (GCS) score of 15. Weapons included a knife (156 patients [81%]), screwdriver (18 [9%]), nail gun (1 [0.5%]), garden fork (1 [0.5%]), barbeque fork (1 [0.5%]), and unknown (15 [8%]). The most common wound locations were temporal (74 [39%]), frontal (65 [34%]), and parietal (30 [16%]). The most common secondary complications were vascular injury (37 patients [19%]) and infection (27 patients [14%]). Vascular injury was significantly associated with imaging evidence of deep subarachnoid hemorrhage and an injury tract crossing vascular territory ($p <= 0.05$). Infection was associated with delayed referral (> 24 hours), lack of prophylactic antibiotic administration, and weapon in situ ($p <= 0.05$). A poorer outcome was associated with a stab depth > 50 mm, a weapon removed by the assailant, vascular injury, and eloquent brain involvement ($p <= 0.05$). Nineteen patients (10%) died from their injuries. The Glasgow Outcome Scale (GOS) score was linearly related to the admission GCS score ($p < 0.001$). One hundred forty patients (73%) had a GOS score of 4 or better at discharge., CONCLUSIONS: The most common NMPHI secondary complications are vascular injury and infection, which are associated with specific NMPHI imaging and clinical features. Identifying these features and using a systematic management paradigm can effectively treat the primary injury, as well as diagnose and manage NMPHI-related complications, leading to a good outcome in the majority of patients.

2186. Harris, C. M. and R. Laughlin (2013). "Reconstruction of hard and soft tissue maxillofacial defects." Atlas of the oral and maxillofacial surgery clinics of North America **21**(1): 127-138.

Reconstruction of maxillofacial composite defects is a technically demanding and time-demanding process. It also requires a prolonged treatment course, a team approach, and meticulous planning that is prosthetic and esthetically driven. The use of vascularized flap reconstruction, dental implants, and computer-aided technology and advances in maxillofacial prosthetics has contributed immensely toward the goal of fully reconstructing victims of large avulsive wounds. Further advances in technology, surgical training, and maxillofacial prosthodontics will undoubtedly aid in minimizing the number of surgical interventions and maximize the final functional and esthetic results of these patients.

2187. Harris, E. W. and C. W. Cotman (1984). "Brain tissue transplantation research." Applied neurophysiology **47**(1-2): 9-15.

2188. Harris, J. H., Jr. (1975). "The significance of soft tissue injury in the roentgen diagnosis of trauma." CRC critical reviews in clinical radiology and nuclear medicine **6**(3): 295-368.

Soft tissue damage is an integral part of trauma. This basic fact is commonly ignored in the evaluation of roentgenograms obtained because of trauma. The soft tissue component of the traumatic lesion may produce the most obvious roentgen sing of injury and is, in these instances, fundamental to the correct roentgen diagnosis. In many instances, the soft tissue lesion is frequently of greater clinical significance that the more obvious skeletal injury. An awareness of the roentgen signs that signal soft tissue injury, and of those skeletal lesions that are commonly associated with radiographically silent, but clinically more significant, soft tissue damage, leads to prompt institution of appropriate

additional diagnostic studies or therapeutic measures. Thus, the soft tissue injury in the roentgen diagnosis of trauma has both diagnostic and therapeutic significance. Each will be discussed in this article.

2189. Harris, J. H., Jr. (2001). "Re: Lanoix R et al. C-spine injury associated with gunshot wounds to the head: retrospective study and literature review. J Trauma.2000;49:860--863." The Journal of trauma **51**(1): 179-180.

2190. Harris, J. P., et al. (2021). "Open-globe wounds in operation Iraqi Freedom and Operation Enduring Freedom: risk factors for poor visual outcomes and enucleation." Acta ophthalmologica **99**(8): 904-908.

PURPOSE: To determine the rates and types of open-globe wounds in soldiers admitted to Walter Reed Army Medical Center from 2001 to 2011 after sustaining combat injuries., METHODS: Data were collected in the Walter Reed Ocular Trauma Database. Inclusion criteria were patients who suffered open-globe injuries. Open-globe injuries were classified by type of wound: corneal, corneo-scleral or scleral, or type of open-globe injury: perforating, rupture, penetrating or intraocular foreign body. The primary analysis assessed the effect on final visual acuity (VA) and the risk of enucleation., RESULTS: In this study, 285 (32.02%) open-globe injuries were recorded in 890 eyes in the data set. Corneal wounds were noted in 127 (44.56%) eyes, corneo-scleral wounds in 78 (27.37%) and scleral wounds in 129 (45.26%) eyes. The involvement of both the corneal and sclera was associated with poorer visual outcome (BCVA < 20/200) compared to injuries with an injury confined to either the cornea or scleral alone ($p = 0.038$). At a wound length of greater than approximately 14 mm, patients had 75% chance of having a poor final VA. Enucleation was performed in 64 (22.46%) eyes of patients with wounds. The type of wound was not found to be predictive of enucleation in multivariate analysis, but rather the type of open-globe injury was predictive. Perforating (OR: 1.58, 95% CI: 1.43-1.72) and globe rupture injuries (OR: 1.49, 95% CI: 1.33-1.66) were more likely to undergo enucleation., CONCLUSIONS: Open-globe injuries occur frequently in combat ocular trauma. Poor final VA was noted most with corneo-scleral wounds with approximately 50% of patients having a final VA less than 20/200.

2191. Harris, L. S. (1991). "Postmortem magnetic resonance images of the injured brain: effective evidence in the courtroom." Forensic science international **50**(2): 179-185.

Magnetic resonance images (MRI) of the whole, formalin-fixed brain produce details of pathologic changes deep within brain substance not apparent on external examination. Photographs of these radiographic images present pathologic features in a black-and-white, 2-dimensional format which has proven particularly effective in court before judge and jury. This pathologist has noted acceptance of such photographs in explaining to jurors the details of his testimony in selected cases where brain trauma resulted in a wrongful death. Penetrating missile wounds and blunt impact injuries are particularly well documented by this method.

2192. Harris, R. and S. Press (2012). "Intraoperative computed tomography for complex midfacial and orbital Trauma." Journal of oral and maxillofacial surgery **70**(9): e-18.

Advanced intraoperative imaging provides the clinician the ability to have real-time feedback while navigating their way through complex surgical procedures. Navigational systems have the benefit of allowing preoperative planning to be integrated into the intraoperative system; however, they do not account for the threedimensional changes that occur in tissue volumes and positioning after surgical manipulation of the initial anatomy. This can lead to unexpected clinical inaccuracies. Intraoperative computed tomography (CT) has been used in the neurosurgical arena for three-dimensional angiography. Since the use of intraoperative CT allows for immediate evaluation, the use in oral and maxillofacial surgery for dealing with the complex anatomy of midfacial and orbital trauma may be beneficial. Inaccurate reduction of the zygomaticomaxillary complex (ZMC) can lead to increased orbital volume with resultant enopthalamos and facial asymmetry due to lack of malar projection. Incorrect placement of orbital floor fixation can lead to hypoglobus, diplopia, continued entrapment of periorbital tissues, and increased posterior vertical orbital height. These conditions are very difficult to address secondarily often requiring osteotomies, custom designed implants, and multiple procedures, all with less than ideal outcomes. Ten patients were selected who presented to the Vanderbilt University Emergency Department with complex midfacial and/or orbital trauma from July 2011 through February 2012. All patients underwent surgical reconstruction of their injuries with the adjunctive use of intraoperative CT guidance. All

procedures and imaging were performed in the same operative suite utilizing the same Phillips Allura Xper FD20 CT unit. Axial, coronal, and sagittal images were obtained and analyzed on each patient prior to procedure completion. Objective analysis intraoperatively focused on the following outcome variables: adequate reduction, comparison of bony symmetry to uninjured side, positioning of inferior rectus muscle, comparison of posterior vertical orbital height, and extraocular movements. Subjective analysis postoperatively focused upon patient satisfaction with esthetics and function. Etiology of injury included gunshot wounds, sporting accidents, assault, and motor vehicle collisions. Ten patients (9 male and 1 female), with a mean age of 39, ranged in age from 18 to 72. Six of the patients had a ZMC fracture while all patients had an orbital fracture. Intraoperative imaging was evaluated prior to completion of the procedure with no patients requiring alteration of their fixation. Based upon intraoperative imaging all patients had clinically acceptable: 1) bony symmetry and fracture reduction compared to the uninjured side; 2) horizontal position of the inferior rectus muscle; 3) posterior vertical orbital height when compared to uninjured side; 4) extraocular movements when forced duction tests were performed. Subjectively all patients were satisfied with their outcomes functionally and esthetically with no reported diplopia. One patient complained of continued left infraorbital nerve (V2) dysesthesia. While intraoperative navigational systems can be helpful, we have found that the use of intraoperative CT predictably improves functional and esthetic outcomes of complex midfacial and orbital trauma. The use of this technology also helps the overall reduction in healthcare costs by eliminating the need for reoperation in complex cases.

2193. Harrop, J. S., et al. (2014). "Evaluating initial spine trauma response: injury time to trauma center in PA, USA." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **21**(10): 1725-1729.

Historical perceptions regarding the severity of traumatic spinal cord injury has led to considerable disparity in triage to tertiary care centers. This article retrospectively reviews a large regional trauma database to analyze whether the diagnosis of spinal trauma affected patient transfer timing and patterns. The Pennsylvania Trauma database was retrospectively reviewed. All acute trauma patient entries for level I and II centers were categorized for diagnosis, mechanism, and location of injury, analyzing transportation modality and its influence on time of arrival. A total of 1162 trauma patients were identified (1014 blunt injuries, 135 penetrating injuries and 12 other) with a mean transport time of 3.9 hours and a majority of patients arriving within 7 hours (>75%). Spine trauma patients had the longest mean arrival time (5.2 hours) compared to blunt trauma (4.2 hours), cranial neurologic injuries (4.35 hours), and penetrating injuries (2.13 hours, $p<0.0001$). There was a statistically significant correlation between earlier arrivals and both cranial trauma ($p=0.0085$) and penetrating trauma ($p<0.0001$). The fastest modality was a fire rescue (0.93 hours) or police (0.63 hours) vehicle with Philadelphia County (1.1 hour) having the quickest arrival times. Most trauma patients arrived to a specialty center within 7 hours of injury. However subsets analysis revealed that spine trauma patients had the greatest transit times. Present research trials for spinal cord injuries suggest earlier intervention may lead to improved recovery. Therefore, it is important to focus on improvement of the transportation triage system for traumatic spinal patients.

2194. Harshith, K., et al. (2019). "Transcalvarial and Transdural Involvement of Skull Actinomycosis with Recurrence." Indian Journal of Neurosurgery **8**(3): 185-187.

Actinomycosis is caused by anaerobic gram-positive bacteria of Actinomyces genus, generally found as commensals in the human body and infection occurs when the immune system is compromised. We present the case of a 35-year-old diabetic woman, who presented with headache and sudden onset of left-sided weakness apart from scalp swelling, which on imaging showed transcalvarial transdural involvement, and subsequent surgical debridement and histopathologic analysis confirmed actinomycosis. Follow-up showed recurrence of the lesion at the same site following a period of remission. Calvarial involvement of actinomycosis is rare and can mimic even neoplastic or malignant lesions, hence requiring prompt diagnosis, treatment with surgery, and long-term antibiotic treatment to prevent complications.

2195. Hart, K. L. and D. Bowles (2012). "Reconstruction of alveolar defects using titanium-reinforced porous polyethylene as a containment device for recombinant human bone morphogenetic protein 2." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **70**(4): 811-820.

PURPOSE: The use of recombinant human bone morphogenetic protein 2 (rhBMP-2) in a collagen carrier is a proven alternative to autogenous bone grafting for certain cases. One of the principle limitations of rhBMP-2 at present, however, is the lack of a reliable rigid containment system to prevent soft tissue collapse of the collagen carrier sponge.

The present case series describes the use of titanium-reinforced porous polyethylene as a containment device for rhBMP-2-grafted alveolar defects., PATIENTS AND METHODS: A case review was performed of 8 patients who had undergone rhBMP-2 bone grafting using porous polyethylene as the containment device. Eight maxillary and two mandibular alveolar defects were grafted using rhBMP-2 and titanium-reinforced porous polyethylene as a soft tissue barrier. One patient received autologous ramus bone in addition to the rhBMP-2. All patients were followed up by clinical examination and periodic radiographic studies for 6 months to 2 years. Implant-borne prostheses were fabricated on all successful grafts., RESULTS: Of the 10 grafted alveolar defects, 2 (20%) resulted in early exposure of the containment devices, were removed, and resulted in no bone formation. One of the 10 defects (10%) became exposed 3 months postoperatively and resulted in only moderate bone formation. In the 7 nonexposed cases (70%), bone formation was excellent, and implants were successfully placed., CONCLUSIONS: Titanium-reinforced porous polyethylene might be a useful alternative containment device for rhBMP-2-grafted alveolar defects. The exposure rate of 30% in the present case series is comparable to that for titanium alone. Modifications to the shape and thickness of the material might improve its use in alveolar reconstruction and further reduce the incidence of exposure. Further studies are needed; however, titanium-reinforced porous polyethylene could become a new addition to the armamentarium of clinicians grafting alveolar defects. Copyright Published by Elsevier Inc.

2196. Hartwig, S., et al. (2009). "Black powder handgun deaths remain an uncommon event." The American journal of forensic medicine and pathology **30**(4): 350-353.

Although it was predicted that there would be an increase in the use of black powder guns due to their greater ease of procurement with less government control on sales, this does not seem to have been the general experience. To determine the rate of use of black powder handguns in shooting deaths in Berlin, Germany, review of the files of the Institute of Legal Medicine and Forensic Sciences, Charite-Universitatsmedizin Berlin was conducted over a 10-year period from 1997 to 2006. Out of total 85 gunshot deaths, there were only 3 where black powder handguns were used (3.5%). The cases involved 3 males aged 55, 62, and 63 years, respectively, all of whom had committed suicide with black powder percussion handguns, using 0.45, 0.56, and 0.36 caliber weapons. The source of the guns could not be determined. Wounds were characterized by excessive soot and propellant soiling and tattooing. The low number of fatalities involving black powder guns in a large forensic institution in Berlin, Germany, suggests that limiting access to such weapons would have little effect on total numbers of gunshot deaths. Simple loading mechanisms and reliability appear to be more important features influencing the choice of a handgun, rather than mere availability.

2197. Hartwig, S., et al. (2010). "Self-constructed shooting devices utilizing manually-impacted firing-pins (suicide machines)." The American journal of forensic medicine and pathology **31**(2): 192-194.

Three cases of suicide are described where deaths were due to single gunshot wounds to the head from self-constructed shooting devices. The victims were twin brothers aged 27 years, and a 53-year-old male. The firearms were manufactured by the victims who used machined metal tubes with 12-gauge shotgun and 7.65 mm ammunition, respectively. The mechanism of action in all cases relied upon direct impact on the firing pin rod; with a hammer in 2 cases, and a rock in the third. Homemade firearms are manufactured globally for use in criminal activities, although they tend to be found more often in countries and among groups where there is limited access to commercially manufactured weapons due to economic or legal constraints. Most devices use either a standard sprung hammer or trigger mechanisms. Given the unusual and cumbersome nature of the firing mechanism in the reported cases, it is likely that these firearms were specifically manufactured for the purpose of suicide.

2198. Hasegawa, I., et al. (2014). "Assisted suicide and killing of a household pet: pre-autopsy post-mortem imaging of a victim and a dog." Forensic science, medicine, and pathology **10**(1): 122-125.

2199. Haselsberger, K. and R. W. Oberbauer (1992). "Extracranial-intracranial arterial bypass after cerebral foreign body embolization: effective treatment of transient ischemic attacks." Neurosurgery **31**(1): 141-144.

A case of traumatic foreign body embolism into the right intracranial carotid artery with stenosis of the right middle cerebral artery in a 9-year-old boy is presented. Initial hemiparesis and a consecutive asymptomatic interval of 12 months were followed by a period of frequent transient ischemic attacks. After an extracranial-intracranial arterial

bypass had been performed 18 months later, symptoms ceased without relapse. A thorough review of the literature demonstrates the rare incidence of this entity.

2200. Hashimoto, K., et al. (2017). "Vitronectin Regulates the Fibrinolytic System during the Repair of Cerebral Cortex in Stab-Wounded Mice." Journal of neurotrauma **34**(22): 3183-3191.

Vitronectin (VN), one of the serum proteins, is known to be involved in the regulation of blood coagulation, fibrinolysis, and cell migration. It has been proposed that the regulation of fibrinolysis by VN promotes the blood-brain barrier (BBB) recovery from brain injuries such as traumatic injury and subarachnoid hemorrhage. The effects of VN on fibrinolysis in the injured brain remain unclear, however. We examined the effects of VN on the fibrinolytic system in the stab-wounded cerebral cortex of VN-knockout (KO) mice. First, hemorrhage and recovery from BBB breakdown in the wounded regions were assessed by serum immunoglobulin G (IgG) extravasation. The level of IgG extravasation increased 3-7 days after the stab wound (D3-7) in the cortex of VN-KO mice, compared with that in wild type mice, indicating that VN deficiency inhibited the recovery from BBB breakdown. The VN deficiency decreased fibrin fiber deposition at D1-3, suggesting that VN deficiency tilts the balance between fibrinogenesis and fibrinolysis toward fibrinolysis. Next, the effects of VN deficiency on the fibrinolytic factors were analyzed in the stab-wounded cortex. The VN deficiency impaired the activity of plasminogen activator inhibitor-1, an inhibitor of the fibrinolytic system, at D3-5. Further, VN deficiency up-regulated the mRNA and protein expression levels of tissue-type plasminogen activator, and urokinase-type plasminogen activator. These results demonstrate that VN contributes to the regulation of the fibrinolytic system and recovery from BBB breakdown in the wounded brain.

2201. Hashmi, Z. G., et al. (2014). "Unequal burden of injury at level I trauma centers: The case for efficiency in resource allocation for optimal trauma care." Journal of the American College of Surgeons **219**(3): S104-S105.

INTRODUCTION: Trauma centers (TCs) are frequently designated and verified based on the availability of resources to optimally care for the injured. However, anecdotal evidence suggests that even between similarly-resourced facilities, some centers treat different proportions of specific injuries than others, raising concerns regarding efficiency of equal resource allocations. The objective of this study was to explore the existence of potential differences in the proportion of specific injuries treated at level I trauma centers. METHODS: We analyzed data from the National Trauma Data Bank 2007-2011. Patients ≥16 years of age, with blunt/penetrating injuries and an Injury Severity Score ≥9 admitted to level I trauma centers were included. The Barell Injury Diagnosis Matrix was utilized to characterize proportions of specific injuries treated at each center. TCs were then classified into proportional quintiles for each specific injury, which were then used to compare inter-quintile variations (lowest vs highest quintile). RESULTS: A total of 720,563 patients from 172 TCs were analyzed. Significant interquintile variations were observed for all cohorts (Table). The greatest variation was found between lowest and highest quintile TCs for penetrating (6.7-fold difference, $p<0.01$) and firearm injuries (9.4-fold difference, $p<0.01$). An average of two fold difference was observed for specific injuries based on the Barell classification including traumatic brain injury, spinal cord, thoracic, abdominal, pelvic and hand injuries. CONCLUSIONS: Similarly-resourced level I trauma centers differ substantially in the proportions of specific injuries treated. Current TC designation and verification strategies may need to be reconsidered to improve efficiency in resource allocations for optimal trauma care. (Table Presented).

2202. Hass, H. D. (1964). "[ON PSEUDOPARESIS OF THE INFERIOR OBLIQUE MUSCLE (TRAUMATIC SHEATH SYNDROME)]." ZUR PSEUDOPARESE DES M. OBLIQUUS INFERIOR (TRAUMATISCHES SHEATH-SYNDROM) **144**: 118-122.

2203. Hassan Osman, M. and S. Shaltout (2013). "Maxillofacial firearm injuries: A protocol for management in Asyut University hospital." International journal of oral and maxillofacial surgery **42**(10): 1225.

Purpose: This study discusses the firearm injuries in the maxillofacial region, protocol for primary care and management, the complications encountered and the outcome of the patients in Asyut University Hospital in upper Egypt. Patients and methods: 47 cases were received the primary care and treatment in Assiut University Hospital - were admitted and treated, the results were recorded and analysed. Results: Mandible (area III) was the common site of injury, the CNS and ocular injury have the same frequency of association. The most common complications were deformed commissure and scars. Cases with bone loss of the mandible leads to mal-occlusion and associated with

mandibular and cervical branch facial nerve injury. Conclusion: Recommendation of simple approach, post operative safe air way and avoidance of sophisticated technique in the stage of primary care and treatment.

2204. Hassan, S. (2022). "Innovation of new surgical technique to contour the missing bone in the face of survivors of traffic and war injuries by new modified Problast painted with a mixture of biocompatible materials." Journal of Population Therapeutics and Clinical Pharmacology **29**(3): e109-e111.

The bone grafts taken from the patient himself (Auto genius graft) to restore the contour of the lost facial bone lost is the ideal technique on the road to recovery from injuries of war or traffic accidents. This novel surgical procedure utilizes a new modified Problast painted with a mixture of a biocompatible materials to restore the lost parts of the zygomatic bones, due to traffic accidents, shell injuries, or bullet injuries.

2205. Hassfeld, S., et al. (1997). "Intraoperative guidance in maxillofacial and craniofacial surgery." Proceedings of the Institution of Mechanical Engineers. Part H, Journal of engineering in medicine **211**(4): 277-283.

The authors' experiences with intraoperative computer assisted guidance in interventions in oromaxillofacial and craniofacial surgery are reported. The guidance system SPOCS (Surgical Planning and Orientation Computer Systems, Aesculap, Germany) consists of an infrared light emitting system of diodes and camera, an imaging workstation and assorted freehand instruments. The software is an updated version of the well-known Viewing Wand software (ISG Technologies, Canada). In tests on phantoms, the system proved a mean accuracy of less than 1.5 mm. Within the last 15 clinical tests, the system has achieved an accuracy better than 3 mm which, at the moment, the authors estimate to be sufficient to proceed with its clinical evaluation. Using bone screws to register the patient's position, an accuracy in the range of less than 2 mm in relation to bony reference points has been achieved. By visualizing the tip of the instrument in real time, this technique allows surgical interventions, even in anatomically complicated situations, without endangering vital neighbouring structures. The 'offset' function of the software, by which the surgeon can elongate the tip of the instrument virtually, allows the surgeon to analyse structures before they are penetrated by the instrument as in a 'look ahead' operation. The authors expect computer assisted simulation and guidance systems to improve surgical quality and reduce the risks associated with surgical interventions.

2206. Hatano, M., et al. (2016). "Combination management by C-arm fluoroscopy and extraocular muscle severance for penetrating ocular trauma with a retrobulbar foreign body." Orbit (Amsterdam, Netherlands) **35**(3): 167-169.

We report here the successful removal of a retrobulbar metallic foreign body in a patient with penetrating ocular trauma by a transconjunctival approach and combination management with C-arm fluoroscopy and extraocular muscle severance. A 37-year-old man sustained a penetrating injury to the right eye while using an iron hammer. Initial slitlamp examination revealed a corneoscleral laceration, iridocele, anterior chamber collapse, and a traumatic cataract. Visual acuity in the right eye was limited to the perception of hand motion. Computed tomography revealed an orbital foreign body in the retrobulbar area. The patient underwent corneoscleral suturing, severance of extraocular muscles, removal of the foreign body with guidance by C-arm fluoroscopy, pars plana lensectomy, and pars plana vitrectomy. Combination management with C-arm fluoroscopy and extraocular muscle severance may thus be a suitable approach to the removal of a retrobulbar metallic foreign body.

2207. Hatefi, M., et al. (2016). "Association of serum uric acid level with the severity of brain injury and patient's outcome in severe traumatic brain injury." Journal of Clinical and Diagnostic Research **10**(12): OC20-OC24.

Introduction: The prognostic value of serum Uric Acid (UA) levels in Traumatic Brain Injury (TBI) is unclear. Aim: To investigate the relationship between serum UA levels and prognosis of patients with TBI when in hospital and at six months after discharge. Materials and Methods: All patients attended our emergency department during July 2014 and December 2015 and were consecutively entered into the study and among 890 evaluated candidates based on inclusion criteria we finally investigated the serum UA levels of 725 TBI patients. Computed Tomography (CT) images of the brain were obtained within the first 24 hours of hospitalization. Outcome was assessed using the Glasgow Outcome Scale (GOS) score at discharge and at six months after discharge. Results: Data of 725 patients (42.89% men; mean age: 54.69 ± 12.37 years) were analyzed. Mean ± Standard Deviation (SD) of GCS scores was 4.65 ± 1.76. Serum levels of UA, when in hospital and at six months after discharge, among those who died were lower than those who survived (in hospital:

0.126 ± 0.026 vs. 0.243 ± 0.942 mmol/l, p = 0.000; 6 months post-discharge: 0.130 ± 0.044 vs. 0.286 ± 0.069 mmol/l, p<0.001). The mean UA plasma was significantly different between deceased and alive patients according to GOS scores (p<0.001 and p=0.030, respectively). The UA levels showed a significant relationship with GCS scores and severity of brain injury assessed using the Marshall Classification Score (p=0.005). Conclusion: Our results showed a strong relationship between UA levels and patients' outcomes either in hospital or at six months after discharge. Serum UA level could be considered as a valuable marker for evaluating the severity of brain injury and outcomes of TBI.

2208. Hatfield, S. and V. R. Challa (1980). "Embolism of cerebral tissue to lungs following gunshot wound to head." The Journal of trauma **20**(4): 353-355.

The case history of a 28-year-old man who sustained a gunshot wound to the head and developed multiple pulmonary emboli composed of cerebral tissue is presented. The brain tissue fragments probably entered the severed end of a bridging vein, traveled along the superior sagittal sinus, and gained access to the internal jugular vein and systemic venous return.

2209. Hauer, T., et al. (2011). "[Bullet and shrapnel injuries in the face and neck regions. Current aspects of wound ballistics]." Schuss- und Splitterverletzungen im Gesichts- und Halsbereich. Aktuelle Aspekte zur Wundballistik. **59**(8): 752-764.

A basic understanding of the ballistic behaviour of projectiles or fragments after entering the human body is essential for the head and neck surgeon in the military environment in order to anticipate the diagnostic and therapeutic consequences of this type of injury. Although a large number of factors influence the missile in flight and after penetration of the body, the most important factor is the amount of energy transmitted to the tissue. Long guns (rifles or shotguns) have a much higher muzzle energy compared to handguns, explaining why the remote effects beyond the bullet track play a major role. While most full metal jacket bullets release their energy after 12-20 cm (depending on the calibre), soft point bullets release their energy immediately after entry into the human body. This results in a major difference in extremity wounds, but not so much in injuries with long bullet paths (e.g. diagonal shots). Shrapnel wounds are usually produced with similarly high kinetic energy to those caused by hand- and long guns. However, fragments tend to dissipate the entire amount of energy within the body, which increases the degree of tissue disruption. Of all relevant injuries in the head and neck region, soft tissue injuries make up the largest proportion (60%), while injuries to the face are seen three times more often than injuries to the neck. Concomitant intracranial or spinal injury is seen in 30% of cases. Due to high levels of wound contamination, the infection rate is approximately 15%, often associated with a complicated and/or multiresistant spectrum of germs.

2210. Haughey, F. (2012). "Post traumatic brain injury fatigue-finding a focus." Brain injury **26**(4-5): 327.

Objectives: Due to its subjective nature, post traumatic brain injury fatigue (PTBIF) is considered difficult to treat. In some cases this may lead to fatigue being overlooked or ignored by the clinician. Fatigue is often neglected as a target for treatment, perhaps because it typically appears unrelated to the severity of the central disease process. PTBIF is very topical in the literature. The number of people presenting with fatigue both as an inpatient and outpatient in our facility is high and it's impact on occupational performance is evident. A formalised pathway of assessment and treatment for patients presenting with PTBIF did not exist in our unit. This exploratory study serves to explore the knowledge base of cliniicans working with persons with PTBIF and their current practices. The study also looked at the evidence in relation to the assessments and interventions used with this population. Methods: A review of the literature was completed to explore the different types of fatigue, the impact of fatigue on occupational performance, assessments and interventions used for people experiencing PTBIF. A number of interviews were completed with clients to establish the subjective experience of PTBIF. A survey was drawn up and distributed to 16 members of the occupational therapy department and 24 members members of the wider interdisciplinary team working in the brain injury programme in this national centre. The purpose of this was to explore current practice and thinking in relation to PTBIF and to compare this with empirical evidence related to same. Results: Survey participants noted that PTBIF was reported by 50-75% of clients. There was varying levels of knowledge between diciplines relating to the etiology, epidemiology and prevalence of PTBIF. Over half of the participants surveyed did not report a question relating to PTBIF as forming part of their initial assessment. There was no established assessment or intervention procedure or fatigue management protocol relating to PTBIF. The literature was reviewed and despite its prevalence and impact on quality of

live, there is little evidence regarding the effectiveness of fatigue management interventions for PTBIF. There was little evidence available to support current practices by clinicians. A fatigue managment protocol is currently being established in the programme which includes: 1. The identification of a Quantitative/Qualitative Measure 2. A compulsory question regarding PTBI fatigue on initial assessment/interview 3. Development of an educational booklet for patients, friends and family 4.Scheduling/Timetabling breaks in therapy schedules Conclusions: PTBIF impacts occupational performance. The importance of treating this deficit early in the inpatient admission is essential. If not acknowledged and addressed as an inpatient it can impact negatively on the client's ability to maximise their potential within their inpatient stay. If a rehabilitation team are to effectively address the needs of people who have sustained a TBI it is essential that this impairment is addressed.

2211. Hausmann, R. and P. Betz (2002). "Thermally induced entrance wound-like defect of the skull." Forensic science international **128**(3): 159-161.

A case of death due to car fire is described where the carbonised skull of the cremated corpse showed an ovoid defect of the cranial bone. The question arose whether this formed fracture was caused by a gunshot. But the reconstruction of the cranial remains with detached parts of the tabula externa provided evidence that the suspicious defect was to be classified as an uncommon heat-induced post-mortem artefact.

2212. Havel, J., et al. (2006). "[Using of scanning electron microscopy for detection of gunshot residue]." Pouziti skenovaci elektronove mikroskopie pri detekci povystrelovych castic. **51**(3): 42-46.

Scanning electron microscope improves the possibility of investigation of surroundings near of gunshot wounds in forensic medicine, it is the next subsequent method for differentiating of area of entrance and exit wound, supplemental method for determination of firing distance, permit of detection (GSR) on the hand of shooter and ensured describing of samples and their stored. Detection of GSR provides many information about composition of bullet and primer. Authors are demonstrating the possibility of detection of GSR on experimental shooting to the krupon (pigs' skin) in different situation (such as in a room and in outside area) and using of different weapon (hand gun CZ No.75 and machine gun No.58).

2213. Haworth, C. S. and J. C. de Villiers (1988). "Stab wounds to the temporal fossa." Neurosurgery **23**(4): 431-435.

Stab wounds to the temporal fossa appear as a characteristic clinical entity. Patients admitted with stab wounds to the head during the period 1970 to 1986 were reviewed retrospectively. Of these, 10 met the criteria of having suffered a stab wound that penetrated the skull and dura mater of the temporal fossa. Injury to the internal carotid artery-cavernous sinus complex (3 patients) or to the basilar artery-pons region (5 patients) was frequent. Two other patients experienced injury to the trigeminal nerve and the petrous ridge. The mechanical, neurological, radiological, and prognostic features of knife wounds to this region are discussed.

2214. Hawramy, T. A. (2007). "Role of pre-hospital care in reducing mortality rate among victims of gunshot injuries." Middle East Journal of Emergency Medicine **7**(2): 61-66.

This study can be regarded as the first research done solely on autopsy findings in the Iraqi Kurdistan region. It is a prospective study on (106) cadavers who were victims of gunshot injuries (included those who died at the scene and those who died as in-patients) seen in Sulaimani Forensic Department from February 2003 to February 2004. A classical approach by dissection was used to determine cause of death in each victim, with age and sex incidence in order to clarify role and importance of pre-hospital care in reducing death for victims of gunshot injuries. In general, victims were either received from the scene after an average period of two to four (2-4) hours from the event or directly from the hospital. The main causes of death among those received from the scene were severe bleeding due to vascular or organic injuries [account for (53/106) 50.02%] , laceration of brain tissue (47/106) 44.34%, and spinal cord transaction (1/106) 0.94%. While septicemia is the only cause of death among those received from hospital, accounting for (5/106) 4.7%. Deaths occurred from injuries to different anatomical sites of the body: head alone (42/106) 39.62%, head with extremity (6/106) 5.66%, neck alone(1/106) 0.94%,chest alone (16/106) 15.92%, chest with extremity (8/106) 7.54%, abdomen alone (15/106) 14.15%, abdomen with extremity(4/106) 3.77%, thigh alone (11/106) 10.37%, and pelvis alone (3/106) 2.83%. The most significant finding is that life almost always could be preserved in at least (11/106) 10.37% with

a single bullet injury to thigh if pre-hospital care was present. Death from gunshot injuries can be regarded as a second major cause of death after road traffic accidents in our region with sex distribution of 86.79% males and 13.21% females. The peak age incidence for females was between 14-44 years and for males 14-54 years, regardless of the type of events, i.e. criminal, suicidal or accidental. Incidence of gunshot injuries are more common in rural areas than urban ones in a ratio of 5.5:1.

2215. Hawryluk, G. W. J. (2016). "Comment." Clinical neurosurgery **78**(5): E760.

2216. Hawryluk, G. W. J. (2016). "Comments." Neurosurgery **78**(5): E760.

2217. Hawryluk, G. W. J., et al. (2022). "Rationale and Methods for Updated Guidelines for the Management of Penetrating Traumatic Brain Injury." Neurotrauma reports **3**(1): 240-247.

Penetrating traumatic brain injury (pTBI) affects civilian and military populations resulting in significant morbidity, mortality, and healthcare costs. No up-to-date and evidence-based guidelines exist to assist modern medical and surgical management of these complex injuries. A preliminary literature search revealed a need for updated guidelines, supported by the Brain Trauma Foundation. Methodologists experienced in TBI guidelines were recruited to support project development alongside two cochairs and a diverse steering committee. An expert multi-disciplinary workgroup was established and vetted to inform key clinical questions, to perform an evidence review and the development of recommendations relevant to pTBI. The methodological approach for the project was finalized. The development of up-to-date evidence- and consensus-based clinical care guidelines and algorithms for pTBI will provide critical guidance to care providers in the pre-hospital and emergent, medical, and surgical settings.

2218. Hay, A., et al. (1991). "Needle penetration of the globe during retrobulbar and peribulbar injections." Ophthalmology **98**(7): 1017-1024.

The charts of 23 patients with needle penetration of the globe during retrobulbar or peribulbar injections between January 1980 and May 1990 were reviewed. Possible needle penetration risk factors included high myopia, previous scleral buckling procedures, injection by nonophthalmologists, and poor patient cooperation during the injection. Of the 23 cases of ocular penetration, 16 (70%) were from sharp (22-, 23-, and 25-gauge) needles, and 7 (30%) were from blunt (23- and 25-gauge) needles. Management options depended on the severity of the intraocular injury. Retinal breaks without retinal detachment were treated by laser photocoagulation (four cases) or cryopexy (one case) and were observed in three cases. More advanced complications (retinal detachment and vitreous hemorrhage) were usually treated by pars plana vitrectomy with or without a scleral buckle (12 of 14 cases). The final visual acuity was 20/400 or better in only 2 of the 14 retinal detachment cases. In cases without retinal detachment, the final visual acuity was 20/50 or better in 7 of 9 cases.

2219. Hayashi, N. (2000). "[Brain hypothermia treatment for the management of severe pediatric brain injury]." No to hattatsu = Brain and development **32**(2): 122-131.

In the management of severe pediatric brain injury, attention has previously been paid to brain edema, ICP elevation and low cerebral perfusion pressure (CPP). However, in the acute stage within 3-6 hours after trauma, brain hypoxia and hyperglycemia associated with diffuse brain injury are often observed. We have pointed out brain thermo-pooling (elevation of brain tissue temperature) and brain hypoxia caused by defective release of oxygen from hemoglobin (due to decrease in red blood cell enzyme (DPG)) as a new mechanism of brain injury. To treat these pathologic changes, we have developed a brain hypothermia treatment, the major purpose of which is to prevent brain hypoxia, brain thermo-pooling, neurohormonal changes causing cytokine encephalopathy, and a selective, radical-mediated damage of the dopamine A10 nervous system. The brain tissue temperature is initially adjusted to 35 degrees C with adequate cerebral oxygenation, followed by brain hypothermia at 34 degrees C for 1 weeks to prevent brain hypoxia, free radical reactions, brain edema and ICP elevation. What is most difficult in the pediatric brain hypothermia treatment is to maintain metabolic balance in the injured brain tissue and pulmonary infections associated with an

immune crisis. When a rapid elevation of serum glucose is noted it is critical to lower the value because glucose quickly penetrates the blood-brain barrier and increases pyruvate and lactate by inhibiting the TCA cycle metabolism. Thus, hyperglycemia during brain hypothermia treatment is one of the major target of management. Another problem is immune crisis associated with secondary pulmonary infections. To prevent them, early enteral nutrition and replacement of L-arginine were most useful, as well as preconditioning for rewarming as follows: serum albumin > 3.0 g/dl; lymphocyte > 1500/mm3; T-H (CD4) lymphocytes > 55%; serum glucose, 120-140 mg/dl; vitamin A > 50 mg/dl; Hb > 12 g/dl and 2,3 DPG, 10-15 mumol/gHb; O2 ER, 23-25% and AT-III, > 100%. The clinical benefit of this therapy is still controversial.

2220. Hayashi, S., et al. (1990). "Treatment of a mandibular gunshot wound." Japanese Journal of Plastic and Reconstructive Surgery **33**(4): 355-358.

A 20-year-old man with mandibular gunshot wound has been treated. AX ray examination revealed that the left side of his mandible was fractured and that the neck was swollen, thoush the carotid artery and vein were still intact. In the case of gunshot wounds, shock waves way cause soft tissue damage far from the primary missile track. Thus for the treatment of gunshot wounds, extensive debridement is needed. For such cases, a vascularlized tissue transfer has proven sucessful in the reconstruction of defective tissue, In this instance, the authors used a free iliac bone graft for the reconstruction of the mandible and the results were excellent.

2221. Hayashi, T., et al. (2013). "Suicide with two shots to the head using a rare 'Velo-Dog' pocket revolver." Forensic science, medicine, and pathology **9**(2): 265-269.

2222. Hayashi, Y., et al. (2003). "Penetrating head injury caused by bear claws: case report." The Journal of trauma **55**(6): 1178-1180.

2223. Hayes, E., et al. (1989). "Cerebral embolism after gunshot wounds." AJNR. American journal of neuroradiology **10**(5 Suppl): S77.

2224. Haynes, Z. A., et al. (2021). "Risk factors of persistent insomnia among survivors of traumatic injury: a retrospective cohort study." Journal of clinical sleep medicine : JCSM : official publication of the American Academy of Sleep Medicine **17**(9): 1831-1840.

STUDY OBJECTIVES: Insomnia is a diagnosis with broad health and economic implications that has been increasingly recognized in military service members. This trend was concurrent with an increase in traumatic wartime injuries. Accordingly, we sought to determine longitudinal predictors of persistent insomnia in combat veterans who sustained traumatic injuries., METHODS: Retrospective cohort study of service members deployed to conflict zones from 2002 to 2016, with longitudinal follow-up in the Veterans Affairs and Military Health Systems. Two cohorts were derived: (1) service members who sustained traumatic injuries and (2) an age-, sex-, and service component-matched cohort of uninjured service members who deployed to a combat zone. Insomnia was defined using International Classification of Diseases, Ninth Revision or International Classification of Diseases, 10th Revision-Clinical Modification codes., RESULTS: The final population of 17,374 service members was followed from date of injury (or date of matched participant's injury) for a median of 8.4 (interquartile range, 5.3-10.7) years. Service members with traumatic injury were at significantly greater risk of developing insomnia than uninjured service members (hazard ratio = 1.43; 95% confidence interval, 1.30-1.58) after adjustment. Traumatic brain injury was associated with insomnia compared with patients without traumatic brain injury in the multivariable model: mild/unclassified traumatic brain injury (hazard ratio = 2.07; 95% confidence interval, 1.82-2.35) and moderate/severe/ penetrating traumatic brain injury (hazard ratio = 2.43; 95% confidence interval, 2.06-2.86). Additionally, burn injury (hazard ratio = 1.95; 95% confidence interval, 1.47-2.59) and amputation (hazard ratio = 1.61; 95% confidence interval, 1.26-2.06) significantly increased the risk of a diagnosis., CONCLUSIONS: Traumatic injuries significantly predicted a diagnosis of insomnia after controlling for mental health disorders. Our findings strongly suggest the need for long-term surveillance of sleep disorders in trauma survivors., CITATION: Haynes ZA, Collen JF, Poltavskiy EA, et al. Risk factors of persistent insomnia among survivors of traumatic

injury: a retrospective cohort study. J Clin Sleep Med. 2021;17(9):1831-1840. Copyright © 2021 American Academy of Sleep Medicine.

2225. Hazama, A., et al. (2018). "Full Recovery After a Bihemispheric Gunshot Wound to the Head: Case Report, Clinical Management, and Literature Review." World neurosurgery **117**: 309-314.

BACKGROUND: Nearly 33,600 people die each year in the United States as a result of gunshot wounds (GSWs). Penetrating craniocerebral GSWs are often fatal with a nearly 70% death rate at the scene of the trauma. Overall combined mortality rate for patients who die at the scene or at the hospital is almost 91%. Poor outcome is associated with initial low Glasgow Coma Scale score and bihemispheric and transventricular gunshot trajectory. We summarize current understanding in management, prognostic factors, and survival outcomes in patients with a penetrating GSWs to the head. We report a patient with return to full function despite bihemispheric, multilobar involvement. Full function is defined here as ability to return to previous work and perform activities of daily living., CASE DESCRIPTION: A 33-year-old man sustained a GSW to the head under unknown circumstances. On initial presentation, he had a Glasgow Coma Scale score of 15. He was verbalizing and communicating but was amnestic for the event. From a left frontal entry wound, the bullet traversed both frontal lobes of the brain reaching the right frontal-parietal junction. Physical examination and vital signs were normal. Appropriate surgical and medical management resulted in complete recovery., CONCLUSIONS: Craniocerebral GSWs have a high mortality rate and usually require aggressive management. Evaluation of most GSWs requires appropriate imaging studies followed by proactive treatment against infection, seizure, and increased intracranial pressure. Surgical intervention is often necessary and ranges from local wound debridement to craniectomy, decompression, and wound exploration.

2226. He, L., et al. (2012). "Pharmacokinetics of bendamustine in patients with brain metastases from solid tumors: Evaluation of bendamustine blood-brain barrier penetration." Clinical Pharmacology and Therapeutics **91**: S130.

BACKGROUND: Bendamustine (BM) is a dual functioning DNA alkylating and cross-linking reagent approved by the US FDA for treatment of CLL and NHL. It is currently in clinical evaluation for treatment of various hematologic and solid tumor malignancies. The ability of BM to penetrate the BBB has not been directly evaluated in humans. The purpose of our study was to evaluate the plasma pharmacokinetics (PK) of BM and determine if BM could be detected and quantified in resected brain lesions after dosing. METHODS: Our team is evaluating BM as a radiosensitizer combined with fractionated stereotactic radiotherapy for treatment of patients with up to 4 brain metastases from solid malignancies. Patients were dosed with a 30 min. IV infusion of BM days 1 to 3 with surgical resection of lesions following dosing on day 3. Plasma samples were collected on day 1 or 2. Surgeries were conducted after infusion on day 3 with collection of plasma, cerebro-spinal fluid (CSF) and brain tumor tissues. Two highly sensitive LC-MS/MS assays for quantification of BM in human plasma and mouse brain tissue (as a surrogate for human brain tissue) were developed and fully validated. RESULTS: Plasma PK data from 3 patients treated with 40 mg BM demonstrated peak concentrations near 13 M at the end of infusion with rapid decline to nM levels within 2 hours and half-lives near 0.8 hrs. CSF and tumors collected 4.5 to 9 hours after BM infusion indicated BM could be detected in the earliest samples collected, although levels were below quantifiable limits. CONCLUSION: Plasma PK for BM is consistent with previous clinical studies. Data from day 3 of treatment suggests BM is present at detectable levels in CSF and brain tumors up to 6 hours after dosing. Additional patients are being accrued with efforts to reduce time delays between BM dosing and surgery.

2227. Healey, D. L. and J. A. Kieser (2005). "Unusual fatal dog attack in Dunedin, New Zealand." The Journal of forensic odonto-stomatology **23**(2): 51-54.

A case of a fatal dog attack on a middle aged woman is presented. The offending dog was her own Bull-mastiff, which had previously shown signs of aggression towards her. Most of the injuries were found on the victim's face, neck and skull. A noteworthy feature of this attack was that the victim was known to suffer from Huntington disease. It is postulated that the involuntary movements, progressive dementia and increased moodiness characteristic of the disease may have had a significant role in triggering the attack.

2228. Healy, J. F. (1982). "Computed tomography of orbital trauma." The Journal of computed tomography **6**(1): 1-10.

Ten cases of trauma to the orbit and orbital region are presented to illustrate the efficacy of computed tomography in the radiologic evaluation of these injuries. CT was able to detect subarachnoid hemorrhage, retrobulbar hematoma, orbital cellulitis, foreign bodies, intraglobal and intraorbital air, dislocated lens, blowout, and tripod fractures in these patients.

2229. Healy, S. M., et al. (2008). "Closed reduction of an intracranially displaced subcondylar fracture: a case report." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **66**(2): 389-393.

2230. Heath, D. L. and R. Vink (1999). "Optimization of magnesium therapy after severe diffuse axonal brain injury in rats." The Journal of pharmacology and experimental therapeutics **288**(3): 1311-1316.

A number of studies have demonstrated that magnesium salts given after traumatic brain injury improve subsequent neurologic outcome. However, given that these earlier studies have used a number of different salts, dosages, and routes of administration, follow-up studies of the neuroprotective properties of magnesium are complicated, with comparisons to the earlier literature virtually impossible. The present study has therefore characterized the dose-response characteristics of the most commonly used sulfate and chloride salts of magnesium in a severe model of diffuse traumatic axonal injury in rats. Both magnesium salts improved neurologic outcome in rats when administered as a bolus at 30 min after injury. The i.v. and i.m. optima of each salt was 250 micromol/kg and 750 micromol/kg, respectively. The identical concentrations required for improved neurologic outcome suggest that improvement in outcome was dependent on the magnesium cation and not the associated anion. Subsequent magnetic resonance studies demonstrated that the administered magnesium penetrated the blood-brain barrier after injury and resulted in an increased brain intracellular free magnesium concentration and associated bioenergetic state as reflected in the cytosolic phosphorylation potential. Both of these metabolic parameters positively correlated with resultant neurologic outcome measured daily in the same animals immediately before the magnetic resonance determinations.

2231. Hebecker, R., et al. (2009). "An unusual case of a penetrating skull-base injury caused by a wild deer's antler." Central European neurosurgery **70**(1): 48-51.

Injuries relevant to neurosurgeons in central Europe are rarely caused by wild animal attacks, whereas dog bites in urban areas and farm-related attacks from cattle and horses are well-known to cause sometimes fatal head injuries. The authors describe the first case of a perforating frontobasal injury caused by a wild deer's antler. Associated lesions involved the endonasal area and the left orbit. A multidisciplinary approach was used to address all lesions in a one-stage operation resulting in a full recovery of the patient. Apart from the problem of a possible contamination of the head wound, injuries caused by wild animal attacks should be treated the same way as comparable "regular" cases. Adequate coverage of dural and bone defects with autologous material via a bifrontal intradural approach and meticulous debridement of the intracranial wound usually gives good functional and cosmetic results.

2232. Hecimovic, I., et al. (2000). "Intracranial infection after missile brain wound: 15 war cases." Zentralblatt fur Neurochirurgie **61**(2): 95-102.

OBJECTIVES: The present study describes 15 cases of intracranial infections developed in a group of in patients with missile brain wound (MBW), during the war in Croatia in the region of East Slavonia., METHOD: The retrospective study included 88 MBW casualties. There were 11 females and 77 males aged 2-80 years. The projectile penetration of the cranial dura was confirmed and the presence of intracranially retained foreign bodies was evaluated with computerized tomography (CT) in all the patients. The wounded were treated according to the modern recommendations of neurotrauma care. However, we extracted only accessible bone/metallic fragments during intracranial debridement. All intracranial infections were documented by cultures, CT, surgery or autopsy. The mean follow-up period of wounded with intracranial infections was 2.4 years (range, 10 days to 7 years)., RESULTS: Intracranial infection developed in 14 patients (17%) as "early intracranial infections". Among 14/15 cases, infection developed within the first 8 weeks, and in 1 case 5 months after wounding. We recorded 4 cases of isolated bacterial meningitis, whereas in 9 cases brain abscess had developed. In 6 cases brain abscess was associated with concomitant meningitis and epidural empyema. Local cerebritis developed in one case, as well as subdural empyema with the concomitant

meningitis in one case. There were 8 deaths in total of 15 cases. Glasgow Outcome Score 3 was observed in 2 and good outcome in 5/15 cases. The infectious organisms were isolated in 8 cases. Gram-positive bacteria were found in 12 different specimens. Gram-negative bacteria were found in 9 specimens. The most frequently isolated organism was Staphylococcus aureus. beta-hemolytic streptococcal and clostridial infections were not observed. Among the 15 patients with intracranial infection, just one did not have intracranially retained bone and/or metallic fragments. However, among the 73 head injuries without intracranial infections only 10 did not have retained fragments. CSF fistula and/or dehiscence developed in 13/15 patients with intracranial infection. In 67/73 wounded without intracranial infections, wound complications were not registered., CONCLUSIONS: The liberal use of post-contrast CT of the brain within the first 2 months after injury, especially if performed early in the clinical course, can lead to a prompt diagnosis of most of "early intracranial infections". The surgical procedures in order to prevent wound CSF fistula/dehiscence development are absolutely necessary. The immediate scalp and dural wound repair in case of wound complications are absolutely indicated and if needed, the procedures can be repeated. However, it seems that retained fragments are not responsible for an increased rate of intracranial infection.

2233. Hedberg, K. M., et al. (2001). "The glioma-associated gangliosides 3'-isoLM1, GD3 and GM2 show selective area expression in human glioblastoma xenografts in nude rat brains." Neuropathology and applied neurobiology **27**(6): 451-464.

This work describes the in vivo expression and distribution of glioma-associated gangliosides (GD3, GM2, 3'-isoLM1) in a novel human brain tumour nude rat xenograft model. In this model, the tumours, which are established directly from human glioblastoma biopsies, show extensive infiltrative growth within the rat brain. This model therefore provides an opportunity to study ganglioside expression not only within the macroscopic tumour, but also in brain areas with tumour cell infiltration. The ganglioside expression was studied by confocal microscopy of immunostained brain sections using antiganglioside monoclonal antibodies. Xenografts from four human glioblastoma multiformes were established in rats and the brains removed after 3-4 months. Ganglioside GD3 was expressed in the tumour parenchyma while ganglioside 3'-isoLM1 was more abundantly expressed in the periphery of the tumour associated with areas of tumour cell invasion. GM2 expression was only seen in one tumour, where it was located within the main tumour mass. Double staining with a pan antihuman monoclonal antibody (3B4) and the antiganglioside monoclonal antibodies confirmed that the ganglioside expression was associated with tumour cells. This work supports the concept of different biological roles for individual gangliosides and indicates that antibodies or ligands directed against GD3 and 3'-isoLM1 might be complementary when applied in the treatment of human glioblastomas.

2234. Hee, J. K., et al. (2008). "Tuberculin survey to estimate the prevalence of tuberculosis infection of the elementary schoolchildren under high BCG vaccination coverage." Tuberculosis and Respiratory Diseases **65**(4): 268-276.

Background: Although the prevalence of tuberculosis infections (PTBI) is one of the basic epidemiologic indices, no survey has been carried out since 1995 because the nation-wide tuberculosis prevalence survey was changed to a surveillance system. Subjects without a BCG scar are examined in a tuberculin survey. However, it is very difficult to select these subjects under high vaccination coverage. It is important to evaluate the impact of BCG vaccinations on the tuberculin response and estimate the PTBI regardless of the BCG vaccination status. Methods: A nation-wide, school-based cross-sectional tuberculin survey was carried out among first graders in elementary school in 2006. A total of 5,148 children in 40 schools were selected by quota sampling. Tuberculin testing with 0.1 ml of two tuberculin units of PPD RT23 was carried out on 4,018 children. The maximum transverse diameter of induration was measured 48 to 72 hours later. The presence of a BCG scar was checked separately. Results: There were no BCG scars in 6.3% of the subjects. The mean induration size of tuberculin testing was 3.7±4.4 mm, which included 1,882 (46.8%) subjects with an induration size of 0 mm. The PTBI was 10.9% (439 subjects) using a cut-off point of ≥10 mm (conventional method). The annual risk of tuberculosis infections (ARTI) was 1.9% when the mean age of the subjects was assumed to be 6 years. There was no difference in the PTBI according to the presence or absence of a BCG scar [11.2% vs 7.6% (OR: 1.54, 95% CI: 0.98-2.43)]. Using a mirror image technique with 16 mm as the cut-off point, the PTBI and ARTI had decreased to 2.4% and 0.4% respectively. Conclusion: PTBI and ARTI, as estimated by conventional methods, appear to be high among BCG vaccinated children. A mirror image technique is more suitable for estimating the indices in a country with an intermediate burden of tuberculosis than the conventional method.

2235. Heffern, E., et al. (2021). "Anatomic Subunit Approach to Composite Reconstruction of Facial Gunshot Wounds." The Journal of craniofacial surgery **32**(7): 2487-2490.

ABSTRACT: With a rise in gun violence in the United States, surgeons are tasked with effectively managing penetrating facial trauma. The purpose of this study is to assess methods used for successful composite reconstruction of each anatomical facial subunit following penetrating trauma. A retrospective chart review was performed in subjects undergoing craniofacial reconstruction following penetrating trauma. Reconstructive methods were analyzed through operative reports. Subjects were categorized by anatomical subunit reconstructed (mandible, maxilla (malar complex and roof/palate), orbit, and cranium) and method of reconstruction (open reduction internal fixation only, bone graft, free flap, implant, and tissue expansion). Thirty-six subjects underwent reconstruction for penetrating facial trauma. Involved subunits include 24 mandible, 11 malar complex, 13 palate, 18 orbit, and 11 cranium. Predominate reconstruction method was open reduction internal fixation only for mandible (45.8%), bone grafting for malar complex (81.8%), implant for orbit (66.7%) and cranium (63.6%), and local tissue rearrangement for palate (84.6%). The predominate bone graft donor site was iliac for mandible (42.9%), rib for malar complex (36.3%) and orbit (40.0%), and frontal bone for cranium (42.8%). The predominate free flap was osteocutaneous for all mandible, orbit, and cranium and 7 of 10 (70.0%) palate reconstructions. Tissue expansion was used in all subunits except cranium. In conclusion, bone grafting, implants, free tissue transfer, and tissue expansion are all viable reconstruction options for penetrating trauma. There is no single approach to use, and decisions regarding definitive reconstruction method should be based upon anatomical subunit involved and the size/area of defects. Copyright © 2021 by Mutaz B. Habal, MD.

2236. Hegde, V., et al. (2005). "Cranio-orbital injury with internal carotid artery laceration and a missing eyelid." Ophthalmic plastic and reconstructive surgery **21**(6): 467-469.

A 37-year-old man presented to the emergency department with a visor impacted in the left orbit after a motorbike accident. His initial injury appeared to be limited to the orbit. Because the bleeding appeared disproportionate to the orbital injury, an intracranial injury was suspected. Subsequently, on hemicraniotomy, the tip of the visor was found at the bifurcation of the internal carotid artery. The avulsed upper eyelid was found under the frontal lobe. The patient underwent the clipping of internal carotid artery and middle and anterior cerebral artery with replantation of the upper eyelid. Neurologic damage was limited to loss of vision, right foot drop, and bowel and bladder incontinence. This case of penetrating orbital trauma demonstrates that the absence of focal neurologic deficit and radiologic signs suggestive of intracranial injury may not rule out life-threatening intracranial injury.

2237. Heidrich, R. and H. J. Sorgel (1965). "[Posttraumatic brain abscess with an unusually long latency]." Posttraumatischer Hirnabszess mit ungewohnlich langer Latenzzeit. **26**(6): 309-312.

2238. Heiferman, D. M., et al. (2016). "Bilateral Through-and-Through Trajectory of a Low-Velocity Transcranial Penetrating Foreign Object in a Twelve-Month-Old." Pediatric neurosurgery **51**(1): 25-29.

A 12-month-old girl sustained a penetrating intracranial trauma of a thin aluminum rod traversing from the left frontal bone and exiting the right occipital bone. The rod entered the left anterior frontal lobe, traveled through the ventricular system, narrowly missed the right posterior cerebral artery by less than 1 mm and exited through the right cerebellum. The rod was surgically extracted, and the child remained neurologically intact. Pre- and postoperative vascular imaging, antibiotics, seizure prophylaxis and surgical planning are paramount to successful care of these delicate cases. Copyright © 2015 S. Karger AG, Basel.

2239. Heimer, J., et al. (2017). "Antemortem identification by fusion of MR and CT of the paranasal sinuses." Forensic science, medicine, and pathology **13**(3): 375-378.

Radiologic forensic identification is usually performed by comparing antemortem and postmortem radiographs. While computed tomography (CT) has become a valuable addition to radiologic identification, magnetic resonance (MR) imaging has only rarely been used for this purpose. In our case, identification was accomplished using fused MR- and CT images in a survivor of a gunshot injury to the head. This case supports and highlights the possibility to perform intermodality radiologic identification comparing preexisting MR imaging to subsequently aquired CT data in living (or

deceased) humans as long as manual modifications of windowing, color and contrast enable differentiation of the two modalities in the fused image.

2240. Heinsius, E. and P. Koch (1966). "[Cavernous hemangioma of the orbit accompanied by hemorrhage in the fundus oculi]." Kavernoses Hamangiom der Orbita verbunden mit Augenhintergrundsblutungen. **67**: 463-466.

2241. Hejna, P. (2010). "Multiple suicidal injuries with shotgun slugs." International journal of legal medicine **124**(1): 79-82.

Shotguns are usually used to fire multiple pellets, but they are capable of firing single projectiles. Shotgun slug injuries are rare, severe, and fully comparable to those inflicted by high-velocity projectiles. A case of gunshot suicide of a 59-year-old man with a shotgun loaded with shotgun slugs is presented. The first two shots were fired into the heart region, but did not hit the vital organs of the victim's thorax and did not cause immediate incapacitation. The man was able to reload and refire. The third shot was fired into the region of right temple; the last shot caused severe cerebrocranial gunshot injury and was fatal. The victim did not pull aside his clothing to expose his skin before shooting into the heart region.

2242. Hejna, P. and M. Bohnert (2013). "Decapitation in suicidal hanging--vital reaction patterns." Journal of forensic sciences **58 Suppl 1**: S270-277.

Complete or incomplete decapitation as a consequence of suicidal hanging is very rare, few cases having been reported in the worldwide literature. Posthanging decapitation is typically related to a drop of several meters. Three cases of complete decapitation and one case of incomplete decapitation by suicidal hanging are reported with particular emphasis on internal findings and vital reaction patterns. Personal, circumstantial, autopsy, and toxicological data were analyzed to define basic characteristics of such extreme injuries. The crucial factor for the state of decapitation itself is the kinetic energy of the falling body, the strength of the human neck tissue, and the diameter and elasticity of the used ligature. Results of our case study suggest Simon's hemorrhage and air embolism as useful autopsy findings in posthanging beheading cases. Simon's hemorrhage was demonstrated in three cases of four. The test for air embolism was positive in all four cases.

2243. Hejna, P. and M. Safr (2010). "An unusual zip gun suicide--medicolegal and ballistic examination." Journal of forensic sciences **55**(1): 254-257.

Home-made guns are imitations of typical firearms and usually have handgun characteristics. This article presents an unusual case of a suicide carried out by means of a fatal gunshot wound to the head using a home-made zip gun. A 49-year-old male, with a history of paranoid psychosis was found dead in the dwelling place of a family house. The investigation at the crime scene did not lead to suspicion of a gunshot wound because of the unusual nature of the firearm used. A medical examiner diagnosed an opened head injury as the primary cause of the victim's death. The autopsy findings provided immediate grounds for further inspection of the crime scene. Subsequently, a simple zip gun, which had been overlooked during the scene investigation, was discovered. An undeformed projectile recovered from the victim's head was consistent with the use of the home-made firearm. Following the completion of the investigations and autopsy, the death was classified as a suicide.

2244. Hejna, P., et al. (2011). "Reconstruction of devastating head injuries: a useful method in forensic pathology." International journal of legal medicine **125**(4): 587-590.

Crushing head injuries usually do not allow direct visual identification of individuals, and above all, it constitutes an obstacle to comprehensive evaluation of discrete traumatic changes of the skin and soft tissues. We present our experience with the plastic adaptation of devastating head injuries in the two exemplary cases. The principal of the reconstruction is manual repositioning of bone fragments of the cranial and facial parts of the skull and careful approximation of the wound edges and their gradual suture using suture material. The reconstruction method can be recommended as an auxiliary technique in the identification of unknown victims with crushing head injuries and in the evaluation of devastating gunshot wound of the head.

2245. Hejna, P., et al. (2012). "The ability to act--multiple suicidal gunshot wounds." Journal of forensic and legal medicine **19**(1): 1-6.

Multiple self-inflicted gunshot wounds are rare and usually present a challenge to the forensic pathologist in determining the manner of death. Determining a person's capability to act following a gunshot wound can be of major importance in crime scene reconstruction and in differentiation between homicide and suicide. Questions concerning the possibility of physical activity following a given gunshot wound are repeatedly raised in court. We report herein three unusual cases of suicide involving multiple gunshot wounds; all the victims suffered gunshot wounds of the head without immediate incapacitation. In the first two cases, the head was target for two gunshots. Third case was a combination of two gunshots to the head and chest. In the text, we focus on the victim's ability to act after the first shot, with regards to the character and localization of the gunshot wound. Also, we focus on findings that are typical for a repeated suicidal shot.

2246. Hejna, P., et al. (2012). "Complex suicide with black powder muzzle loading derringer." Forensic science, medicine, and pathology **8**(3): 296-300.

Planned complex suicide is defined as the combination of more than one method of suicide, previously planned by the victim, to prevent failure of the first method. Herein, we present a case of planned complex suicide, committed by a black powder muzzle loading handgun and hanging. A 39-year-old man was found dead in the bathroom of his flat, hanging by the neck with a huge atypical gunshot entrance in the right temporal region of his head with extensive backspatter. The skin defects, as well as soft tissues in the subcutaneous pocket undermining, were heavily burnt. Along the wound canal were multiple bone fragments, and at the end of the path at the left temple was an embedded lead ogival projectile with a cross shaped artificial incision at its tip. The hanging was incomplete. There were no fractures of the hyoid bone and laryngeal cartilages. Cervical muscles and vessels were intact. Simon's sign was negative. Signs of asphyxia were not present. This is the first reported case of complex suicide with a black powder derringer and manipulated projectile.

2247. Helán, M., et al. (2020). "Ischaemic Stroke Caused by a Gunshot Wound to the Chest." EJVES Short Reports.

Introduction: Pneumatic weapons rarely cause severe trauma. However, pellet embolisation can cause severe and unexpected injuries. Report: This is the case study of a 32 year old man, who was shot in the chest with a pneumatic rifle. Initially, urgent damage control surgery was performed to resolve pneumothorax and pericardial tamponade, but no projectile was found. Subsequent atypical symptomatology led to more extensive imaging that found a pellet embolised into the right carotid artery, thrombosis of the middle cerebral artery, and development of a large right hemispheric ischaemic area. After an unsuccessful endovascular intervention, the projectile was removed during an open surgical procedure. The right hemisphere oedema required decompressive hemicraniectomy, but long term intensive care and physiotherapy resulted in a satisfactory recovery with moderate neurological sequelae. Conclusion: An unusual clinical presentation in combination with an absent exit wound might be symptomatic of projectile embolisation and should lead to a search for it. When the projectile position is convenient, surgical removal is the treatment of choice while an endovascular approach should be reserved for inaccessible locations or asymptomatic cases.

2248. Helbig, H. and H. P. Iseli (2002). "Traumatic rupture of the globe caused by cow horns." European journal of ophthalmology **12**(4): 304-308.

PURPOSE: We investigated the epidemiology, clinical findings and functional outcome of open-globe injuries caused by cow horns over a 50-year period in eastern Switzerland., METHODS: We retrospectively evaluated the files of cases with ruptures of the globe caused by cow horns between 1950 and 1999., RESULTS: We found 59 cases with ruptures of the globe by cow horns, accounting for 5% of all open-globe injuries. The incidence of these accidents did not change during the observation period. Twenty-two eyes (37%) were enucleated. Only 7 eyes (12%) retained a vision of > or = 0.1. Between 1950 and 1989 only 2/43 eyes (5%) reached a vision of > or = 0.1. In the 1990's, with the introduction of vitreous surgery 5/16 eyes (31%) had a vision of > or = 0.1. Four patients (7%) had blinding eye disease in the partner eye, and three (5%) had a second open-globe trauma., CONCLUSIONS: In rural regions, with cattle breeding,

open-globe injuries by cow horns are relatively common and the frequency is still the same as 50 years ago. The visual prognosis of these eyes is still guarded, but functional results have improved with the introduction of vitreous surgery. Patients who have had a rupture of the globe appear to have an increased risk for partner eye trauma. Therefore, all efforts are justified to preserve even limited vision in severely injured eyes.

2249. Heller, H. C. (2011). "Repeatability is not the same as accuracy." Sleep **34**(7): 839.

2250. Helling, E. and A. J. McKinlay (2005). "Considerations for the head-injured air-evacuated patient: a case report of frontal sinus fracture and review of the literature." Military medicine **170**(7): 577-579.

Head and neck injuries are not uncommon in combat environments and may be increasing due to survivable injuries from the use of kevlar helmets and body armor. With the current capability of rapid evacuation from the battlefield, acutely injured patients with frontal sinus injuries may undergo further barometric challenges. Proper care during transport can prevent the occurrence of secondary injury (increased intracranial pressure, tension pneumocephalus) that would complicate the patient's management at the next level of care. Management principles (importance of low-level flight/pressurized cabin, preflight use of decongestants, avoidance of valsalva, and ability to manage complications either procedurally or by landing) are reviewed. In addition, we propose a simple mechanism for pressure equilibration of a compromised frontal sinus during air evacuation using an angiocatheter placed through the wound before closure.

2251. Helling, T. S., et al. (1992). "The role of early surgical intervention in civilian gunshot wounds to the head." The Journal of trauma **32**(3): 398-400.

Surgical management of gunshot wounds of the head has remained a controversial issue in the care of civilian patients. In an attempt to determine who might benefit from aggressive surgical intervention, we examined 89 patients over a 3-year period who had suffered cranial gunshot wounds and had at least one computed tomographic scan of the head after admission. Patients were divided into those receiving early (less than 24 hours) surgical intervention (ES, n = 27), late (greater than 24 hours) surgical intervention (LS, n = 6) or no surgical intervention (NS, n = 56). Overall mortality was 63%. Ten of 27 patients (37%) in the ES group died compared with 46 of 56 patients (82%) in the NS group (p less than 0.0001). Glasgow Coma Scale (GCS) scores in the ES group averaged 7.86 +/- 4.72 and in the NS group 5.59 +/- 4.42 (p less than 0.05). The GCS scores in the LS group (all of whom survived) were significantly higher than those of the other two groups, 12.17 +/- 4.10. The number of patients with GCS scores of 3 or 4 on admission was significantly less in the ES (41%) than in the NS group (66%, p = 0.035) and survival was better with surgery (36%) than without (3%, p = 0.007). Patients with mass lesions (clot, ventricular blood) were more often found in the ES group (17/27) than in the NS group (18/56) (p = 0.008). Patients with bihemispheric injuries fared better with surgery (7 of 14 survivors) than without (2 of 33 survivors, p = 0.0003). Only one infectious complication (brain abscess) was encountered in the LS group. No delayed intracranial complications in survivors in the NS group were seen.(ABSTRACT TRUNCATED AT 250 WORDS)

2252. Helmick, K., et al. (2012). "Traumatic brain injury: next steps, research needed, and priority focus areas." Military medicine **177**(8 Suppl): 86-92.

Traumatic brain injury (TBI) has been not only a major focus of concern during the recent conflicts in Afghanistan and Iraq, but also among our garrison service members. The prevalence of these injuries has compelled the nation and Congress to invest in the development of policies and programs that support evidence-based care for the full continuum of TBI, from mild (otherwise known as concussion) to severe and penetrating brain injuries. Although, the Department of Defense has made great strides in the areas of TBI clinical care, education, and research, there remains a great need to leverage scientific, policy, and clinical advancement to maximize care of the service member. The purpose of this article is to outline the 7 major areas of work currently being undertaken to help advance the field of TBI. The 7 areas include: (1) eliminating undetected mild traumatic brain injury through prompt early diagnosis, (2) ensuring force readiness and addressing cultural barriers, (3) improving collaborations with the Department of Veterans Affairs, other federal agencies, and academic and civilian organizations, (4) improving deployment-related assessments, (5) deploying effective treatments, (6) conducting military-relevant and targeted research, and (7) enhancing information technology systems.

2253. Helmick, K. M., et al. (2015). "Traumatic brain injury in the US military: epidemiology and key clinical and research programs." Brain imaging and behavior **9**(3): 358-366.

Traumatic brain injury (TBI), and particularly concussion, is a major concern for the U.S. Military because of the associated short term disability, long term cognitive and pain symptoms suffered by some, and risk of prolonged or permanent neurologic injury if the Service member incurs a second TBI before full recovery from the first. Concussions were seen more often during the recent conflicts in Afghanistan and Iraq than in prior conflicts, such as the Vietnam War, because of the use of improvised explosive devices that typically caused non-penetrating closed head injury. Since 2000 more than 300,000 Service members were diagnosed with TBI, of which more than 80 % were concussions. Improved TBI screening tools also have identified a higher than expected incidence of concussions occurring in garrison. In this review we summarize current epidemiologic data for TBI in the Military, and describe contemporary Military procedures and strategies for TBI prevention, identification, evaluation, and acute and chronic care. Key TBI clinical research priorities and programs are described, and innovative organizational plans to address future TBI needs are summarized.

2254. Helmy, A. (2017). "Neuroinflammation in traumatic brain injury." British journal of neurosurgery **31**(2): 128-129.

Trauma is an everyday part of the life of every surgeon. Specifically, Traumatic Brain Injury (TBI, head injury) is the cause of death in half of all cases of trauma mortality. TBI is a complicated disease with several interacting facets of injury including disrupted metabolism, excitotoxicity, loss of cerebral autoregulation and increased intracranial pressure. Current treatments have focussed on promoting physiological stability to avoid further 'secondary' injury rather than dealing with the underlying injurious processes. Until recently, the brain was incorrectly thought to be immunoprivileged. In fact, inflammation plays a key role following TBI. Cytokines and chemokines are important mechanistic drivers of the pathological processes that occur after TBI and are therefore potential therapeutic targets. As well as the role of inflammation in the acute injury following TBI, there is also increasing evidence that inflammation has a role in some of the late complications of TBI such as pituitary dysfunction, epilepsy and depression. There is an increasing recognition that as the physiological response to injury, inflammation is in fact a key mechanism in TBI and brain injury in general. Our work has focussed on exploring the underlying mechanisms that are responsible for neuronal damage and death after TBI. Our TBI patients are routinely monitored with a microdialysis catheter in order to measure a wide range of soluble mediators. In the clinical setting, metabolic intermediaries such as glucose, lactate and pyruvate are used to infer the metabolic state of the brain. The same microdialysis technique, can be expanded to recover a wide range of other molecules in a research setting. We have used microdialysis to systematically characterise the inflammatory response to TBI in the human brain over several days following injury. Cytokines and chemokines carry out a range of functions including recruiting and activating inflammatory cells, biasing them towards certain functions such as promoting inflammation versus repair as well as having direct effects on neurones. Evidence from animal models suggests that these inflammatory molecules provide a link between the deforming force applied to the brain at the time of injury and wide range of injurious processes that follow. All previous studies of neuroprotective drugs in TBI have failed, despite promising pre-clinical studies: the complex reasons behind this include understanding the biology of TBI in humans, determining whether a drug penetrates the blood brain barrier in a timely fashion and ultimately determining whether it has any biological effect. To address these issues we have carried out a randomised control trial of a potential neuroprotective agent, Interleukin-1 Receptor Antagonist, together with microdialysis monitoring to show that the drug crossed the blood brain barrier and is able to modify the inflammatory response to TBI. This paradigm is a promising model for future research in brain injury that combines an assessment of the biological processes that cause injury with a pharmacokinetic assessment to optimise therapeutic drug dosage and delivery. In this way, a new front has been opened up in our search for new therapies for this devastating and deadly condition.

2255. Helmy, A., et al. (2014). "Recombinant human interleukin-1 receptor antagonist in severe traumatic brain injury: a phase II randomized control trial." Journal of cerebral blood flow and metabolism **34**(5): 845.

Traumatic brain injury (TBI) is the commonest cause of death and disability in those aged under 40 years. Interleukin-1 receptor antagonist (IL1ra) is an endogenous competitive antagonist at the interleukin-1 type-1 receptor (IL-1R). Antagonism at the IL-1R confers neuroprotection in several rodent models of neuronal injury (i.e., trauma, stroke and excitotoxicity). We describe a single center, phase II, open label, randomized-control study of recombinant human

IL1ra (rhIL1ra, anakinra) in severe TBI, at a dose of 100 mg subcutaneously once a day for 5 days in 20 patients randomized 1:1. We provide safety data (primary outcome) in this pathology, utilize cerebral microdialysis to directly determine brain extracellular concentrations of IL1ra and 41 cytokines and chemokines, and use principal component analysis (PCA) to explore the resultant cerebral cytokine profile. Interleukin-1 receptor antagonist was safe, penetrated into plasma and the brain extracellular fluid. The PCA showed a separation in cytokine profiles after IL1ra administration. A candidate cytokine from this analysis, macrophage-derived chemoattractant, was significantly lower in the rhIL1ra-treated group. Our results provide promising data for rhIL1ra as a therapeutic candidate by showing safety, brain penetration and a modification of the neuroinflammatory response to TBI by a putative neuroprotective agent in humans for the first time.

2256. Hemphill, J. C., 3rd, et al. (1999). "Endovascular therapy of traumatic injuries of the intracranial cerebral arteries." Critical care clinics **15**(4): 811-829.

Traumatic intracranial arterial injuries represent uncommon complications of both closed-head injury and penetrating head trauma. These injuries include arterial dissections, pseudoaneurysms, and fistulas, both direct and indirect. Although these lesions may be identified while still asymptomatic, they usually present in a delayed fashion with intracranial hemorrhage, focal cerebral ischemia, or, occasionally, severe epistaxis. Endovascular therapy has assumed a major role in the management of this diverse group of lesions. Embolization of pseudoaneurysms with balloons or detachable coils, the use of embolic particles for small arterial injuries, and large vessel occlusion with detachable balloons represent current treatment strategies that have evolved over the past three decades. Angioplasty and stent deployment may have a future role to play in the management of arterial dissection. Principles of neurologic critical care that minimize secondary brain injury are essential adjuncts in the management of these patients before, during, and after endovascular treatment.

2257. Henderson, V. W. (1987). "Outcome prediction after severe closed head injury in adults." Bulletin of clinical neurosciences **52**: 47-63.

Disability after severe closed head injury (CHI) differs from that of penetrating trauma or other causes of more focal cerebral damage, but its symptoms can be understood in terms of the pathophysiology and the usual pathology of CHI. Outcome can be quantified by means of specific, narrowly-defined measures, which may fail to reflect other serious sequelae, or by means of functional rating scales, which bear little logical relation to CHI pathophysiology and lump together patients with diverse deficits. The choice of appropriate intake measures of CHI severity in turn depends on which aspects of outcome are to be determined. As the cardinal symptom of CHI is altered consciousness, logical intake measures of CHI severity include measures of the depth and the duration of the abnormal state of consciousness. Confounding factors in outcome prediction include secondary complications of CHI, premorbid characteristics, and effects of acute and rehabilitative therapy. Most research has focused on functional outcome predictions based on simple intake measures obtained shortly after injury, but intake measures that permit accurate prediction of rehabilitation potential or of specific cognitive and behavioral outcomes are also needed.

2258. Hendricks, A. M., et al. (2013). "Screening for mild traumatic brain injury in OEF-OIF deployed US military: an empirical assessment of VHA's experience." Brain injury **27**(2): 125-134.

BACKGROUND: VHA screens for traumatic brain injury (TBI) among patients formerly deployed to Afghanistan or Iraq, referring those who screen positive for a Comprehensive TBI Evaluation (CTBIE)., METHODS: To assess the programme, rates were calculated of positive screens for potential TBI in the population of patients screened in VHA between October 2007 through March 2009. Rates were derived of TBI confirmed by comprehensive evaluations from October 2008 through July 2009. Patient characteristics were obtained from Department of Defense and VHA administrative data., RESULTS: In the study population, 21.6% screened positive for potential TBI and 54.6% of these had electronic records of a CTBIE. Of those with CTBIE records, evaluators confirmed TBI in 57.7%, yielding a best estimate that 6.8% of all those screened were confirmed to have TBI. Three quarters of all screened patients and virtually all those evaluated (whether TBI was confirmed or not) had VHA care the following year., CONCLUSIONS: VHA's TBI screening process is inclusive and has utility in referring patients with current symptoms to appropriate care. More than 90% of those evaluated received further VHA care and confirmatory evaluations were associated with significantly higher average utilization. Generalizability is limited to those who seek VHA healthcare.

2259. Hendrickson, S., et al. (2014). "Neurosurgical management of indirect brain injury in penetrating trauma: A stab in the right direction." Brain injury **28**(5-6): 726.

Introduction: Penetrating trauma is traditionally the domain of the vascular/general surgeon; however, focal ischaemic neurological consequences are amenable to neurosurgical intervention. This study presents two patients (one knife wound victim, one gunshot victim) who required emergency decompressive craniectomies for malignant middle cerebral artery infarcts following penetrating trauma not involving the head, brain or spine. Both cases describe unique injury patterns and are supported by novel radiological findings. Case description: The first patient was a 22-year old Caucasian male who received a single stab wound to the precordium, necessitating an emergency thoracotomy, release of cardiac tamponade and repair of myocardial lacerations. Two days post-operatively the patient was noted to have a left hemiparesis. A Computed Tomography (CT) scan revealed a large right middle cerebral artery (MCA) territory infarct, probably resulting from embolic left ventricular thrombus. He underwent an urgent decompressive craniectomy. The patient made an excellent recovery and returned to part time work 3 months post-injury. The second patient was a 56-year old male who received a shotgun wound to the right side of his neck. He was noted to have a dense left hemiplegia on admission. A CT scan subsequently demonstrated migration of one shotgun pellet into the MCA via the internal carotid, which resulted in a large right MCA territory infarct and radiological evidence of raised intracranial pressure. Similarly, this patient underwent an emergency decompressive craniectomy. The patient made a limited neurological recovery with a persistent left hemiplegia 4 months post-injury. Discussion: The benefits of decompressive craniectomy have been clearly demonstrated for malignant middle cerebral artery territory infarcts; however, there is limited literature on infarcts resulting from trauma. These cases demonstrate that the role of neurosurgery in a major trauma centre extends beyond the management of direct traumatic brain injury and that early intervention in embolic infarction secondary to trauma can improve outcome.

2260. Hendry, A., et al. (1997). "Neurosurgical handling of brain gunshot wound victims with GCS of 3, 4 or 5." British journal of neurosurgery **11**(5): 467.

2261. Hengzhu, Z., et al. (2014). "A rare case of penetrating brain injury by crossbow in a 22-month-old child." Pediatric emergency care **30**(6): 421-423.

Nonmissile penetrating brain injuries are exceedingly uncommon among civilian population and are most often associated with inflicted injury. They show specific characteristics different from that of missile wounds. In this article, we describe a rare case of a 22-month-old child who experienced accidental penetrating head trauma caused by a crossbow. We document neuroimaging studies and review the management concerning this pathology. To our knowledge, this is the youngest survived case of penetrating brain injury by a crossbow with such radiological findings reported in the literature.

2262. Henion, A., et al. (2022). "Epilepsy Risk Factors in One Million Post-9/11 U.S. Veterans: Impact of Traumatic Brain Injury, Deployment and Physical and Mental Comorbidities." Brain injury **36**(SUPPL 1): 109.

Objectives: We examined predictors of epilepsy in over a million Post 9/11 Veterans. We hypothesized that individuals with epilepsy would be more likely to have a history of TBI or deployment, where blast-related injury/military exposures are common. We also evaluated other established risk factors for epilepsy including brain tumor, stroke, and other neurological conditions, as well as mental and physical health comorbidities. Methods: We compiled and merged Veterans Health Administration (VHA) (2002-2018) and Department of Defense health data (2000-2019) for Veterans who entered VHA care between 2002 and 2014. We identified epilepsy using convulsions/epilepsy specific ICD9/10 codes, and concomitant use of anti-seizure medications (ASM). We identified TBI severity using self-reports (VHA comprehensive TBI screening evaluation) and ICD9/10 codes. Mental and physical health comorbidities were identified using ICD9/10 codes before the index date (Epilepsy: date of the first ASM after epilepsy diagnosis or the first seizure date if there was no ASM use; No Epilepsy: first care in VHA plus mean time to epilepsy [978 days]). We used logistic regression to calculate adjusted odds ratios and their 95% confidence intervals presented as (AOR; 95% CI). Results: In this cohort (N = 1,055,873; mean age at index date = 34.6 years), 27,438 (2.6%) were veterans with epilepsy (VWE). Compared to those without epilepsy, fewer VWE were deployed (61% vs.71%) and more had TBI (39% vs. 18%). In

analyses controlling for demographics, and mental/physical health comorbidities, the odds of epilepsy were significantly lower for deployed (vs. non-deployed; 0.66; [0.63-0.69]). Odds of epilepsy were significantly higher for people with all levels of TBI severity compared to no TBI: mild TBI (1.49; 1.43-1.54), moderate/severe TBI (2.43; 2.31-2.56), or penetrating TBI (5.59; 5.15-6.08). Other strong predictors included brain tumor (17.24; 15.51-19.16), encephalopathy (6.03; 5.22-6.97), Alzheimer's disease or frontotemporal dementia (3.88; 2.81- 5.35), stroke (3.74; 3.58-3.91), Parkinson's disease (2.75; 2.2- 3.75), multiple sclerosis (2.53; 2.17-2.95), headache (2.32; 2.25-2.39), anoxic brain damage (2.17; 1.69-2.78) and cardiovascular disease (1.96; 1.89-2.04). Smoking history, opioid abuse, sedative abuse, and overdose were also significantly associated with epilepsy. Conclusions: As expected, TBI severity (including mild TBI) was significantly associated with epilepsy even after controlling for brain tumor and other neurologically related conditions. However, our hypothesis regarding deployment history as a risk factor for epilepsy was not supported, perhaps due to chronic physical and mental health conditions that preclude deployment. This is consistent with the finding that cardiovascular disease, smoking, overdose and opioid or sedative abuse were strong risk factors for epilepsy in this relatively young cohort. More sophisticated statistical models using longitudinal data (or extremely large observational cohort studies) are needed to better understand the interactions among TBI, deployment and chronic mental/physical comorbidities.

2263. Henley, M., et al. (1984). "An unusual injury in a most unusual situation: conservative management of retained intracranial foreign body." Annals of the Royal College of Surgeons of England **66**(3): 204-206.

2264. Hennington, G., et al. (2011). "Effect of aerobic exercise on cortical activation and working memory following traumatic brain injury." Journal of Head Trauma Rehabilitation **26**(5): 435-436.

Introduction/Rationale TBI is on the rise in the active duty US military population and is frequently associated with impairments in working memory. Cortical regions currently considered to play a role in this system includes the dorsolateral prefrontal cortex (DLPFC), anterior cingulate (ACC) and precuneus (PreC). In animal and human models, these regions have shown improved levels of activity in human and animal models following aerobic exercise as well as improved cognitive performance. The aim of this study was to investigate changes in the cortical activity and working memory performance in three TBI survivors after following a 12 week aerobic exercise program. Method/Approach Three male subjects (mean age 39.6 ± 16.9) with severe, non-penetrating TBI (6.3 ± 5.0 years post-injury). Cortical activation was obtained using 3T fMRI during performance of a visual fixation condition (control), 0-back and 2-back conditions of the N-back working memory task. Scans were performed on 3 different days prior to and after a 12 week aerobic exercise program consisting of 3, 40 minute sessions per week. Analysis of changes in activation during the N-back task was performed using Brain Voyageur. Measurements of working memory were measured through the accuracy and reaction time on the N-back task. Results/Effects Following completion of the 12-week exercise program all 3 subjects demonstrated a decrease in the intensity of the caudal ACC and PreC and right DLPFC areas during the 0- back task compared to the control task. However, an increase in the intensity and voxel count in the left DLPFC was noted during the 0-back task compared to the 2-back task. In 2 of the subjects, an increase in the intensity of the ACC and the right DLFPC was also noted during the 2-back task when compared to the 0-back task. Conclusions/Limitations Participation in aerobic exercise resulted in significant changes in cortical activation in the ACC, PreC & DLPFC and working memory. This pilot study contributes to emerging evidence supporting the use of aerobic exercise following severe TBI and indicates the need for further research to determine if these findings exist in a larger population.

2265. Henry, B., et al. (2012). "Cerebral microdialysis and PtiO2 to decide unilateral decompressive craniectomy after brain gunshot." Journal of Emergencies, Trauma and Shock **5**(1): 103-105.

Decompressive craniectomy (DC) following brain injury can induce complications (hemorrhage, infection, and hygroma). It is then considered as a last-tier therapy, and can be deleteriously delayed. Focal neuromonitoring (microdialysis and PtiO2) can help clinicians to decide bedside to perform DC in case of intracranial pressure (ICP) around 20 to 25 mmHg despite maximal medical treatment. This was the case of a hunter, brain injured by gunshot. DC was performed at day 6, because of unstable ICP, ischemic trend of PtiO2, and decreased cerebral glucose but normal lactate/pyruvate ratio. His evolution was good despite left hemiplegia due to initial injury.

2266. Hentschel, F., et al. (1995). "[A Jefferson fracture following a nonaxial force impact]." Jefferson-Fraktur nach nicht-axialer Gewalteinwirkung. **162**(1): 75-77.

2267. Herford, A. S., et al. (2007). "Clinical applications of rhBMP-2 in maxillofacial surgery." Journal of the California Dental Association **35**(5): 335-341.

MATERIALS AND METHODS: Examples of defects including mandibular continuity defects, preprosthetic atrophic alveolar ridge deficiencies, traumatic defects, and maxillary clefts were included., RESULTS: All patients demonstrated osseous regeneration stimulated by rhBMP-2., CONCLUSION: rhBMP-2 is successful in regenerating bone in a variety of maxillofacial defects. In the future, rhBMP-2 will play a significant role in the treatment of bone deficiencies.

2268. Herman, T. E., et al. (1995). "Unrecognized retention of intraorbital graphite pencil fragments: the role of computerized tomography." Pediatric radiology **25**(7): 535-537.

Children with unrecognized intraorbital pencil fragments may come to attention because of surrounding abscess and granuloma formation, after a long delay, and may be suspected to have an intraorbital neoplasm. Two such patients are reported, with emphasis on CT findings. Recognition of the CT manifestations of intraorbital pencil fragments may allow a more conservative surgical intervention than that for presumed intraorbital neoplasm.

2269. Hermann, A. L. and A. Lecler (2021). "Post-traumatic retained foreign body in the cavernous sinus." Interdisciplinary Neurosurgery: Advanced Techniques and Case Management **23**.

The case of a post-traumatic organic foreign body incarcerated in the cavernous sinus is described herein. Trans-orbital post-traumatic foreign bodies are very rare and can present varying clinical features. The objective is to show the danger of this type of foreign body and to suggest a diagnostic approach using imaging.

2270. Hernandez, S., et al. (2020). "Endonasal resection of the cartilaginous eustachian tube with nasoseptal flap closure for refractory CSF fistula following previous mastoid and middle ear obliteration." Journal of Neurological Surgery, Part B Skull Base **81**.

Background: Lateral skull base approaches or previous temporal bone trauma can lead to persistent encephaloceles or CSF fistula despite appropriate management with mastoid obliteration and attempted occlusion of the bony eustachian tube through the middle ear space. These patient scenarios may present a reconstructive dilemma. Objective/Case Presentation: We present a challenging case of a young male with a remote history of penetrating injury to the lateral skull base. He had resultant cholesteatoma and encephalocele requiring transmastoid repair and obliteration with closure of the external auditory canal. He had persistent infectious complications and subcutaneous emphysema over the temporal scalp when blowing his nose, indicating a persistently patent eustachian tube. There was also some concern for intermittent CSF rhinorrhea on history and examination. Technique: A submucous resection and partial turbinectomy was first performed to facilitate appropriate exposure and uninarial two-handed technique. Cuts were designed around the torus, extending into the fossa of Rosenmuller posteriorly. The cartilaginous eustachian tube was then resected and surrounding mucosa meticulously removed. The remaining visible lumen was packed with Surgicel. An ipsilateral nasoseptal flap was then harvested and rotated for inset with excellent coverage. Care was taken to avoid covering any native mucosa as to avoid mucocele formation. Results: The cavity was carefully packed and the patient observed overnight. He has done well in the immediate postoperative setting with no recurrent subcutaneous emphysema and no evidence to suggest CSF rhinorrhea. Conclusions: Endonasal closure of the eustachian tube may be an option in cases of recalcitrant CSF fistula and infectious complications. Employing a vascularized septal flap ensures optimal wound healing and ample closure.

2271. Hernesniemi, J., et al. (1986). "[Can mortality in severe traumatic brain damage be generally reduced?]." Kann die Mortalitat bei schweren traumatischen Hirnschaden uberhaupt mehr reduziert werden? **47**(2): 99-104.

A total of 272 cases with fatal traumatic brain injuries were retrospectively analysed. 68% of the cases were outside of any form of therapy. Only the third of these fatal cases are ever seen by a neurosurgeon. In 12% of these fatal

cases the outcome might have been improved by an optimum diagnosis and therapy. Prevention of these severe head injuries seems to be the only potential therapy.

2272. Herrera, M. L., et al. (2021). "Intramuscular insulin-like growth factor-1 gene therapy modulates reactive microglia after traumatic brain injury." Brain research bulletin **175**: 196-204.

Reactive gliosis is a key feature and an important pathophysiological mechanism underlying chronic neurodegeneration following traumatic brain injury (TBI). In this study, we have explored the effects of intramuscular IGF-1 gene therapy on reactive gliosis and functional outcome after an injury of the cerebral cortex. Young adult male rats were intramuscularly injected with a recombinant adenoviral construct harboring the cDNA of human IGF-1 (RAd-IGF1), with a control vector expressing green fluorescent protein (RAd-GFP) or PBS as control. Three weeks after the intramuscular injections of adenoviral vectors, animals were subjected to a unilateral penetrating brain injury. The data revealed that RAd-IGF1 gene therapy significantly increased serum IGF1 levels and improved working memory performance after one week of TBI as compared to PBS or RAd-GFP lesioned animals. At the same time, when we analyzed the effects of therapy on glial scar formation, the treatment with RAd-IGF1 did not modify the number of glial fibrillary acidic protein (GFAP) positive cells, but we observed a decrease in vimentin immunoreactive astrocytes at 7 days post-lesion in the injured hemisphere compared to RAd-GFP group. Moreover, IGF-1 gene therapy reduced the number of Iba1+ cells with reactive phenotype and the number of MHCII + cells in the injured hemisphere. These results suggest that intramuscular IGF-1 gene therapy may represent a new approach to prevent traumatic brain injury outcomes in rats.

2273. Herring, C. J., et al. (1988). "Transcranial stab wounds: a report of three cases and suggestions for management." Neurosurgery **23**(5): 658-662.

Transcranial stab wounds are uncommon. Three such cases are presented. The severity of the wounds may vary from innocuous to devastating. Skull films are useful in delineating the depth of penetration. The presence of the knife blade in situ may make the computed tomographic scan impossible to perform or difficult to interpret. Cerebral angiography may be indicated if injury to a major cerebral vessel is suspected or if the patient suffers a delayed subarachnoid or intracerebral hemorrhage. Provided that the patient's clinical status indicates a positive prognosis, transcranial stab wounds should be explored surgically. The weapon should be removed in the operating room immediately before or at the time of operation.

2274. Herzog, M., et al. (2005). "[Injuries of the head and neck in suicidal intention]." Verletzungen des Kopfes und des Halses in suizidaler Absicht. **84**(3): 176-181.

BACKGROUND: Injuries of the head and neck with suicidal intention might create serious situations that require rapid and interdisciplinary treatment., METHODS AND PATIENTS: Twenty-seven patients with suicidal head and neck injuries were treated at the Department of oto-rhino-laryngology, head and neck surgery, University of Wurzburg/Germany, between 1991 and 2002. The medical histories were analyzed retrospectively., RESULTS: Twenty-three of them were male, 4 female. Mean age at time of attempted suicidal was 48 years (18 - 90). One patient was already treated for a psychiatric disorder. None of the patients had a suicidal attempt in the history. Nine patients suffered from a pharynx or larynx trauma after strangulation. Four out of seven patients with cutting or stabbing injuries showed a perforation of the upper airways. Nine patients had gunshot traumas, one of them with perforation of the pharynx. Thirteen patients underwent immediate endoscopy under general anaesthesia followed by a neck exploration in 3 patients. Six patients received a temporary tracheotomy. All patients were considered suicidal for the duration of stay in the ENT-department resulting in a permanent supervision. All patients were transferred to a psychiatric unit as soon as possible for further treatment. A statistically significant accumulation was observed during the last third of a year. Over the period of 11 years, suicidal injuries of the head and neck tend to occur more frequently., CONCLUSIONS: The presented study emphasizes the need of immediate surgical and intensive care treatment of patients with head and neck injuries due to suicide attempts as well as an adequate psychiatric supervision during as well as after the surgical treatment.

2275. Hess, U., et al. (2000). "[The radiological diagnosis of an intraorbital bullet projectile]." Radiologische Diagnostik eines intraorbitalen Geschossprojektils. **40**(4): 404-407.

Beside conventional X-ray examination, ultrasound and computer tomographic examination are accepted radiologic techniques to assess the extend of damage of intraorbital injuries. With the exception of a few reports in the literature there is agreement that intraorbital metallic foreign bodies and gun-shot bullets represent a contraindication for magnetic resonance (MR) imaging examination because of artificial imaging side effects and the potential of secondary dislocation of the metallic foreign body due to ferromagnetism. By means of the case reported here it is shown that this general opinion is not universally valid. Depending on the elemental metallic composition of foreign bodies and gun-shot bullets it is demonstrated that MR examination allows high-resolution illustration and in some cases is advantageous compared with other radiologic imaging techniques.

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2276. Hesse, L., et al. (1994). "[Computer-assisted, improved evaluation of Comberg images with three-dimensional graphic reconstruction]." Computerunterstutzte, verbesserte Auswertung von Comberg-Aufnahmen mit dreidimensionaler graphischer Darstellung. **204**(4): 248-251.

BACKGROUND: Small metallic foreign bodies may easily be identified by conventional x-ray. The Comberg shell is a useful tool to discriminate between extra-respectively intraocular localization of the foreign body. However, poor results are common when evaluating the x-ray films., METHODS: We have improved evaluation of the radiographs by means of a program for a personal computer, regarding the following aspects: To avoid errors of measurement the relevant points of the radiograms are read by a digitizer-tableau. The different projection failure of the lateral respectively posteroanterior x-ray is calculated separately. For the calculation of the modell the true axial length of the eye is considered., CONCLUSION: A three dimensional image from varying points of view gives an instructive impression of the foreign body and its relation to structures of the eye. Handling of the presented computer program is easy. It standardizes analysis of the Comberg radiograms.

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2277. Hesse, R. and B. Plaisier (2003). "Gunshot wounds of the cranium or torso: implications for spinal immobilization and airway management." Air medical journal **22**(6): 21-23.

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2278. Hesselink, L., et al. (2020). "New automated analysis to monitor neutrophil function point-of-care in the intensive care unit after trauma." Intensive Care Medicine Experimental **8**(1).

Background: Patients often develop infectious complications after severe trauma. No biomarkers exist that enable early identification of patients who are at risk. Neutrophils are important immune cells that combat these infections by phagocytosis and killing of pathogens. Analysis of neutrophil function used to be laborious and was therefore not applicable in routine diagnostics. Hence, we developed a quick and point-of-care method to assess a critical part of neutrophil function, neutrophil phagosomal acidification. The aim of this study was to investigate whether this method was able to analyze neutrophil functionality in severely injured patients and whether a relation with the development of infectious complications was present. Results: Fifteen severely injured patients (median ISS of 33) were included, of whom 6 developed an infection between day 4 and day 9 after trauma. The injury severity score did not significantly differ between patients who developed an infection and patients who did not ($p = 0.529$). Patients who developed an infection showed increased acidification immediately after trauma ($p = 0.006$) and after 3 days ($p = 0.026$) and a decrease in the days thereafter to levels in the lower normal range. In contrast, patients who did not develop infectious complications showed high-normal acidification within the first days and increased tasset to identify patients at risk for infections after trauma and to monitor the inflammatory state of these trauma patients. Conclusion: Neutrophil function can be measured in the ICU setting by rapid point-of-care analysis of phagosomal acidification. This analysis differed between trauma patients who developed infectious complications and trauma patients who did not. Therefore, this assay might prove a valuable asset to identify patients at risk for infections after trauma and to monitor the inflammatory state of these trauma patients. Trial registration: Central Committee on Research Involving Human Subjects, NL43279.041.13. Registered 14 February 2014. https://www.toetsingonline.nl/to/ccmo_search.nsf/Searchform?OpenForm.

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2279. Hessler, C., et al. (2012). "[Fatal crossbow injury in an adolescent]." Todliche Armbrustverletzung im Jugendalter. **229**(3-4): 90-95.

The authors present the case of a 14-year-old boy who died while handling a crossbow, which was a gift from a friend's mother. The bolt passed through the right nostril, penetrated the sinus sphenoidalis, the brain stem, the left occipital lobe and the occipital calvaria. Immediately after the accident, the victim was taken to a maximum care hospital. In spite of neurosurgical treatment and intensive care the victim died 4 days later. The case presented demonstrates that crossbows are not suitable as toys for underage persons, as they are deadly weapons which can cause serious penetrating injuries. In Germany, no license is required to buy and/or possess crossbows. In the authors' opinion, legal restrictions on the sale of crossbows and a special training of the users would be reasonable measures to reduce such accidents.

2280. Hettige, S., et al. (2010). "Chopstick injury penetrating the skull base: A case report." Skull Base **20**(3): 219-222.

We describe an unusual case of a foreign body penetrating the skull base and lodging in the posterior fossa. A 38-year-old woman fell onto a chopstick while eating, causing it to impact into her mouth. The chopstick penetrated the oropharynx and the occipital bone via the jugular foramen to enter the posterior fossa intracranially, piercing the tentorium cerebelli and leaving a fractured tip in the occipital lobe. Three-dimensional reconstructive computed tomographic scans were obtained to view the trajectory and position of the chopstick. Reconstructed angiography revealed the proximity of the carotid artery and the jugular vessels to the foreign object. Safe access to the chopstick was via an occipital craniotomy to retrieve the distal portion and an ipsiplateral retrosigmoid craniectomy to remove the proximal end. Provision was made to gain proximal control of all major nearby vessels in the event of any hemorrhage. Trauma causing penetration of a foreign body into the posterior fossa of the skull is rare due to its surrounding thick bone. Appropriate preoperative planning, including 3-D computed tomographic images and angiograms, are integral in the surgical approach for the safe removal of such objects. Copyright © 2010 by Thieme Medical Publishers, Inc.

2281. Heuer, A., et al. (2016). "hESC-derived neural progenitors prevent xenograft rejection through neonatal desensitisation." Experimental neurology **282**: 78-85.

Stem cell therapies for neurological disorders are rapidly moving towards use in clinical trials. Before initiation of clinical trials, extensive pre-clinical validation in appropriate animal models is essential. However, grafts of human cells into the rodent brain are rejected within weeks after transplantation and the standard methods of immune-suppression for the purpose of studying human xenografts are not always sufficient for the long-term studies needed for transplanted human neurons to maturate, integrate and provide functional benefits in the host brain. Neonatal injections in rat pups using human fetal brain cells have been shown to desensitise the host to accept human tissue grafts as adults, whilst not compromising their immune system. Here, we show that differentiated human embryonic stem cells (hESCs) can be used for desensitisation to achieve long-term graft survival of human stem cell-derived neurons in a xenograft setting, surpassing the time of conventional pharmacological immune-suppressive treatments. The use of hESCs for desensitisation opens up for a widespread use of the technique, which will be of great value when performing pre-clinical evaluation of stem cell-derived neurons in animal models. Copyright © 2016 The Authors. Published by Elsevier Inc. All rights reserved.

2282. Heully, F., et al. (1965). "[Pistol bullet revealed by arteriography performed for a hemiplegic syndrome]." Balle de pistolet revelee par une arteriographie pratiquee pour un syndrome hemiplegique. **45**(3): 298-302.

2283. Heydenrych, L. G., et al. (2016). "Open-Angle Glaucoma and an Enlarged Superior Orbital Fissure Caused by Trauma." JAMA ophthalmology **134**(1): 103-104.

2284. Heyworth, P., et al. (1994). "Unsuspected orbitocranial injury following ocular trauma." British journal of hospital medicine **51**(4): 174-175.

2285. Hickman, D. M. (1984). "Benign sequelae of a transorbital stab wound: an unusual case report." Annals of plastic surgery **12**(3): 279-283.

A case of a benign steak knife wound to the left orbit is presented. The perioperative strategy for this and similar injuries is discussed.

2286. Hickman, Z. L., et al. (2019). "Efficacy of seizure prophylaxis following complicated mild traumatic brain injury: A retrospective pilot study." Journal of neurosurgery **131**(1): 102.

Introduction: Complicated mild TBI (mTBI) is defined as GCS 13-15 with a head CT demonstrating a traumatic intracranial lesion (hemorrhage/contusion/edema) or depressed skull fracture. Studies investigating the necessity/efficacy of seizure prophylaxis following complicated mTBI to prevent post-traumatic seizures (PTS) are limited and guidelines for antiepileptic drug (AED) administration in these patients are lacking. We examined PTS incidence following complicated mTBI in patients that either received, or did not receive, seizure prophylaxis. Methods: A Level 1 trauma center database was retrospectively reviewed to identify consecutive subjects aged 15+ years that presented with complicated mTBI between Apr-Dec 2016. Exclusion criteria included a history of seizures; prior or penetrating TBI; neurological decline to GCS<13; need for invasive neurosurgical intervention. Demographic data was collected and prophylactic AED administration information was obtained, including AED type/dose/duration. Medical records were queried to determine the incidence of early/late PTS from in-hospital events and on follow-up. Data was analyzed using unpaired Student's t, Fisher's exact, or Chi square tests, as appropriate. Results: 86 consecutive complicated mTBI patients (mean age 58.7+/-2.3y, 62% male, mean GCS 14.8+/-0.1) were included in our cohort. 79.1% of patients received prophylactic AEDs, median AED duration was 8 days (range 1-98). There were no in-hospital PTS (0/86, 0%). For patients with 7+ days follow-up (n=62), the incidence of early PTS was 1.9% (1/52) in the AED group and 10.0% (1/10) in the no AED group (P=0.30). There were 3 late PTS in both the AED/no AED groups (4.4% versus 16.7%) (P=0.10). Overall PTS incidence was 8.1% (7/86). Conclusion: No patients in our cohort had an immediate PTS during their initial hospital visit. The early PTS rate was low (3.2%), but there was a non-trivial incidence of late PTS (8.1%). The incidence of both early/late PTS trended lower in patients that received prophylactic AEDs immediately after injury.

2287. Hida, K., et al. (1978). "[Brain abscess discovered 38 years after head injury (author's transl)]." No shinkei geka. Neurological surgery **6**(8): 811-813.

We reported a case of delayed brain abscess following a penetrating gun-shot injury. The brain abscess surrounding retained intracranial fragments of bone and shell was found 38 years after head injury. The patient's only symptom had been minimal weakness of the right arm. This case was treated surgically with good results. The long period of silent infection was discussed.

2288. Hidaka, H., et al. (2012). "Traumatic pneumolabyrinth: air location and hearing outcome." Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology **33**(2): 123-131.

OBJECTIVE: To describe 3 cases of pneumolabyrinth after penetrating injury to the middle ear and to review previously reported cases, comparing precipitating factors and hearing outcomes., DATA SOURCES: Three cases we encountered and the PubMed and Japan Medical Abstracts Society databases., STUDY SELECTIONS: In addition to our 3 cases, we identified 48 cases from 41 articles regarding pneumolabyrinth. DATA EXTRACTIONS: All articles describing cases of pneumolabyrinth were used for this review., DATA SYNTHESIS: Among the 51 cases, audiologic evaluation was not available in 16 cases. In the remaining 35 cases, hearing outcomes were analyzed focusing on 3 factors: 1) differences in and interval until medical intervention, 2) existence of stapes lesions, and 3) extension of air bubble into the inner ear. We failed to find any significant differences in interventions, although operation less than 2 weeks after injury tended to be associated with a higher rate of hearing recovery (54%) than operation 2 weeks or longer after injury (25%). Furthermore, 11 (48%) of 23 cases with pneumolabyrinth limited to the vestibule or semicircular canals showed improved hearing, whereas none of 6 cases (0%) with pneumolabyrinth extending from the vestibular organs to the cochlea showed hearing recovery. This difference was statistically significant ($p < 0.05$)., CONCLUSION: Assessment of the location and extension of pneumolabyrinth appears important in predicting hearing outcomes and planning the management of middle and inner ear trauma.

2289. Hiebert, C. A. and F. J. Gregory (1974). "Bullet embolism from the head to the heart." JAMA **229**(4): 442-443.

2290. Hill, C., et al. (2013). "Prehospital lateral canthotomy." Emergency medicine journal : EMJ **30**(2): 155-156.

2291. Hillemacher, A. and E. Lichtenberger (1979). "[Brain-damage resulting from suicidal attempts (author's transl)]." Schadel-Hirn-Verletzungen durch Suizidhandlungen. **50**(3): 185-189.

2292. Hillered, L., et al. (2005). "Translational neurochemical research in acute human brain injury: the current status and potential future for cerebral microdialysis." Journal of neurotrauma **22**(1): 3-41.

Microdialysis (MD) was introduced as an intracerebral sampling method for clinical neurosurgery by Hillered et al. and Meyerson et al. in 1990. Since then MD has been embraced as a research tool to measure the neurochemistry of acute human brain injury and epilepsy. In general investigators have focused their attention to relative chemical changes during neurointensive care, operative procedures, and epileptic seizure activity. This initial excitement surrounding this technology has subsided over the years due to concerns about the amount of tissue sampled and the complicated issues related to quantification. The interpretation of mild to moderate MD fluctuations in general remains an issue relating to dynamic changes of the architecture and size of the interstitial space, blood-brain barrier (BBB) function, and analytical imprecision, calling for additional validation studies and new methods to control for in vivo recovery variations. Consequently, the use of this methodology to influence clinical decisions regarding the care of patients has been restricted to a few institutions. Clinical studies have provided ample evidence that intracerebral MD monitoring is useful for the detection of overt adverse neurochemical conditions involving hypoxia/ischemia and seizure activity in subarachnoid hemorrhage (SAH), traumatic brain injury (TBI), thromboembolic stroke, and epilepsy. There is some data strongly suggesting that MD changes precede the onset of secondary neurological deterioration following SAH, hemispheric stroke, and surges of increased ICP in fulminant hepatic failure. These promising investigations have relied on MD-markers for disturbed glucose metabolism (glucose, lactate, and pyruvate) and amino acids. Others have focused on trying to capture other important neurochemical events, such as excitotoxicity, cell membrane degradation, reactive oxygen species (ROS) and nitric oxide (NO) formation, cellular edema, and BBB dysfunction. However, these other applications need additional validation. Although these cerebral events and their corresponding changes in neurochemistry are important, other promising MD applications, as yet less explored, comprise local neurochemical provocations, drug penetration to the human brain, MD as a tool in clinical drug trials, and for studying the proteomics of acute human brain injury. Nevertheless, MD has provided new important insights into the neurochemistry of acute human brain injury. It remains one of very few methods for neurochemical measurements in the interstitial compartment of the human brain and will continue to be a valuable translational research tool for the future. Therefore, this technology has the potential of becoming an established part of multimodality neuro-ICU monitoring, contributing unique information about the acute brain injury process. However, in order to reach this stage, several issues related to quantification and bedside presentation of MD data, implantation strategies, and quality assurance need to be resolved. The future success of MD as a diagnostic tool in clinical neurosurgery depends heavily on the choice of biomarkers, their sensitivity, specificity, and predictive value for secondary neurochemical events, and the availability of practical bedside methods for chemical analysis of the individual markers. The purpose of this review was to summarize the results of clinical studies using cerebral MD in neurosurgical patients and to discuss the current status of MD as a potential method for use in clinical decision-making. The approach was to focus on adverse neurochemical conditions in the injured human brain and the MD biomarkers used to study those events. Methodological issues that appeared critical for the future success of MD as a routine intracerebral sampling method were addressed.

2293. Hilton, G. D., et al. (2004). "Neuroprotective effects of estradiol in newborn female rat hippocampus." Brain research. Developmental brain research **150**(2): 191-198.

Perinatal brain injury, consequent to hypoxic/ischemic events, is associated with the release of excess excitatory neurotransmitters, including glutamate. We have previously shown that administration of a glutamate receptor agonist, kainic acid (KA), to postnatal day 0 (PN0) and PN1 rats results in damage selective to the dentate gyrus of females. Pretreatment with the gonadal steroid estradiol prevents KA-induced damage to the female dentate gyrus. To begin to

elucidate the cellular mechanism of the neuroprotective effects of estradiol in neonatal females, we have employed the estrogen receptor antagonists Tamoxifen and ICI 182,780 in vivo and in vitro, respectively. Peripheral administration of Tamoxifen, which crosses the blood-brain barrier, prevented estradiol-mediated neuroprotection against KA-induced damage in the dentate gyrus. The highly selective estrogen receptor antagonist ICI 182,780, which does not penetrate into the brain from the periphery, also prevented estradiol's protective effects on KA-induced cell death in cultured hippocampal neurons but only late in the time course of injury. The data suggest that the neuroprotection afforded by estradiol against KA-induced injury in the female is estrogen receptor mediated but may include an additional mechanism that is not antagonized at the receptor.

2294. Hilton-Jones, D. and C. P. Warlow (1985). "Non-penetrating arterial trauma and cerebral infarction in the young." Lancet (London, England) **1**(8443): 1435-1438.

In a retrospective study of 60 patients under the age of 45 with ischaemic stroke the commonest likely predisposing factor was trauma, which applied to 13 (22%) patients. In 9 of these patients neck movement was the most likely factor that precipitated the stroke and was the factor identified in all the 3 who had damage to the vertebral artery. The other 4 patients had sustained direct trauma in the neck area, 2 as a result of attempted strangulation and 2 by carrying heavy loads on the shoulder. There may be a delay between the traumatic event and manifestation of the stroke, probably because the initial damage, which is most likely a small tear, is of no immediate consequence, and the stroke results after thrombus has formed over the tear and subsequently embolised.

2295. Hinderer, K. H. (1976). "Nasal problems in children." Pediatric annals **5**(8): 499-509.

Nasal problems in children are very common. The factors that affect the embryologic development have been discussed. Injuries that occur in prenatal, natal, and postnatal periods affect normal development. Prompt treatment of minor injuries is necessary to prevent airway problems later. The "wait and see" attitude toward nasal deformity is ill advised. X-ray findings are not conclusive, as the nasal pyramid in a child is largely cartilaginous. Obstructive nasal breathing can result in facial asymmetry, malocclusion, and cardiopulmonary problems. Allergy and sinusitis are frequently causes of obstruction.

2296. Hindman, H. B., et al. (2007). "Traumatic globe luxation and enucleation caused by a human bite injury." Ophthalmic plastic and reconstructive surgery **23**(5): 422-423.

A 55-year-old woman presented to the emergency room with complete loss of vision in the left eye after being bit in the face by her autistic grandson. She had a small upper eyelid laceration and an anophthalmic socket on the left side. A thorough history revealed that the bite had caused traumatic luxation of her globe, which had allowed the child to transect the optic nerve with his teeth. Careful attention was directed toward the prevention of retrograde infection in this unusual case of traumatic enucleation.

2297. Hink, A. B., et al. (2022). "Adolescent Suicide—Understanding Unique Risks and Opportunities for Trauma Centers to Recognize, Intervene, and Prevent a Leading Cause of Death." Current Trauma Reports **8**(2): 41-53.

Purpose of Review: This provides up-to-date epidemiology of adolescent suicide and risk factors for suicide and highlights the overlap of risks for suicide and injury. It reviews signs and symptoms, and the up-to-date evidence on screening for depression, post-traumatic stress disorder (PTSD), suicide, substance abuse, and lethal means, and offers strategies of implementation in trauma centers. Recent Findings: The incidence of adolescent suicide has continued to rise in the USA to 6.5 per 100,000, with notable racial disparities. The risk factors are complex, but many pre-existing risk factors and sequela after injury such as exposures to violence, suicidal behaviors, substance abuse, depression and post-traumatic stress disorder, and specific injuries including traumatic brain injury and spinal cord injury have further emerged as risks. Studies show rates of suicidality as high as 30% in the acute care setting. There are short screening instruments that can be used to universally screen for depression and suicidality in adolescent trauma patients. Step-up models of care for PTSD are promising to increase screening and services after injury. Lethal means counseling, secure firearm storage practices, and firearm safety policies can reduce the risk of suicide. Summary: Suicide is the second leading cause of death in US adolescents, and trauma patients have significant risk factors for mental illness and

suicidality before and after injury. Trauma centers should strongly consider screening adolescents, establish strategies for mental health support and referrals, and provide lethal means counseling to help prevent suicide.

2298. Hinkelbein, J., et al. (2007). "Local cerebral blood flow is preserved in sepsis." Current neurovascular research **4**(1): 39-47.

Sepsis is often complicated by encephalopathy, neuroendocrine dysfunction and cardiovascular autonomic failure. The cause of septic brain dysfunction is not fully understood. The aim of the present study is to explore whether septic brain dysfunction in a common septic model in the rat correlates with abnormalities either of local cerebral blood flow (LCBF) of defined brain areas or of whole brain blood flow (CBF). 45 male Wistar rats (320+/-13 g) were randomly assigned to a sepsis group (31 rats, cecal ligature and puncture, CLP) or a control group (14 rats, sham operation). Of these 45 rats, 16 rats were used for blood analysis; the remaining 29 rats were used for CBF/LCBF measurements. LCBF measurements were performed 24h after initial surgery using quantitative autoradiography with 4-iodo[N-methyl-(14)C]antipyrine, which allows to analyze CBF on a regional/local and global basis. In 42 different brain regions bilateral optical density measurements were performed. Septic rats (vs. control) presented tachycardia (507+/-37 vs. 452+/-44 min(-1), P<0.05), leukocytopenia (2.96+/-2.37 vs. 8.83+/-2.9710(9) x L(-1), P<0.05), hypocapnia (29.3+/-4.6 vs. 36.4+/-3.9 mmHg, P<0.05), and higher serum lactate concentrations (5.7+/-3.9 vs. 2.2+/-2.0 mmol x L(-1), P<0.05). LCBF of all 42 areas, as well as, CBF (116+/-59 vs. 115+/-52 m x 100 g(-1)min(-1), n.s.) did not differ. The results showed that severe sepsis (mortality rate of 43 %) did not induce alterations in mean CBF and LCBF. It is concluded that brain dysfunction is not reflected in changes of CBF during severe sepsis.

2299. Hiraishi, T., et al. (2009). "Unstable stenosis of the internal carotid artery caused by a craniofacial nail-gun injury-case report." Neurologia medico-chirurgica **49**(12): 590-593.

A 30-year-old carpenter suffered accidental piercing of his jaw by a 3-inch nail from a nail gun. No neurological deficits were found on admission. Computed tomography showed that the tip of the nail had reached the foramen lacerum. Cerebral angiography revealed severe stenosis at the C(4) portion of the left internal carotid artery (ICA) and marked decrease in the flow of the distal ICA. He had developed right hemiparesis and sensory aphasia by the following morning. T(2)-weighted and fluid-attenuated inversion recovery magnetic resonance imaging showed a focal hyperintense signal in the left central region indicating cerebral infarction. Repeat angiography demonstrated that the antegrade blood flow from the occluded point on the admission day had partially resumed, and endovascular trapping of the ICA was successfully carried out. The nail was then removed safely without problematic bleeding. The patient suffered no additional deficit, and his sensory aphasia and right hemiparesis gradually improved. The fluctuating blood flow through the unstable stenosis of the ICA related to nail movement possibly caused the delayed cerebral infarction. To avoid the occurrence of such events, rapid treatment after necessary investigations is recommended in patients with craniofacial penetrating injuries that affect the ICA.

2300. Hiraishi, T., et al. (2007). "[Delayed brain abscess after penetrating transorbital injury]." No shinkei geka. Neurological surgery **35**(5): 481-486.

We report a case of brain abscess caused by a penetrating head injury that occurred 9 years earlier. A 14-year-old girl presenting with fever, headache, and stiff neck was admitted to our hospital. She was diagnosed with aseptic meningitis and treated conservatively. Seven days after admission she became stuporous and showed left hemiparesis. Computed tomography (CT) revealed two ring-enhancing masses with perifocal edema in the right frontal lobe. We diagnosed brain abscess and performed right fronto-temporal decompressive craniectomy and stereotactic aspiration, followed by systemic antibiotic therapy. Post-surgery bone window CT revealed a well-defined, low-density foreign body passing from the left orbita to the right frontal lobe through the ethmoid sinus. We learned that the patient had been struck with a plastic chopstick in the left medial eyelid at the age of 5 years. No particular symptoms developed during the following 9 years. After the cerebral edema had diminished over the next 10 days, a second surgery was performed to remove the residual chopstick, repair the fistula at the base of the skull, and perform cranioplasty. The patient was discharged with only slight hyposmia after a 4-week course of antibiotics. This case showed that it is necessary to remove a residual foreign body and to close the dural fistula if there is a possibility of recurrent central nervous system infection. When a child presents with brain abscess, previous penetrating head injury should be considered.

2301. Hiramatsu, T. (2020). "Bullet fragments spontaneously migrating in opposite directions after a cardiac arrest treated with extracorporeal cardiopulmonary resuscitation following a gunshot wound to the head: A case report." Trauma case reports **28**: 100330.

Gunshot injuries to the head are associated with a poor neurological prognosis, have a high risk of mortality, and make the return of spontaneous breathing and circulation after cardiopulmonary arrest difficult. Bullets or bullet fragments can cause penetrating injuries to the brain tissue and sometimes remain in the skull, potentially migrating within the skull. Herein, we describe a rare patient who achieved a return of spontaneous circulation after cardiopulmonary (ROSC) arrest caused by a gunshot wound, following extracorporeal cardiopulmonary resuscitation. After ROSC, repeated computed tomography (CT) identified spontaneously migrating bullets/fragments in the right hemisphere and the metal fragment was excreted from the skull, while another fragment had moved from the left temporal to the occipital fossa. The patient died on the 15th day of hospitalization. The present case had a rare clinical course, suggesting that ROSC may be achieved under adequate respiratory and circulation management in cases of cardiac arrest with a head injury. The scans showed differing movements of the bullet fragments at each lesion, which was difficult to predict from the first CT scan. When surgical treatment is required to remove bullet fragments remaining in the skull (due to lead poisoning, or infection, among others), it may be useful to be aware that fragments may move in various directions, even out of the skull. Furthermore, we recognized the usefulness of CT scanning for detecting the location of the foreign body in cases of gunshot injury to the head. Copyright © 2020 The Author.

2302. Hirsch, M., et al. (1975). "Delayed hemopericardium following penetrating foreign body into the aorta." Pediatric radiology **3**(2): 111-113.

A four and a half year old girl with delayed appearance of traumatic hemopericardium, detected radiologically despite misleading clinical manifestations, is presented. The presence of cardiomegaly and a needle in the right upper mediastinum on the chest roentgenogram and its partial motion together with diminished cardiac pulsations at fluoroscopy led to angiocardiography. The radiological demonstration of hemopericardium due to the needle penetrating the aortic root, enabled successful surgical intervention.

2303. Hirsch, S. A. (1978). "Cervicofacial actinomycosis following surgical trauma in rats." Oral surgery, oral medicine, and oral pathology **46**(6): 827-830.

Cervicofacial actinomycosis in man is often associated with physical trauma. The presence of intrabony abscesses in rat mandibles following surgical trauma supports the clinical observation that antecedent trauma is an important factor in the pathogenesis of cervicofacial actinomycosis.

2304. Hitchcock, E. and R. Cowie (1983). "Stereotactic removal of intracranial foreign bodies: review and case report." Injury **14**(5): 471-475.

A 13-year-old boy presented himself with an airgun injury with a track from an entry wound in the left temporal region to the right thalamic pulvinar. The patient made a good recovery following stereotactic removal of the pellet. The literature is reviewed and the indications for stereotactic removal of intracranial foreign bodies discussed.

2305. Hobson, H., et al. (2018). "Language and alexithymia: Evidence for the role of the inferior frontal gyrus in acquired alexithymia." Neuropsychologia **111**: 229-240.

The clinical relevance of alexithymia, a condition associated with difficulties identifying and describing one's own emotion, is becoming ever more apparent. Increased rates of alexithymia are observed in multiple psychiatric conditions, and also in neurological conditions resulting from both organic and traumatic brain injury. The presence of alexithymia in these conditions predicts poorer regulation of one's emotions, decreased treatment response, and increased burden on carers. While clinically important, the aetiology of alexithymia is still a matter of debate, with several authors arguing for multiple 'routes' to impaired understanding of one's own emotions, which may or may not result in distinct subtypes of alexithymia. While previous studies support the role of impaired interoception (perceiving bodily states) in the development of alexithymia, the current study assessed whether acquired language impairment following traumatic brain injury, and damage to language regions, may also be associated with an increased risk of

alexithymia. Within a sample of 129 participants with penetrating brain injury and 33 healthy controls, neuropsychological testing revealed that deficits in a non-emotional language task, object naming, were associated with alexithymia, specifically with difficulty identifying one's own emotions. Both region-of-interest and whole-brain lesion analyses revealed that damage to language regions in the inferior frontal gyrus was associated with the presence of both this language impairment and alexithymia. These results are consistent with a framework for acquired alexithymia that incorporates both interoceptive and language processes, and support the idea that brain injury may result in alexithymia via impairment in any one of a number of more basic processes. Copyright © 2018. Published by Elsevier Ltd.

2306. Hoey, A., et al. (2022). "Delayed-Onset Seizures Following Self-Inflicted Nail Gun Injury to the Head: A Case Report and Literature Review." Journal of neurological surgery reports **83**(2): E54-E62.

Nail gun use and its associated incidence of injury have continued to increase since it was first introduced in 1959. While most of these injuries involve the extremities, a subset of patients suffer intracranial trauma. The most recent comprehensive review on this particular subject referenced 41 cases and advocated for further discussion regarding proper treatment plans for these individuals. We present the case of a 25-year-old who suffered 35 self-inflicted penetrating head wounds from a nail gun after suffering an amputation injury at his job site. No neurological deficits were present on his arrival to the emergency room. He underwent surgery to treat his arm wound and remove 13 of the 35 nails. The patient was discharged from the hospital on levetiracetam and made a full recovery. Nearly 1 year later, he experienced a seizure at his workplace. However, after resuming his antiepileptic medication, he reports no further complications. This case is distinct for not only being the most nails in a patient's head at presentation, but also following surgery. Utilizing this case, prior review, and 27 subsequent cases, we propose an updated algorithm for diagnosis and treatment of nail-gun-related penetrating head trauma.

2307. Hofbauer, M., et al. (2010). "Predictive factors influencing the outcome after gunshot injuries to the head-a retrospective cohort study." The Journal of trauma **69**(4): 770-775.

BACKGROUND: Civilian gunshot injuries to the head are relatively rare in the irenical European Union, and studies of treatment and outcomes are seldom for this region in the current literature., METHODS: A cohort of 85 patients with civilian head gunshot injuries, who were admitted to our University hospital over a period of 16 years, was reviewed retrospectively. Clinical manifestation, computed tomography scan findings, and surgical treatment were described, with special regard to prognostic factors and outcome., RESULTS: The mean age was 48 years (range, 17.8-98.4 years), and 87% were men. Sixty patients sustained penetrating craniocerebral injuries (P-group) and 25, nonpenetrating gunshot wounds (NP-group). The overall mortality was 87% in the P-group and 4% in the NP-group. The Glasgow Coma Scale (GCS) score at admission was recorded to be 3 to 5 in 58 patients (96%) and 7 patients (28%) in the P-group and NP-group, respectively. Only 8 patients (13%) survived in the P-group compared with 24 patients (96%) in the NP-group. Excluding wound debridement, there were 16 surgical procedures in the P-group and 8 in the NP-group, with a mortality rate of 63% and 13%, respectively., CONCLUSIONS: Glasgow Coma Score at admission and the status of pupils and hemodynamic situation seem to be the most significant predictors of outcome in penetrating craniocerebral gunshot wounds. Computed tomography scans, bi- or multilobar injury, and intraventricular hemorrhage were correlated with poor outcome. Patients with a GCS score >8, normal pupil reaction, and single lobe of brain injury may benefit from early aggressive management.

2308. Hoff, S. F. (1986). "Lesion-induced transneuronal plasticity in the adult rat hippocampus." Neuroscience **19**(4): 1227-1233.

The process of reactive synaptogenesis has been demonstrated in several areas of the central nervous system, including the hippocampal dentate gyrus. After a complete unilateral entorhinal lesion, approximately 85% of the input to the outer two-thirds of the ipsilateral dentate molecular layer is lost. Bilateral fluctuations in synaptic density within non-denervated zones of the dentate molecular layer predict further alterations in neural circuitry at sites located transneuronally to the denervated dentate granule cells. Using quantitative electron microscopy, our study demonstrates a complete cycle of synapse loss and reacquisition within the ipsilateral but not contralateral CA4/hilus region of the hippocampal formation. This area is one of the terminal fields for the dentate granule cell mossy fiber axons. In addition the granule cell mossy fiber axons sprout during the postlesion time course and form a significantly increased number of new mossy fiber terminals within the ipsilateral and contralateral CA4/hilus area. Our results

indicate that responses to brain injury may no longer be confined to a local denervated site, but probably include polyneuronal circuitry loops, which may encompass one or more areas of the central nervous system. Previous difficulties in providing a close behavioral or functional correlation to localized structural events may be explained by a more global brain response to an injury.

2309. Hoffman, J. F., et al. (2021). "Brain region- and metal-specific effects of embedded metals in a shrapnel wound model in the rat." Neurotoxicology **83**: 116-128.

The health effects of prolonged exposure to embedded metal fragments, such as those found in shrapnel wounds sustained by an increasing number of military personnel, are not well known. As part of a large collaborative effort to expand this knowledge, we use an animal model of shrapnel wounds originally developed to investigate effects of embedded depleted uranium to investigate effects of military-relevant metals tungsten, nickel, cobalt, iron, copper, aluminum, lead, and depleted uranium compared to an inert control, tantalum. Rats are surgically implanted with pellets of one of the metals of interest in the gastrocnemius (leg) muscle and tracked until 1 month, 3 months, 6 months, or 12 months from the time of implant, at which point they are euthanized and multiple organs and tissue samples are collected for inspection. Here we focus on four regions of the brain: frontal cortex, hippocampus, amygdala, and cerebellum. We examined changes in accumulated metal concentration in each region as well as changes in expression of proteins related to blood brain barrier tight junction formation, occludin and ZO-1, and synapse function, PSD95, spinophilin, and synaptotagmin. We report few changes in metal accumulation or blood brain barrier protein expression, but a large number of synapse proteins have reduced expression levels, particularly within the first 6 months of exposure, but there are regional and metal-specific differences in effects. Copyright Published by Elsevier B.V.

2310. Hoffmann, B. and A. Sepehrnia (2005). "Taylored implants for alloplastic cranioplasty--clinical and surgical considerations." Acta neurochirurgica. Supplement **93**: 127-129.

Traumatic loss of bone substance or post - decompression defects require the reconstruction of the skull. In cases of simple geometry there are handy, secure and cost effective procedures such as using autologuous cryopreserved bone flaps or polymerized Methylmethacrylat. For large sized defects CAD - taylored implants developed to provide a comfortable procedure to ensure high biocompatibility and perfect anatomical results by one - stage surgery. Furthermore cranioplasty does not only imply anatomical reconstruction but also functional recovery of awareness, cognition and motoric functions as shown in several studies according to changes in cerebral hemodynamics and metabolism. In our series of 286 patients who underwent cranioplasty during the past 10 years (1993-2003) we used taylored implants in 15 cases starting in 1999. All the patients included showed large sized defects > 64 cm2, complications did not occur neither during surgery nor the postoperative course, cosmetical results were excellent in all the patients. Neurological findings and the functional state improved in 11/15 patients, 4/15 patients showed no change, nevertheless these patients had reached a good recovery before surgery. Application of this technique is limited by cost, nonetheless it is recommended for extensive reconstruction of the skull.

2311. Hoffmann, C., et al. (2014). "Successful management of a severe combat penetrating brain injury." Journal of the Royal Army Medical Corps **160**(3): 251-254.

We report the case of successful management of a transcranial penetrating high-energy transfer injury in a 20-year-old soldier. The bullet traversed both cerebral hemispheres and lacerated the superior sagittal sinus rendering him unconscious. We detail the care received at all stages following injury from 'Buddy Aid' on the battlefield, resuscitation by a forward medical team through to prompt neurosurgery within 2 h of injury. Subsequent aeromedical evacuation and continuing aggressive critical care has allowed the patient to survive with acceptable neurological impairment after what is generally considered an unsurvivable injury. Copyright Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to http://group.bmj.com/group/rights-licensing/permissions.

2312. Hohenegger, M., et al. (1990). "Serum vasopressin (AVP) levels in polyuric brain-dead organ donors." European archives of psychiatry and neurological sciences **239**(4): 267-269.

Hydromineral metabolism and serum arginine-vasopressin (AVP) levels were investigated in 11 patients who sustained brain death. They showed various degrees of polyuria with low osmolality and low fractional sodium excretion. Urine osmolality was always below that of serum, and AVP levels were between 1.3 and 50.0 pg/ml vs 0.7-8.0 pg/ml in ten normal subjects. Thus central diabetes insipidus was excluded. A renal mechanism inducing water diuresis has to be assumed. The type of renal lesion, however, remains unclear.

2313. Hohl, A., et al. (2012). "Acute hypogonadism in male patients with severe traumatic brain injury." Endocrine Reviews **33**(3).

Objectives: The hypothalamic-pituitary axis may change in traumatic brain injury (TBI), with subsequent hypopituitarism(1,2). Late gonadotrophin deficiency after TBI has been demonstrated frequently: 1-32% (3,4). The present study evaluates the total testosterone and calculated free testosterone in male patients with severe TBI in acute phase and its relationship with mortality. Methods: We included 60 consecutive male patients with severe TBI (Glasgow Coma Scale score 8 or lower after acute neurosurgical resuscitation, or deterioration to that level within 48 hours of impact), admitted to the intensive care unit of the Hospital Governador Celso Ramos between April 2006 and April 2008. This is a public reference hospital for TBI covering a population of approximately 1 million, in the metropolitan area of Florianopolis, Brazil. Victims of gunshot injury and patients who evolved to brain death before 24 hours of admission were excluded. Total testosterone and SHBG (for calculation of free testosterone) were determined in blood plasma on the first, second, and third day after TBI (12, 30 and 70 hours after TBI, respectively). The study was approved by the ethics committee and the family responsible for the patient signed a consent form. Results: Of 60 male patients evaluated, the average age of patients was 35 years. Outcome for 40 patients survived and 20 died, during hospitalization (33.3%). The causes of TBI were traffic accidents (60%), fall (28%), aggression (6%) and others (6%). The mean total testosterone (normal range > 300 ng/dL) fell significantly from first to last evaluation: 438, 278 and 196 ng/dL, respectively. The same situation was observed with the calculated free testosterone (normal range > 6.5 ng/dL): 12.3, 7.9 and 5.0 ng/dL, respectively. Both analyzed hormones showed a high prevalence of abnormalities ranging from 36.5% of patients with low total testosterone in first sample up to 83.3% of cases with low total and calculated free testosterone in the last sample. However, there was no statistically significant difference between the group of patients who survived and those who died during hospitalization ($p \geq 0.13$). Conclusion s: Testosterone decreased progressively in the first 70 hours after severe TBI in male patients. A probable recovery occurs at a later period, since only a few of these men develop permanent hypogonadism. There was no relationship between levels of total and free testosterone and mortality among the patients studied.

2314. Hoit, D. A., et al. (2008). "Angiographic detection of carotid and vertebral arterial injury in the high-energy blunt trauma patient." Journal of spinal disorders & techniques **21**(4): 259-266.

BACKGROUND AND OBJECTIVE: Injury to the carotid and vertebral arteries is an identified risk to patients after blunt high-energy cranio-cervical trauma with an associated risk of thromboembolic stroke. We sought to determine the incidence, features, and risk factors of arterial injury using selective cerebral angiography in a high-risk trauma patient subset., METHODS: Blunt trauma patients with a high-energy mechanism were selected to undergo screening cerebral angiography if they met one of the following criteria: (1) cervical spine hyperextension/hyperflexion injury, (2) skull-base or facial fracture, (3) lateralizing neurologic deficit, ischemic deficit, or cerebral infarction, or (4) hemorrhage of arterial origin., RESULTS: Of 69 screened patients 20 were found to have a vascular injury (28.9%), including 13 carotid and 15 vertebral; 9 of the 20 patients with vascular injury were symptomatic (45%). The most frequent injuries were intimal dissections (8/28), pseudoaneurysms (6/28), and vessel occlusions (5/28); 8 lesions were intracranial and 20 cervical. Displaced facial fractures ($P<0.02$) but not skull-base fracture were predictive of carotid injury; multilevel cervical spine fractures ($P<0.001$) and transverse foraminal fractures ($P<0.02$) were associated with vertebral injury., CONCLUSIONS: Cerebral angiography in a selected group of trauma patients was found to yield a significant rate of carotid and vertebral arterial injury, a finding that had implications to subsequent clinical management.

2315. Hokl, J., et al. (2004). "Modality of brain death and serum troponin T levels in donors and their heart transplant recipients." Annals of transplantation **9**(3): 42-43.

Cardiac troponin T levels and inotropic requirements were assessed in the sera of 39 heart donors immediately before heart harvesting and, in their recipients, during the first two days after transplantation. In the donors who died of

cranial trauma (n=21), serum troponin T levels as well as inotropic support were lower (P<0.05 and P<0.025, respectively) than in the donors (n= 18) in whom death was caused by spontaneous intracranial haemorrhage. In the recipients, no differences in troponin T or inotropic support levels were found in relation to the modality of their donors' brain death.

2316. Holbrook, E. R. and J. Thompson (2013). "The longest journey is from the head to the heart." Journal of Investigative Medicine **61**(1): 178.

Case Report: Introduction Approximately 50% of intravascular missiles enter the venous circulation, and have the potential for central migration toward the heart.We present a case with embolization of a bullet from the head to the distal pulmonary bed. We then reviewed our own institutional experience and the world's literature to help determine the best treatment strategy for patients with projectile embolization to the pulmonary artery. Case Report: A 25-year-old male sustained a gunshot wound to the left eye. Computed tomography (CT) scan of the head disclosed rupture of the left globe and lens, complex fractures of the boney structures, and a 5 mm, well-circumscribed metallic foreign body consistent with a bullet fragment in the right superior aspect of the posterior fossa just caudad to the tentorium. Aside from the head injuries, there was no evidence of additional trauma. Soon after arrival to the emergency department, a right lateral ventricular external drain was placed into the calvarium. In order to monitor the progression of the cerebral injury, repeat CT scan of the head was performed a few hours later, and the bullet fragment was gone. Chest x-ray revealed a dense object in the region of the pulmonary artery that had not been present on the prior chest film. CT scan of the chest showed that the bullet fragment was now in the left lower lung field (figure 1). There was consolidation of the lung parenchyma in the area of the bullet fragment. Broad spectrum antibiotics that had previously been started were continued. Several days later, the patient was transferred to another institution for continued neurologic treatment. At the time of transfer the patient had no complications due to the retained bullet. Discussion: Review of our institution's medical record revealed two additional cases of bullet fragments having embolized from penetrating head injuries to the pulmonary arteries. Both patients were managed conservatively, and had no pulmonary sequelae at 2 years and 18 months respectively. Assessment of the world's literature demonstrates that controversy still exists as regards the need for and appropriate timing of extraction of projectiles that have embolized to the pulmonary circulation.

2317. Holds, J. B., et al. (1993). "Hydraulic orbital injection injuries." Ophthalmology **100**(10): 1475-1482.

BACKGROUND: A high-pressure stream from mechanical equipment may inject gas or liquids deep into the orbit with few initial clinical signs. Aggressive surgical debridement as used in the extremities for the treatment of injection injuries is not possible in the orbit., METHODS: Four patients with orbital injection injuries from farm or industrial equipment are presented. Previously reported cases of high-pressure injection injury are reviewed., RESULTS: Two patients suffered localized anterior orbital inflammation partially responsive to steroidal and nonsteroidal anti-inflammatory agents. Late debridement was required in one patient for a persistent lipogranuloma. Two patients suffered more dramatic and diffuse injections of hydrocarbon mixtures, requiring emergent early surgical debridement and decompression for compressive orbital signs. All patients attained an adequate functional outcome, with one patient's vision limited by a coexisting ocular injury., CONCLUSIONS: High-pressure orbital injection injuries manifest a spectrum of signs ranging from acute inflammation with tissue necrosis and compressive visual loss to late chronic inflammation with a pseudotumor-like course. The authors recommend the initial treatment of orbital injection injuries with systemic antibiotics followed by prompt neuroradiologic imaging. Systemic corticosteroids should be added for confirmed injection injuries with surgical debridement of discrete masses and orbital decompression when indicated. Continued therapy with anti-inflammatory medication may be required to suppress chronic inflammation with selective late surgical debridement of lipogranulomas.

2318. Holland, P., et al. (2004). "Should airguns be banned?" British journal of neurosurgery **18**(2): 124-129.

In this article, we express concerns regarding the availability of airguns, the injuries that they cause and their abuse as weapons of assault. We wish to stimulate debate on this topic and report a 5-year retrospective analysis of all airgun injuries to the head and neck, presenting to Alder Hey Children's Hospital, Liverpool, from June 1998 to June 2003. We identified 16 patients who suffered such injuries with ages ranging from 5 to 15 years. The majority of cases were violent assaults, which is not in accordance with previous published reports. All of these occurred in public places

outside the home. Most incidents occurred through the spring and summer period. Six patients required overnight stay in hospital. Nine patients required operative procedures to remove the airgun pellets. Two patients had serious eye injuries resulting in loss of vision. Two patients had penetrating neck injuries requiring exploration of the wound. The remaining group had either skin-penetrating injuries with lodgement of fragments in subcutaneous tissues or non-skin penetrating injuries. This study highlights serious injuries arising from the abuse of airguns as weapons of assault. Airguns are readily available to people without license. Recent legislation has increased the minimum age at which airguns can be carried in a public place, but we believe that stricter legislation is required to produce a reduction in the number of airgun-related injuries.

2319. Hollerhage, H. G. and G. Dorfmuller (1992). "[Extensive brain injury caused by attempted suicide with an airgun and ultrasound controlled removal of the deep intracranial projectile]." Ausgedehnte Hirnverletzung durch Suizidversuch mit Luftgewehr und ultraschallgestutzte Entfernung des tief intrakraniellen Projektils. **63**(10): 641-643.

A 65-year-old man attempted suicide by shooting himself in the right temple with an air-gun. There was no loss of consciousness. He remained neurologically asymptomatic. On plain x-rays, the pellet was found in the left frontal lobe and CT-scans revealed a vast cerebral injury with a large hematoma in the right frontotemporal region and along the bullet track. The entry wound was opened and the hematoma was evacuated after removal of small bone fragments and limited osteoclastic enlargement of the bullet hole under the view of the microscope. No attempt was made to remove the pellet through the bullet track in order to avoid additional injury to delicate frontal midline structures. A left frontal burr hole was made and a thin silastic tube, as used for ventricular drainage, was placed with its tip at the projectile under ultrasonic guidance. Along the tube, the pellet was removed through a 5 mm cortical incision with the use of the microscope. The postoperative course was uneventful, the patient had no neurological deficit and early postoperative CT-scans showed complete removal of the hematoma and the bullet without additional brain injury.

2320. Hollier, L., et al. (2001). "Facial gunshot wounds: a 4-year experience." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **59**(3): 277-282.

PURPOSE: Facial gunshot wounds can result in devastating functional and aesthetic consequences for patients. In an attempt to evaluate the management and outcome in these patients, a 4-year retrospective review was undertaken of all patients presenting with facial gunshot wounds at a level I trauma center., PATIENTS AND METHODS: A total of 121 patients were identified. Medical documentation could be obtained on 84 of those patients. The patients' maxillofacial injuries were treated by the 3 participating services: plastic surgery, oral and maxillofacial surgery, and otorhinolaryngology. The patients ranged in age from 6 to 64 years, with a mean age of 27 years., RESULTS: The gunshot wounds were single in 64% of the cases and multiple in 36% of the cases. Overall mortality in the series was 11%. Sixty-seven percent (56/84) of the patients suffered an injury to the underlying craniofacial skeleton. Seventy-five percent of these patients required surgical intervention. Twenty-one percent of the patients (16/75) required tracheostomy emergently for management of the airway. Eighteen percent (15/84) of these patients had an intracranial injury, with 50% of these patients requiring surgery. Fourteen percent of the patients in the series (12/84) had great vessel injuries diagnosed at the time of angiography, with 50% of these patients requiring surgery for treatment., CONCLUSION: Contrary to much of the published literature, most patients in this series required surgical intervention for treatment of their facial gunshot wounds. Reconstructive procedures were performed early in the patient's course and, when possible, addressed both the soft tissue and underlying bony injury in a minimum number of stages.

2321. Holmes, A. D. and K. A. Marshall (1979). "Use of the temporalis muscule flap in blanking out orbits." Plastic and reconstructive surgery **63**(3): 336-343.

We report the use of the temporalis muscle as a transposition flap to obliterate the orbit in 5 patients. In 4 of the cases we split the muscle coronally and passed the anterior part through a window in the lateral orbital wall. In two of these patients, skin grafts were put on both sides of the temporalis muscle-fascia flap, to restore nasal lining and to cover the facial surface simultaneously. In the remaining patients, the muscle was split sagittally to provide a large surface for coverage. The temporalis muscle flap is a versatile one for filling orbits after exenteration.

2322. Holmes, P.-J., et al. (2005). "Intraoperative imaging techniques: a guide to retrieval of foreign bodies." Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics **100**(5): 614-618.

Foreign bodies are frequently introduced into the tissues of the head and neck by various mechanisms, and oral and maxillofacial surgeons are often called upon to retrieve these embedded objects. Retrieval may be quite challenging depending on many factors such as the size of the object, the location, and the surrounding anatomical structures. Preoperative imaging is very important in deciding upon the surgical approach. Computerized tomography is considered the gold standard for detection of foreign bodies because of the ability to localize an object in multiple planes and the creation of a 3-dimensional image. Difficulty arises when looking for a small object in an area with multiple important anatomical structures, such as the infratemporal fossa or the neck. Surgery can become tedious secondary to the risk of postoperative morbidity with injury to various anatomical structures. Foreign bodies in the head and neck are often difficult to manage even when a plan has been formulated from static preoperative images. Intraoperative feedback or guidance, especially when navigating through troublesome locations, can be extremely useful. In this paper, we report 2 cases and discuss the various modalities used for intraoperative imaging as a guide for surgical retrieval of foreign bodies.

2323. Holmquist, M., et al. (1999). "A critical pathway: guiding care for organ donors." Critical care nurse **19**(2): 84-100.

2324. Holt, G. R. and J. E. Holt (1976). "Lacerations of the lacrimal apparatus, parotid duct, and facial nerve: case report." The Journal of trauma **16**(5): 414-419.

Diagnosis and surgical treatment of a male patient with severe facial lacerations involving the lacrimal duct, parotid duct, and buccal branch of facial nerve are presented. Careful wound care and localization of severed nerves and ducts, and repair under microscope are emphasized.

2325. Hon, K., et al. (2022). "A case report of blunt intraoral cerebrovascular injury in a child following intraoral trauma: The pen is mightier than the sword." Trauma case reports **37**.

Carotid artery dissection in the paediatric population is uncommon and in rare cases it can be due to intraoral blunt trauma associated with a stick-like object such as pen or chopstick in the mouth at the time of injury. Given the rarity of the condition, there is significant knowledge gap in evidence-based diagnosis and management of paediatric blunt cerebrovascular injury (BCVI). This case report presents a rare case of asymptomatic carotid artery dissection due to intraoral blunt trauma in a young patient and the successful conservative management. This report also demonstrated the sonographic progression of the carotid artery dissection on follow up imaging.

2326. Hon, K. L., et al. (2020). "Brain death in children: a retrospective review of patients at a paediatric intensive care unit." Hong Kong medical journal = Xianggang yi xue za zhi **26**(2): 120-126.

PURPOSE: Among patients in paediatric intensive care units (PICUs), death is sometimes inevitable despite advances in treatment. Some PICU patients may have irreversible cessation of all brain function, which is considered as brain death (BD). This study investigated demographic and clinical differences between PICU patients with BD and those with cardiopulmonary death., METHODS: All children who died in the PICU at a university-affiliated trauma centre between October 2002 and October 2018 were included in this retrospective study. Demographics and clinical characteristics were compared between patients with BD and patients with cardiopulmonary death., RESULTS: Of the 2784 patients admitted to the PICU during the study period, 127 died (4.6%). Of these 127 deaths, 22 (17.3%) were BD and 105 were cardiopulmonary death. Length of PICU stay was shorter for patients with cardiopulmonary death than for patients with BD (2 vs 8.5 days, P=0.0042). The most common mechanisms of injury in patients with BD were hypoxic-ischaemic injury (40.9%), central nervous system infection (18.2%), and traumatic brain injury (13.6%). The combined proportion of accident and trauma-related injury was greater in patients with BD than in patients with cardiopulmonary death (27.3% vs 3.8%, P<0.001). Organ donation was approved by the families of four of the 22 patients with BD (18.2%) and was performed successfully in three of these four patients., CONCLUSIONS: These findings emphasise the importance of injury prevention in childhood, as well as the need for education of the public regarding acceptance of BD and support for organ donation.

2327. Hon, K. L. E., et al. (2013). "Pediatric ICU mortality: Communicable or non-communicable diseases." Intensive care medicine **39**: S103-S104.

Objectives: We investigated the pattern of mortality at a PICU and explored if any unusual pathogens are associated with these deaths. Methods: Demographic data of all PICU deaths were analyzed. Results: There were 81 deaths (males 59 %; infants 25 %) over the 10-year period between 2002 and 2012. The mean annual mortality rate of PICU admissions was 5.7 %. Septicemia with common gram positive (commonest coagulase negative staphylococcus), gram negative (commonest pseudomonas) and fungal (commonest candida species) pathogens were present in 12 (15 %), 13 (16 %) and 5 (6 %) of these patients, respectively. Viruses (commonest CMV) were isolated in 20 patients (25 %). 91 % of these patients were ventilated, 73 % required inotropes, 91 % received broad spectrum antibiotic coverage, 31 % received systemic corticosteroids, 52 % blood transfusion and 38 % anticonvulsants. 36 patients (44 %) had a DNAR (Do-Not-Attempt-Resuscitation order) prior to their death at the PICU. Oncological diagnoses (n = 24) were predominant diagnoses. In the trauma category (n = 9), patients were more likely to present with cardiac arrest preceding ICU admission, and to have brain death subsequently. Trauma deaths typically affected healthy boys and not involving any pathogens. There was no gunshot or asthma death. Postmortem examination was performed in 30 % deaths. Conclusions: Death in the PICU is a heterogeneous event that involves infants and children of both genders. These patients may have a premorbid condition but healthy children are not spared. Infections are important associations only in non-traumatic PICU mortality. Nearly half of the patients did not receive active resuscitation against medical futility in honor of caregivers' wishes.

2328. Hong, K., et al. (2021). "Patterns of Pediatric Facial Fractures." Craniomaxillofacial Trauma and Reconstruction.

Objective: The aim of this study was to assess patterns of maxillofacial trauma in the pediatric population in Atlanta. This information is important to help guide management and allocate resources for treatment of maxillofacial injuries at Children's Healthcare of Atlanta (CHOA). Methods: This study was a retrospective chart review of children who presented from 2006 to 2015. Inclusion criteria were: (1) age 18 years old or younger, (2) presentation to emergency department, (3) diagnosis of maxillofacial fractures, and (4) evaluation by Oral and Maxillofacial Surgery, Otolaryngology, or Plastic Surgery services. Medical records were reviewed to record demographic, mechanism of injury, fracture location, and yearly incidence of injury. Descriptive statistics were computed to summarize findings and overall trends. Results: During the study period, 39,833 patients were identified. Of them, 1995 met the inclusion criteria. The majority were male (n = 1359, 68%) with an average age of 9.4 years old (range of 1 month to 18 years old). Mechanisms of injury were motor vehicle collisions (MVC) (n = 597, 29.9%), fall (n = 565, 28.3%), sports injury (n = 317, 15.9%), pedestrian struck (n = 215, 10.8%), assault/abuse (n = 204, 10.2%), other (n = 81, 4.1%), or gunshot wound (n = 16, 0.8%). Fracture sites were mandible (n = 519, 26%), complex (n = 479, 24%), nasal (n = 419, 21%), dentoalveolar (n = 279, 14%), orbital (n = 259, 13%), and maxilla (n = 40, 2%). Males had a higher incidence of assault than females (n = 185, 91% of assaults). The incidence of maxillofacial trauma increased with age with a peak incidence in 13 to 16-year-olds (n = 566, 28.3%). During the years examined, there was an upward trend in MVCs as the etiology with a peak incidence of facial fractures due to MVCs occurring in 2015. All other mechanisms remained constant during this time period. Conclusions: There was an increase in pediatric facial fractures secondary to motor vehicle collisions from 2007 to 2015 despite improvements in regulations, traffic safety, and technology.

2329. Hong, M. H., et al. (2017). "YH25448, a highly selective 3rd generation EGFR TKI, exhibits superior survival over osimertinib in animal model with brain metastases from NSCLC." Journal of Thoracic Oncology **12**(1): S1265-S1266.

Background: Currently-available EGFR TKIs are ineffective for the treatment of brain metastases (BrM) due to limited blood-brain barrier (BBB) penetration. YH25448 is a potent, highly mutant-selective and irreversible 3rd generation EGFR TKI that is able to penetrate the BBB, and targets both the T790M mutation and activating EGFR mutations while sparing wild type (wt). Methods: The biochemical and pharmacological activity of YH25448 were characterized through in vitro kinase assays, and functional cell assays. The animal model with brain metastases from NSCLC was established by implanting luciferase-transfected NCI-H1975 human NSCLC cells carrying the L858R/T790M mutation both subcutaneously and intracranially into nude mice. In this animal model, YH25448 was compared with osimertinib in terms of tumor growth inhibition, survival, weight loss and clinical signs. The correlation of PK profiles (plasma, CSF and tumor tissues) with biological activity using inhibition of EGFR phosphorylation (pEGFR) in the tumor tissue was evaluated. Results: YH25448 selectively inhibited EGFR single and double mutant kinase activity with IC50

values of 2 nM for L858R/T790M against 76 nM for wt-EGFR. In the cell proliferation assays, GI50 values were 6 nM, 5 nM, and 711 nM for H1975 cells (L858R/T790M), PC9 cells (del19) and H2073 cells (wt), respectively. In primary cancer cells from patients harboring EGFR mutations, YH25448 showed more potent inhibition of cancer cell growth compared to osimertinib. YH25448 treatment at the once-daily doses of 1-25 mg/kg resulted in dosedependent tumor regression in both subcutaneous and intracranial lesions in mice implanted with H1975 cells. Given its high selectivity against wild type and wide safety margin, there were no changes in body weight and no abnormal clinical signs. At 10-25 mg/kg, YH25448 achieved more significant, complete tumor growth inhibition and longer overall survival compared to same doses of osimertinib. Dose-dependent inhibition of pEGFR expression in tumor tissue by YH25448 treatment was well translated into the in vivo efficacy. Plasma half-life of YH25448 was 5.9-6.8 hr and tumor to plasma AUC0-last ratio was 3.0-5.1. YH25448 also showed excellent penetration of the BBB, achieving CSF concentrations exceeding the IC50 value for pEGFR inhibition. Conclusion: The strong in vitro potency and high selectivity of YH25448 for mutant EGFR translated into robust in vivo efficacy. These findings indicate that YH25448 will be able to address the urgent unmet needs for EGFR mutant-positive patients with brain metastases.

2330. Hoogerwerf, N., et al. (2013). "Benefit of Helicopter Emergency Medical Services on trauma patient mortality in the Netherlands?" Injury **44**(2): 274-275.

2331. Hoover, D. A. and A. Mahmood (2001). "Ossification of autologous pericranium used in duraplasty. Case report." Journal of neurosurgery **95**(2): 350-352.

Pericranium is frequently used in duraplasty and is considered superior to the many other alternatives because of its easy availability and because it offers a watertight dural closure while minimizing the problems of adhesion, infection, and rejection. Although the osteogenic potential of all periosteal tissues is recognized, a review of the literature did not reveal a reported case of osseous formation following use of pericranium for duraplasty. The authors report the case of a 17-year-old man who presented with a self-inflicted gunshot wound to the head. He was obtunded, but moving all extremities purposefully. Computerized tomography scanning demonstrated bifrontal injury. A bicoronal craniotomy with debridement was performed on an emergency basis, with vascularized pericranium used for a duraplasty. Follow-up cranioplasty demonstrated significant ossification of the pericranium 5 months after the original surgery. Pericranium is an attractive material for duraplasty; however, its osteogenic potential may interfere with future cranioplasty and cosmesis. This may be especially relevant in young persons.

2332. Hoppe, I. C., et al. (2014). "Pediatric facial fractures as a result of gunshot injuries: an examination of associated injuries and trends in management." The Journal of craniofacial surgery **25**(2): 400-405.

INTRODUCTION: Facial fractures are relatively uncommon in the pediatric population, especially those inflicted as a result of interpersonal violence in the form of gunshot injuries. Few studies have examined the unique management of such high-energy injuries in the pediatric population. Oftentimes the resultant damage to soft tissue and bony structures is so great that it challenges the previously accepted standards in the management of pediatric facial fractures. This study will examine a level 1 trauma center's experience with these unique injuries., METHODS: A retrospective review of all facial fractures occurring in a pediatric population (those 18 years of age or younger) as a result of gunshot wounds in a level 1 trauma center in an urban environment was performed for the years 2000 to 2012. Descriptive information was collected regarding each case as well as information regarding concomitant injuries, treatment modalities, and selected outcomes., RESULTS: During this time period, there were 3147 facial fractures treated at our institution, 353 of which were in pediatric patients. Of these, 17 were the results of gunshot wounds. Three patients were excluded due to insufficient data, leaving a total of 14 patients. The average age of patients was 16.5 (range 14-18); all patients were African-American males. The most common fracture was that of the mandible (n = 10), with 2 of those patients exhibiting panfacial fractures. The average Glasgow Coma Scale on admission was 13.5 (range 3-15). Six of the patients were intubated in the emergency department. The most common concomitant injury was a skull fracture (n = 3), followed by cervical spine fractures (n = 2) and intracranial hemorrhages (n = 2). All patients were admitted to the hospital for reasons other than fracture management. Seven patients ultimately went to the operating room for fracture management. The treatment modalities employed were conservative management with closed techniques (n = 11), rigid internal fixation (n = 2), and the use of an external fixator device (n = 1). Minimal to no soft-tissue debridement was performed in 10 of the 14 patients, 2 of which presented between 6 months and 10 years

post-injury with soft-tissue complications related to retained material. The mean hospital length of stay was 8.2 days (range 1-18 days). One patient expired., DISCUSSION: Pediatric facial fractures as a result of gunshot wounds represent a unique and fortunately rare entity that presents a challenge to all disciplines involved in treatment. In our patients, there was a tendency towards conservative management, with only 3 patients undergoing some form of fixation and only 7 undergoing some form of operative debridement. Concomitant injuries and the high-energy nature of gunshot wounds often preclude traditional management with rigid fixation to ensure adequate bony healing. However, it is important to adequately debride devitalized soft tissue and remove all foreign material to avoid future soft tissue-related complications.

2333. Horan, J., et al. (2019). "Transient Incomplete Locked-In Syndrome Secondary to Supratentorial Gunshot Wound." World neurosurgery **126**: 560-563.

BACKGROUND: Locked-in syndrome (LIS) is a rare neurologic disorder characterized as quadriplegia with anarthria. The diagnosis of LIS is challenging and requires a high index of suspicion. The syndrome is typically caused by an infratentorial lesion to the ventral pons, regardless of etiology. LIS secondary to supratentorial injury is extremely rare, and to our knowledge, this is the first reported case., CASE DESCRIPTION: We report the case of a 26-year-old woman who sustained a gunshot to the left suboccipital area, with supratentorial extension. A diagnosis of incomplete LIS was made on the day of admission, with eye movement preservation. Imaging studies confirmed bilateral injury of the motor homunculus. The clinical course was that of progressive improvement, aided by intensive care unit (ICU) supportive care and early physiotherapy rehabilitation. Her condition improved, and she was discharged to a rehabilitation facility at the end of week 7 postadmission., CONCLUSIONS: This is a unique case of incomplete LIS after supratentorial injury. Initial ICU care and early rehabilitation likely played a major role in the full recovery of this patient. The influence of etiology and site of injury on outcome prognosis is also suggested. Although severe diffuse brain injury may occur in the face of an unremarkable computed tomography (CT) scan, the emerging role of magnetic resonance imaging in optimally evaluating traumatic brain injury with discordant clinical and CT information is highlighted and is useful in cases of LIS where prognosis prediction is important.

2334. Hori, A. and H. Akiyama (2012). "Rare head trauma. Report 1: Gunshot wound." Neuropathology **32**(3): 328.

Seven autopsy cases of gunshot wound were analyzed in three groups. Group 1: Acute death (3cases), group 2: two subacute cases, and group 3: two survived cases and death through unrelevant diseases. In Group 1, multiple/diffuse cortical contusion lesions were found, probably due to peracute swelling of the brain by the flying bullet. Eosinophilic neuronal degeneration could be found at the perifocal area of the injury. The main finding in Group 2 was a bacterial infection. In Group 3, the lesion was not different from the conventional scar formation of the brain. Due to different chronological course of the individual cases, microglial and macroglial reaction was different from each other. This fact suggests the forensic usefulness of the chronological pathology.

2335. Horowitz, M. B., et al. (1999). "Multidisciplinary approach to traumatic intracranial aneurysms secondary to shotgun and handgun wounds." Surgical neurology **51**(1): 31-32.

BACKGROUND: Traumatic intracranial aneurysms (TICAs) may develop following gunshot injuries to the head. Management of these lesions often combines various aspects of microneurosurgical and endovascular techniques to safely repair or obliterate vessel defects., METHODS: We reviewed our experience over the last 18 years and identified five cases of intracranial aneurysms following gunshot and handgun wounds that were treated surgically and/or endovascularly., RESULTS: All patients had successful obliteration of their lesions using a variety of therapeutic modalities aimed at preserving neurologic function while at the same time eliminating the aneurysm from the circulation., CONCLUSION: Both microneurosurgery and endovascular surgery have important roles to play in the management of TICAs. In some cases, both methods can be combined to eliminate lesions and maximize patient recovery in a safe, efficient, and effective fashion.

2336. Horton, J. C., et al. (1996). "Confirmation by magnetic resonance imaging of optic nerve injury after retrobulbar anesthesia." Archives of ophthalmology (Chicago, Ill. : 1960) **114**(3): 351-353.

2337. Horvat, A., et al. (2001). "A novel role for protein tyrosine phosphatase shp1 in controlling glial activation in the normal and injured nervous system." The Journal of neuroscience : the official journal of the Society for Neuroscience **21**(3): 865-874.

Tyrosine phosphorylation regulated by protein tyrosine kinases and phosphatases plays an important role in the activation of glial cells. Here we examined the expression of intracellular protein tyrosine phosphatase SHP1 in the normal and injured adult rat and mouse CNS. Our study showed that in the intact CNS, SHP1 was expressed in astrocytes as well as in pyramidal cells in hippocampus and cortex. Axotomy of peripheral nerves and direct cortical lesion led to a massive upregulation of SHP1 in activated microglia and astrocytes, whereas the neuronal expression of SHP1 was not affected. In vitro experiments revealed that in astrocytes, SHP1 associates with epidermal growth factor (EGF)-receptor, whereas in microglia, SHP1 associates with colony-stimulating factor (CSF)-1-receptor. In postnatal and adult moth-eaten viable (me(v)/me(v)) mice, which are characterized by reduced SHP1 activity, a strong increase in reactive astrocytes, defined by GFAP immunoreactivity, was observed throughout the intact CNS, whereas neither the morphology nor the number of microglial cells appeared modified. Absence of (3)[H]-thymidine-labeled nuclei indicated that astrocytic proliferation does not occur. In response to injury, cell number as well as proliferation of microglia were reduced in me(v)/me(v) mice, whereas the posttraumatic astrocytic reaction did not differ from wild-type littermates. The majority of activated microglia in mutant mice showed rounded and ameboid morphology. However, the regeneration rate after facial nerve injury in me(v)/me(v) mice was similar to that in wild-type littermates. These results emphasize that SHP1 as a part of different signaling pathways plays an important role in the global regulation of astrocytic and microglial activation in the normal and injured CNS.

2338. Hosein, K. K., et al. (2013). "Engraftment of fetal cell transplants in rat model of penetrating brain injury-a “proof of concept” study." Journal of neurotrauma **30**(15): A90.

Introduction In the US, over 1.7 million traumatic brain injury (TBI) cases occur annually. Treatments to ameliorate chronic brain damage after severe TBI do not exist. The purpose of this study was to assess longitudinal survival of genetically modified fetal rat precursor cells transplanted into rat brains following penetrating ballistic-like brain injury (PBBI). Methods Male Sprague-Dawley rats were subjected to unilateral frontal PBBI (10% injury severity). Fetal cortical neural precursor cells (NPCs) were isolotated from D14 rat embryos and lentivirally doubletransduced to express green fluorescent protein and multineurotrophin (GFP/MNTS1). GFP/MNTS1-positive NPCs (400,000 cells in 4ll of stem cell media) were stereotactically microinjected into the injured penumbra. Animals were immunosuppressed with cyclosporine A for the duration of the study and perfusion-fixed at either 1, 6 or 8 weeks post-transplant. The brains were sectioned on a freezing microtome and processed for mature neuronal NeuN and glial GFAP markers using immunofluorescent labeling. Quantitative (unbiased stereology) and confocal microscopy was used to assess NPC transplant survival, neurite outgrowth, and phenotypic differentiation. Results The NPC transplants produced a robust graft spanning a millimeter square (mm2). Engrafted NPC neurite lengths were ∼150lm at 1 week post-transplant. However, by 8 weeks post they displayed elongated extensions out to ∼3 millimeters from the transplant site and showed maximal engraftment of the lesion site. Notably, numerous varicosities were observed on the dendritic processes of the transplanted cells, suggestive of synaptic densities on neurites. The majority of the grafted NPCs were NeuN positive while a few labeled ambiguously with GFAP. Unbiased stereology (calibrated to mean section 30 lm thickness) demonstrated an increase in the estimated population of surviving GFP-positive NPCs from 1 week (22,000) to 8 weeks post-transplant (∼42,000). The volume of the GFP signal increased ∼4-fold over the 8 weeks. Conclusions This pilot study suggests that PBBI brains are conducive to NPC transplants out to 8 weeks post-njury. In addition, the GFP/MNTSpositive NPC transplants survived well, exhibited a strong proliferative profile and a propensity towards a neuronal phenotype in response to severe TBI. Although the NPC transplants did not appear to be migratory, the prolific growth of the neurites and varicosities suggest a capacity for synaptic connections that warrants further investigation.

2339. Hoshide, R., et al. (2018). "Management of Through-and-Through Penetrating Skull Injury: A Railroad Spike That Transgressed the Anterior Skull Base." World neurosurgery **110**: 65-70.

BACKGROUND: Penetrating injuries involving foreign objects that transgress the entirety of the human skull present challenges in the management of vascular injuries, infectious risk, cerebrospinal fluid leak, and cosmetic repair. Ultimately, effective management of these injuries requires a multidisciplinary team and judicious surgical planning., CASE DESCRIPTION: Here we present the treatment of a patient who experienced a penetrating injury from a railroad

spike, with entry and exit points involving the left and right anterior aspects of the temporal fossa, respectively., CONCLUSIONS: The rationale for management decisions is reviewed in the context of the published literature.

2340. Hoshmand, M., et al. (2013). "Intraorbital foreign bodies: Diagnosis, management and imaging mimics." Emergency radiology **20**(5): 363.

Purpose/Aim: - Understand the clinical presentation of intraorbital foreign bodies (IOFBs) and importance of accurate diagnosis - Recognize the imaging features of different types of IOFBs mainly on computed tomography - Become familiar with the complications and ocular comorbidities associated with IOFBs - Learn about the surgical management of IOFBs - Recognize imaging mimics of IOFBs Background: Intraorbital foreign bodies are an important cause of ocular morbidity especially in the younger population. They may occur in various settings including high velocity injury such as gunshot wounds, from glass fragments or minor trauma such as wood stick or pencil penetration. Intraorbital foreign bodies may or may not be well tolerated based on the nature of the object. Surgical removal depends on the nature of IOFB, its location within the orbit, and associated injuries or complications. Content Organization: - Background - Learning objectives - Orbital foreign bodies - Metallic versus nonmetallic objects: Case-based demonstration - Surgical Indications and postoperative findings: Case-based demonstration - Complications: Discuss examples including infection, abscess, and fistula - Ocular comorbidities: Discuss and illustrate cases of IOFB comorbidities such as orbital bone fracture, globe rupture, and corneal and retinal hemorrhage, extraoccular muscle injury and optic nerve injury - Differential diagnosis: Cover imaging mimics of IOFBs such including surgical material, Drusen bodies, dislocated prosthetic lens, arcus senilis, and trochlear apparatus calcifications - Summary Summary/Conclusion: Computed tomography is the most sensitive imaging modality for detection of metallic and glass intraorbital foreign bodies. Dry wood is harder to detect on CTandmay be confused with air column. If there is a suspicion of wooden foreign body, MRI can be pursued if initial CT is negative. Organic foreign bodies are more likely to induce cellulitis and abscess. The type of foreign body and its location within the orbit guides surgical decisions. Entities that can mimic foreign bodies in the orbit include surgical devices, Dursen bodies, phthisis bulbi, arcus senilis and trochlear apparatus calcifications which have typical imaging characteristic that allow their differentiation from foreign bodies.

2341. Hossain, S., et al. (2016). "Prevalence of post-concussion symptoms in an Asian country; Base rates and the effects of mild traumatic brain injury." Brain injury **30**(5-6): 618-619.

Objectives: To develop a Bengali version of the Rivermead Post Concussion Symptom Questionnaire (RPCSQ) and use this in Bangladesh to ascertain base rates of symptoms in a normal sample and to investigate the effects of mild traumatic brain injury (MTBI), with a view to clarifying the aetiological basis of post-concussional symptoms. Methods: The Bengali RPCSQ was developed using backtranslation procedures; a 16-item checklist using a 5-point scale of symptom severity relative to previous status. Group results are typically expressed as the percentage symptomatic on a particular item. Four groups comprised 524 participants, 18 years of age or older with no history of neurological disorder, substance abuse or significant psychiatric disorder: Mild Traumatic Brain Injury (MTBI; n = 124, mean age = 34.2 years, 85% males), seen 7-14 days post-accident; Orthopaedic Patient Controls (PC; n = 84, age = 34.2 years, 81% males), seen 7-14 days post-accident; Normal Controls (NC; n = 272, age = 29.25 years, 67% males) with no recent history of accident or injury; Previous TBI (pTBI, n = 44, age = 27.6 years, 64% males) who were approached to be normal controls but were found to have had previous TBIs. Results: Cronbach's Alpha was 0.93, item-total correlations ranging from 0.31-0.81. Of the MTBI group 27% were illiterate or just literate. The mechanism of injury included assault (32%), struck by falling or flying objects (23%), pedestrian struck by a vehicle (23%) and accident while in a vehicle (19%). On average, 44% of the MTBI group and 42% of the PC group was symptomatic on each item. Both behavioural and cognitive symptoms were common in both groups, e. g. 59.7% of MTBI and 58.3% of PC reported fatigue, 45.2% in both groups reported being irritable and 40.3% and 48.8% reported taking longer to think. NC yielded the lowest symptom rates on 10 of the 16 items, but still an average of 37.9% were symptomatic on each item. NC ratings on cognitive symptoms at least matched those of MTBI, e. g. 43.4% vs 37.9% on forgetfulness, 49.3% vs 41.5% on poor concentration and 51.5% vs 40.3% on taking longer to think. MTBI patients and normal controls in Bangladesh were both approximately twice as symptomatic as TBI patients in the UK and US (where an average of only 14-31% are symptomatic on each item). Conclusions: The experience of post-concussion symptoms is not caused by brain injury; it is a non-specific response to injury and life stresses. The clinical management of post-concussion symptoms after mild

brain injury should focus on addressing adjustment rather than provision of brain injury rehabilitation. There are culturally determined ways of expressing adjustment issues and this will influence symptom base rates and again will need to be taken into account in clinical management.

2342. Hossfeld, B., et al. (2014). "[Primary treatment of penetrating injuries. Part 1: blast trauma]." Primarversorgung penetrierender Verletzungen. Teil 1: Explosionstrauma. **63**(5): 439-450.

Blast injuries may result from a variety of causes but the biomechanical impact and pathophysiological consequences do not differ between domestic or industrial accidents or even terrorist attacks. However, this differentiation relevantly affects the tactical procedures of the rescue teams. Focusing on further detonations, top priority is given to the personal safety of all rescue workers. The rareness of blast injuries in a civilian setting results in a lack of experience on the one hand but on the other hand the complexity of blast injuries to the human body places high demands on the knowledge and skills of the entire rescue team for competent treatment. The purpose of this article is to explain the physicochemical principles of explosions and to convey tactical and medical knowledge to emergency medical services.

2343. Hotz, G., et al. (2001). "Development of the pediatric test of brain injury." The Journal of head trauma rehabilitation **16**(5): 426-440.

OBJECTIVE: The Pediatric Test of Traumatic Brain Injury (PTBI) (currently in its research edition) is a tool for assessing the cognitive-linguistic skills of school-aged children and adolescents in acute care and rehabilitation settings after traumatic brain injury. Development of the PTBI was motivated by the fact that, to date, no standardized test has been available to assess the full range of cognitive-linguistic impairments associated with pediatric brain injury. In this article we describe how the research edition of the PTBI was developed, provide rationale for the areas of assessment, discuss a plan for standardization, and illustrate its use with three children with TBI., DESIGN: The PTBI was constructed to sample the attention, memory, language, reading, writing, metalinguistic, and metacognitive skills that are particularly at risk in pediatric brain injury and that are relevant to the general education curriculum., MATERIAL: The test material for the PTBI was selected on the basis of clinical and experimental evidence that children and adolescents with TBI demonstrate a wide range of cognitive and language deficits. These first appear in the early stages of recovery and often persist but change over time., CONCLUSION: Our goal is to standardize the PTBI so it can be used to establish baseline behaviors and track cognitive-linguistic recovery.

2344. Hotz, G. A., et al. (2000). "Neurobehavioural outcomes of penetrating and tangential gunshot wounds to the head." Brain injury **14**(7): 649-657.

OBJECTIVE: The objective of this study was to compare penetrating and tangential gunshot wounds to the head with regards to demographic, neurobehavioural and clinical outcome measures., METHODS: Twenty-nine patients with penetrating gunshot wounds (P-GSW) and 11 patients with tangential gunshot wound (T-GSW) to the head admitted to an acute neurotrauma service were compared using standardized neurobehavioural and clinical outcome measures., RESULTS: The mean GCS was 10.5 +/- 0.79 for the P-GSW group and 13.4 +/- 0.72 for the T-GSW group. The mean AIS-CNS for the P-GSW group was 5.00 +/- 0 and for the T-GSW group was 3.7 +/- 0.27. Significance was found on Digit Span ($p < 0.05$) and Block Design ($p < 0.009$) subtests. Outcomes between the two groups were similar, except for significant differences were found for acute length of stay (LOS) (P-GSW was 47.72 +/- 13.2 and T-GSW group was 13.0 +/- 1.3, $p = 0.005$) and for acute care charges (P-GSW group was $150,533 +/- 23,834 and T-GSW group was $70,712 +/- 16,587, $p = 0.05$)., CONCLUSIONS: Initially, a penetrating gunshot wound is a more severe and costly injury than a tangential gunshot wound to the head, however T-GSW possess significant deficits and, if the patient survives past the acute phase of recovery, the two groups have similar functional outcomes. Future standard classification, neuropsychological, and clinical outcome measures.

2345. Howaldt, H. P., et al. (1994). "Transnasal approach to the orbit, the interorbital space, and the nasopharynx." The Journal of craniofacial surgery **5**(2): 130-135.

We present a surgical procedure that provides exposure to the medial part of the orbit, the interorbital space, and the nasopharynx. A midline incision of the nose is followed by a pedicled osteotomy of the lateral nasal wall and the

medial wall of the orbit in one piece. This transnasal approach provides good exposure to the medial parts of the craniofacial junction to remove foreign bodies or benign tumors.

2346. Hoz, S. S., et al. (2020). "Fatal Penetrating Head Injuries Caused by Projectile Tear-Gas Canisters." Clinical neurosurgery **67**(SUPPL 1): 151.

INTRODUCTION: Since their advent in the 1920s, tear gas canisters have been frequently used in crowd-control. Previous studies have focused on their chemical toxicities on the eyes, skin, and respiratory system. Few case reports have documented non-penetrating injuries attributed directly to the tear gas canisters (TGC). METHODS: We conducted a retrospective medical chart review of all the patients who were admitted to the Neurosurgery Teaching Hospital (NTH) since the start of the anti-government protests (October/2019). All patients who suffered a penetrating head trauma caused by the TGC were included in our study. We collected variables such as patients' demographics, wound location, neurological exam, head CT scan findings, surgical management and clinical outcomes. RESULTS: We documented 10 cases of penetrating head trauma caused by the TGC. All victims were males, with a mean age of 16 years (rang = 14- 19 years). The TGCs penetrated the skull in all patients. The mean GCS was 7 (range of 3-10). The neurological examination revealed unilateral hemiplegia/hemiparesis and pupillary defect in 40% (N = 4) and 50% (N = 5) of the patients, respectively. Head CT scans revealed an extensive pattern of brain damage. The TGCs crossed the midline in 40% of the cases (N = 4) and assumed a complete intracranial location in 20% (N = 2). Surgical intervention which included removal of the TGCs, debridement of both brain and skin, and hemostasis was achieved in 70% of the patients (N = 7). The in-hospital mortality rate was 100% (N = 10), with all fatalities occurring within (1-3) days of admission. CONCLUSION: Our findings demonstrate that, when fired directly at the head, tear gas weapons have significant potential to inflict serious injuries and death. For penetrating head injuries related to TGC, the mortality rate can be extremely high. Consequently, strict international guidelines are required before the use of these weapons can be condoned again.

2347. Hoz, S. S., et al. (2020). "Fatal Penetrating Head Injuries Caused by Projectile Tear Gas Canisters." World neurosurgery **138**: e119-e123.

BACKGROUND: Since their advent in the 1920s, tear gas canisters (TGCs) have been frequently used in crowd control. Few reports have documented nonpenetrating injuries attributed directly to TGCs. In this study, we report a case series of fatal penetrating head injuries caused by TGCs., METHODS: We conducted a retrospective chart review of all the patients who were admitted to the Neurosurgery Teaching Hospital in Baghdad, Iraq, since the start of the antigovernment protests (October 2019). All patients who suffered penetrating head trauma caused by TGCs were included in our study. We collected patient demographics, wound location, neurologic examination, computed tomography (CT) scan findings, surgical management, and clinical outcomes., RESULTS: We found 10 cases of penetrating head trauma caused by TGCs. All victims were men, with a mean age of 16 years (range, 14-19 years). The mean Glasgow Coma Scale score was 7 (range, 3-10). The neurologic examination revealed unilateral hemiplegia/hemiparesis and pupillary abnormality in 40% (n = 4) and 50% (n = 5) of the patients, respectively. CT scans revealed an extensive pattern of brain damage. Surgical intervention was done in 80% of cases (n = 8), which included removal of the TGC, wound debridement, and hemostasis. The in-hospital mortality rate was 100% (N = 10), with all fatalities occurring within 1-3 days of admission., CONCLUSIONS: TGCs have the potential to cause lethal penetrating head injuries, calling for a reevaluation of their safety and methods of use in terms of human health.

2348. Hoz, S. S., et al. (2021). "Careening intracranial bullets: An existing entity?" Surgical neurology international **12**.

2349. Hozumi, I., et al. (1990). "GFAP mRNA levels following stab wounds in rat brain." Brain research **534**(1-2): 291-294.

We previously reported that glial fibrillary acidic protein (GFAP) levels increased significantly at 3 days after stab wounds, relative to sham-operated controls, reaching a maximum of 200% of control value at 5-7 days. They then fell to near-normal values by 21 days. To determine whether these protein changes correlated with changes in GFAP mRNA we performed Northern blot analyses. Total RNA, isolated from lesioned, sham-operated and intact rat forebrains, was hybridized with 32P-labeled mouse GFAP cDNA and quantified by densitometry. The maximum increase in total RNA content in lesioned animals was only 20% over controls at 12 h. GFAP mRNA levels increased to 2-fold control values at 6

h and reached 5-fold at 12 h. Thereafter they remained at 3.5- to 6-fold until 5 days and then declined to 1.5-fold by 21 days. The rapid increase of GFAP message at 12 h preceded a significant increase in GFAP by 2 days and the decrease of message after 5 days was more precipitate than the slow decrease in GFAP content. Sham-operated animals showed no significant changes in GFAP mRNA, compared to intact controls, during the period 3 h to 14 days postoperation. GFAP mRNA and GFAP in the stab-wound model reached levels similar to those found in the experimental autoimmune encephalomyelitis (EAE) model, but returned to normal much more rapidly.

2350. Hozumi, I., et al. (1996). "Immunoreactivity of growth inhibitory factor in normal rat brain and after stab wounds--an immunocytochemical study using confocal laser scan microscope." Brain research **741**(1-2): 197-204.

The growth inhibitor factor (GIF) is a new member of the metallothionein family that is downregulated in Alzheimer's disease brain. Using a confocal laser scan microscope with polyclonal and monoclonal antibodies to GIF, and monoclonal antibodies to glial fibrillary acidic protein (GFAP) and MAP-2, we demonstrated that GIF immunoreactivity was expressed primarily in astrocytes and much less in neurons. In astrocytes of normal rat brain GIF immunoreactivity was detected mainly in the cell bodies, while GFAP immunoreactivity was detected mainly in the processes. GIF immunoreactivity was more strongly expressed in reactive astrocytes. These findings were confirmed with both polyclonal and monoclonal antibodies. Following stab wounds, a number of GIF-positive reactive astrocytes were detected around the wounds at 3 days postoperation. After 7 days GIF immunoreactivity was detected in cell bodies and processes of reactive astrocytes. The number of GIF-positive astrocytes and the intensity of the immunoreactivity remained elevated over the control levels at least through 28 days. These immunocytochemical findings correlated well with changes in GIF protein and mRNA levels. Not only changes in GIF protein and mRNA levels but also intracellular localization of GIF in normal rat brain and after stab wounds in rat brain were different from those of GFAP. These results support the concept that GIF plays an important role in the processing of reconstruction after brain damage.

2351. Hsieh, C.-C., et al. (2021). "A Case of Penetrating Head Wound Due to Helicopter Rotor Blade Injury in a 34-Year-Old Naval Helicopter Pilot Who Returned to Active Service 5 Years Later." The American journal of case reports **22**: e933862.

BACKGROUND Head trauma, defined as damage to the brain, skull, or scalp when the head is hit by an external force, is a major cause of mortality in military personnel. Therefore, we report a novel case involving a naval helicopter pilot who sustained a helicopter propeller rotor blade injury. CASE REPORT We describe a case involving a pilot struck on the head by a helicopter rotor blade. He received care from medical staff shortly after the injury and was en route to the nearest trauma center. Cranial computed tomography (CT) scans revealed a comminuted fracture of the right occipital bone, with bone fragment retention in the right cerebral hemispheres. We performed an emergency right occipital craniotomy. The visual field patterns demonstrated right homonymous hemianopia when the patient was discharged. The patient underwent delayed titanium mesh cranioplasty about 3 months after the right occipital craniotomy. From discharge to 5 years, the patient had performed rehabilitation exercise for at least 3 days every week. The patient's continued recovery was confirmed at the 5-year follow-up in 2019. The bilateral visual acuity was 20/20, and the right homonymous hemianopia problem also disappeared. In the same year, after a physical and psychological assessment by an aviation doctor, he was able to resume flying. CONCLUSIONS This report has shown that despite safety regulations for military and civilian helicopter personnel, which include the wearing of helmets, helicopter rotor blade injuries still occur and can have long-term consequences due to the severity of head injury.

2352. Hsu, C. Y. and S. J. Wang (1994). "CSF leakage into the orbit demonstrated by Tc-99m DTPA cisternography." Clinical nuclear medicine **19**(5): 463.

2353. Hu, B., et al. (2019). "Brain Abscess with Intracranial Bone Fragment Migration." World neurosurgery **125**: 327-328.

Penetrating brain injury is 1 type of traumatic brain injury. Brain abscess is a common complication after penetrating brain injury, and fragments increase the risk of occurrence of brain abscess. It is uncommon to see the migration of bone fragments in the brain in clinical cases. We report a rare case of brain abscess with migration of bone fragments after traumatic brain injury.

2354. Hu, C.-F., et al. (2013). "Current approaches to the treatment of head injury in children." Pediatrics and neonatology **54**(2): 73-81.

Head trauma is one of the most challenging fields of traumatology and demands immediate attention and intervention by first-line clinicians. Symptoms can vary from victim to victim and according to the victim's age, leading to difficulties in making timely and accurate decisions at the point of care. In children, falls, accidents while playing, sports injuries, and abuse are the major causes of head trauma. Traffic accidents are the main cause of disability and death in adolescents and adults. Injury sites include facial bones, muscles, ligaments, vessels, joints, nerves, and focal or whole-brain injuries. Of particular importance are cranial and intracranial injuries. A closed injury occurs when the head suddenly and violently hits an object but the object does not break through the skull. A penetrating injury occurs when an object pierces the skull and affects the brain tissue. Early diagnosis and proper management are crucial to treat patients with potentially life-threatening head and neck trauma. In this review, we discuss the different cases of traumatic brain injury and summarize the current therapies and neuroprotective strategies as well as the related outcomes for children with traumatic brain injury. Copyright © 2012. Published by Elsevier B.V.

2355. Hu, N., et al. (2020). "Microbiology of acute hematogenous osteomyelitis in hospitalized children." Open forum infectious diseases **7**(SUPPL 1): S693.

Background. Acute hematogenous osteomyelitis affects 1 in 5,000 children in the U.S. and Staphylococcus aureus is the most common bacterial cause. At our institution, clindamycin is used empirically for osteomyelitis, despite increasing clindamycin-resistance over the years. The objective of this study is to describe microbiologic results and antibiotic resistance patterns in children hospitalized with acute hematogenous osteomyelitis. Methods. This was a single-center retrospective cohort study of patients < 21 years of age with acute osteomyelitis hospitalized between 1/1/2010 and 5/31/2019 at Children's National Hospital. We excluded patients with recent orthopedic surgery, hardware infection, penetrating trauma, or with an underlying immunocompromising condition. We performed chart review to collect data on location of infection; blood, synovial fluid, or surgical site cultures; culture results, and susceptibilities. Results. Of the 162 encounters of acute osteomyelitis that met inclusion criteria, the average patient age was 8.3 years. Lower extremity infections were most common (105, 64.8%), followed by upper extremity (31, 19.1%), pelvis (14, 8.6%), spine (7, 4.3%), shoulder (4, 2.5%), rib (1, 0.6%) and mandible (1, 0.6%). Almost half of cases (73, 45%) had no positive cultures, and 89 cases (55%) had at least one positive culture from blood or local source (Figure 1). The most common pathogen was methicillin susceptible S. aureus (MSSA) followed by methicillin resistant S. aureus (MRSA) comprising 60 (67%) and 19 (20%) of culture-positive infections respectively. Other isolated pathogens included S. pyogenes (5, 5.6%) Salmonella species (2, 2.2%), S. pneumoniae (1, 1.1%), S. agalactiae (1, 1.1%), and Kingella kingae (1, 1.1%) (Figure 1). Among S. aureus infections, 69 (87%) were susceptible to clindamycin (85% among MSSA, 95% among MRSA). Categorized Blood and Wound Culture Results Conclusion: Almost half of all children with acute hematogenous osteomyelitis did not have any microbiologic data to guide antibiotic usage. S. aureus was the most common (87%) isolate, with more MSSA (74%) than MRSA (24%). Non-S. aureus isolates were more likely to grow from surgical specimen cultures than from blood cultures. Clindamycin resistance was more commonly seen in MSSA than in MRSA osteomyelitis.

2356. Hu, R., et al. (2018). "Real-time computerised tomography assisted porous tantalum implant in ARCO stage I-II non-traumatic osteonecrosis of the femoral head: minimum five-year follow up." International orthopaedics **42**(7): 1535-1544.

PURPOSES: This study was established to investigate the medium-term clinical effect of real-time CT assisted porous tantalum implant for the treatment of ARCO stage I-II non-traumatic osteonecrosis of the femoral head (ONFH)., METHODS: This study comprised 24 ONFH patients (29 hips) who were treated with intra-operative real-time CT accurate rapid positioning assisted drilling decompression, lesion removal and porous tantalum implant. Harris score, VAS score and imaging in pre-operation and follow-up period were recorded., RESULTS: The average operative time and intra-operative blood loss were 72.6 min and 158.8 ml, respectively. The mean follow-up was 5.4 years. No femoral head penetrating, wound infection, and death occurred. Harris and VAS score improved significantly (73.78 vs. 88.11; 7.13 vs. 2.66) at last follow-up ($P < 0.05$). The functional improvement and pain relief rate was 100% at six months after operation. The effective rate was 86.21% at 12 months after operation and last follow-up. Five pre-operative ARCO stage

I hips had no radiographic progress. Meanwhile, four among the 24 ARCO stage II hips progressed into stage III between eight and 12 months after surgery, among which two progressed into stage IV and two remained in stage III at the last follow-up. The average value of Kerboul combined necrotic angle was 263.24degree. There was no progress in Kerboul combined necrotic angle among the grades 2 and 3 patients. However, among the six cases at grade 4, four cases with post-operative progress, two patients converted to THA., CONCLUSIONS: Our technique is safety and effective in the treatment of ARCO stage I-II non-traumatic ONFH.

2357. Hu, S., et al. (2009). "Trajectory reconstruction through analysis of trace evidence in bullet-intermediate target interaction by SEM/EDX." Journal of forensic sciences **54**(6): 1349-1352.

A young male was shot to death by a police officer with a Chinese Type 64 7.62 mm pistol when he was dealing with an aggravated assault arising from a traffic accident. By using scanning electron microscopy and energy dispersive X-ray spectroscopy (SEM/EDX), trace deposits on the discharged bullet and the intermediate target, i.e., a concrete telegraph pole at the scene, were identified to be from each other. The result demonstrated the bullet causing the death ricocheted from the concrete telegraph pole before striking the victim, thus indicating the incident was accidental. The case report illustrates the evidential value of trace materials derived, respectively, from discharged bullets and intermediate targets in bullet-intermediate target interaction for trajectory reconstruction. In addition, it indicates that the SEM/EDX method with its nondestructive nature, compared to other methods, may be more helpful in certain situations in determining the origins of trace evidentially valuable deposits on substrates.

2358. Hu, Y., et al. (2015). "Acute bilateral mass-occupying lesions in non-penetrating traumatic brain injury: a retrospective study." BMC surgery **15**: 6.

BACKGROUND: Traumatic acute bilateral mass-occupying lesions (TABML) is a common entity in head injury, with high morbidity and mortality. Our aim in this study was to evaluate the benefits of different treatment options and the outcome predictors in patients with TABML., METHODS: From October 2010 to November 2012, a consecutive cohort of patients aged 16-70 years with TABML were retrospectively analyzed based on the clinical and radiological characteristics. Patients with TABML were included if admitted within 24 h after injury and were excluded if they presented with infratentorial lesions, unilateral lesions within the first 24 h after injury, or penetrating head injury. According to their treatment option, patients were divided into three groups: a conservative treatment group, a unilateral surgery group, and a bilateral surgery group. Outcomes were assessed using the Glasgow Outcome Scale (GOS). Binary logistic regression analysis was applied to determine the outcome predictors., RESULTS: Forty-seven patients (58.8%) had severe injuries (Glasgow Coma Scale score (GCS), 3-8) upon admission, and the overall mortality was 31.3% at 6 months post-injury. The mortality was 55.6% in patients who underwent conservative treatment (N = 18), 17.9% in unilateral surgery patients (N = 39), and 34.8% in the bilateral surgery group (N = 23). In the surgical group, the mortality was 53.3% (8 of 15) in those with a GCS of 3-5, which decreased steeply to 14.9% (7 of 47) of those with GCS >= 6. On logistic regression analysis, the absence of pupillary reactivity, disappearances of basal cisterns and conservative treatment were related to higher mortality. A lower initial GCS score was associated with an unfavorable outcome. Midline shift tended to be associated with mortality and an unfavorable outcome, although statistical analysis did not show a significant difference., CONCLUSIONS: TABML is suggestive of severe brain injury. As conservative treatment is always associated with a poorer outcome, surgery is advocated, especially in patients with a GCS score of >= 6. Whereas the prognostic value of midline shift might be limited because of the counter-mass effect in TABML, the GCS score, the pupillary reactivity, and particularly, the compression of basal cisterns should be emphasized.

2359. Hu, Z., et al. (2020). "Human neural stem cell transplant location-dependent neuroprotection and motor deficit amelioration in rats with penetrating traumatic brain injury." The journal of trauma and acute care surgery **88**(4): 477-485.

BACKGROUND: Penetrating traumatic brain injury induces chronic inflammation that drives persistent tissue loss long after injury. Absence of endogenous reparative neurogenesis and effective neuroprotective therapies render injury-induced disability an unmet need. Cell replacement via neural stem cell transplantation could potentially rebuild the tissue and alleviate penetrating traumatic brain injury disability. The optimal transplant location remains to be determined., METHODS: To test if subacute human neural stem cell (hNSC) transplant location influences engraftment, lesion expansion, and motor deficits, rats (n = 10/group) were randomized to the following four groups (uninjured and

three injured): group 1 (Gr1), uninjured with cell transplants (sham+hNSCs), 1-week postunilateral penetrating traumatic brain injury, after establishing motor deficit; group 2 (Gr2), treated with vehicle (media, no cells); group 3 (Gr3), hNSCs transplanted into lesion core (intra); and group 4 (Gr4), hNSCs transplanted into tissue surrounding the lesion (peri). All animals were immunosuppressed for 12 weeks and euthanized following motor assessment., RESULTS: In Gr2, penetrating traumatic brain injury effect manifests as porencephalic cyst, 22.53 +/- 2.87 (% of intact hemisphere), with p value of <0.0001 compared with uninjured Gr1. Group 3 lesion volume at 17.44 +/- 2.11 did not differ significantly from Gr2 ($p = 0.36$), while Gr4 value, 9.17 +/- 1.53, differed significantly ($p = 0.0001$). Engraftment and neuronal differentiation were significantly lower in the uninjured Gr1 ($p < 0.05$), compared with injured groups. However, there were no differences between Gr3 and Gr4. Significant increase in cortical tissue sparing ($p = 0.03$), including motor cortex ($p = 0.005$) was observed in Gr4 but not Gr3. Presence of transplant within lesion or in penumbra attenuated motor deficit development ($p < 0.05$) compared with Gr2., CONCLUSION: In aggregate, injury milieu supports transplanted cell proliferation and differentiation independent of location. Unexpectedly, cortical sparing is transplant location dependent. Thus, apart from cell replacement and transplant mediated deficit amelioration, transplant location-dependent neuroprotection may be key to delaying onset or preventing development of injury-induced disability., LEVEL OF EVIDENCE: Preclinical study evaluation of therapeutic intervention, level VI.

2360. Hu, Z., et al. (2017). "Effect of human neural stem cell grafts on penetrating ballistic-like brain injury (PBBI) induced behavioral deficits." Journal of neurotrauma **34**(13): A20.

We previously reported amelioration of PBBI-induced cognitive deficits following engraftment of NSI-566 human neural stem cells (hNSC). However, the mechanism of such amelioration is unknown. To gain insights we hypothesized that transplant induced behavior modification will depend on transplant location, extent of tissue spared, numbers of cells engrafted derived processes. To test the hypothesis, one million green fluorescent protein (GFP) expressing hNSCs transplanted one week following injury either in the core of injured tissue (intralesional) or in undamaged tissue surrounding the core (perilesional). Same dose of cells were transplanted into an uninjured sham group to uncover hNSCs effects. The animals were tested after 12 weeks (by this time hNSC have been shown to undergo neuronal differentiation) in a standard Morris WaterMaze for acquisition (latency on day 5 after 4 days of training) and performance following spatial reversal (day 12). Linear regression to explore relationship between transplant location, lesion volume, cell numbers and latencies was assessed. Surprisingly there was no relationship between transplant location, extent of engraftment and latency to find platform. Similar analysis on additional parameters such as extent of GFP processes in corpus callosum and internal capsule will be presented to gain insights to the mechanism. These results are similar to those with bone marrow stem cell therapies in stroke patients.

2361. Huang, H.-M., et al. (2011). "Preventing iatrogenic injury from inadvertent intracranial migration of a urinary foley catheter while controlling profuse epistaxis after severe craniofacial trauma." The Journal of craniofacial surgery **22**(2): 748-749.

The massive nasopharyngeal bleeding that may accompany complicated comminuted fractures of the craniofacial bones can be controlled by pressure tamponade using an inflatable urinary Foley catheter. However, inadvertent intracranial catheter penetration poses a serious risk in such situations. Management of a relevant case is described, and a simple preventive measure is suggested.

2362. Huang, J., et al. (2017). "Successful management of a penetrating iron-rod injury through the oral cavity involving the posterior cranial fossa." Neurology India **65**(3): 666-668.

2363. Huang, S.-T., et al. (2020). "Early Application of Bevacizumab After Sclerocorneal Grafting for Patients With Severe Late-Stage Ocular Chemical Burns." Cornea **39**(6): 754-760.

PURPOSE: To investigate whether subconjunctival bevacizumab help prevent corneal graft neovascularization and prolong the graft survival of patients with chemical burns., METHODS: We performed a prospective nonrandomized comparative case series study. Twenty-six eyes received subconjunctival bevacizumab (10 mg/0.4 mL) once and topical immunosuppressive agents after sclerocorneal lamellar keratoplasty as the treatment, and 13 eyes received a topical immunosuppressant alone and served as the control group. The main outcomes were a cumulative probability of graft

survival, development of corneal neovascularization, and complications., RESULTS: The postoperative follow-up time was 14.3 months (range, 2-62 mo). The cumulative graft survival time was significantly longer in the treatment group than that in the control group (42.9 +/- 5.9 vs. 4.8 +/- 0.7 mo; log rank < 0.001). In the treatment group, 19 of the 26 grafts (73.1%) survived as transparent with a mean follow-up of 18.7 +/- 3.0 months. At the end of the follow-up, 4 grafts remained free of neovascularization, 2 developed edema without neovascularization, and 15 remained transparent with a stable ocular surface and some neovascular vessels in the peripheral transplant interface. The other 5 grafts became opaque and neovascularized. In the control group, all grafts became opaque and neovascularized within the follow-up period (5.5 +/- 0.7 mo). During the follow-up, a corneal epithelial defect developed in 9 eyes in the treatment group and 7 in the control group., CONCLUSIONS: Early application of subconjunctival bevacizumab after sclerocorneal lamellar keratoplasty can significantly prevent corneal neovascularization and promote graft survival for severe late-stage ocular chemical burns.

2364. Huang, T., et al. (2020). "Penetrating transorbital injury by a coloring pencil in a 3-year-old child: A case report." The Journal of international medical research **48**(3): 300060519886210.

A transorbital penetrating injury by a foreign body is an extremely rare type of injury, and its severity is often difficult to estimate by examination of the superficial wound alone. Thus, such injuries are challenging for neurosurgeons to investigate and manage. We herein present a peculiar case involving a 3-year-old girl with a penetrating transorbital skull-base injury caused by a coloring pencil and discuss the anatomical location of the foreign body, radiological examination findings, diagnosis, and treatment strategy. The pencil was completely removed by manual extraction. Follow-up investigations confirmed a good outcome. Multidisciplinary cooperation, radiological examination, correct diagnosis, timely treatment, and detailed follow-up studies are necessary to manage penetrating transorbital skull-base injuries caused by foreign bodies. The orbital walls are very thin in children, and the orbital roof and superior orbital fissure are often penetrated by foreign bodies in cases such as that described herein. The anatomical location of the foreign body influences the clinical management strategy.

2365. Huang, Y.-K., et al. (2010). "Traumatic pericardial effusion: impact of diagnostic and surgical approaches." Resuscitation **81**(12): 1682-1686.

INTRODUCTION: In trauma patients with chest injuries, traumatic pericardial effusion is an important scenario to consider because of its close linkage to cardiac injury. Even with advances in imaging, diagnosis remains a challenge and use of which surgical approach is controversial. This study reviews the treatment algorithm, surgical outcomes, and predictors of mortality for traumatic pericardial effusion., PATIENTS AND METHODS: Information on demographics, mechanisms of trauma, injury scores, diagnostic tools, surgical procedures, associated injuries, and hospital events were collected retrospectively from a tertiary trauma center., RESULTS: Between June 2003 and December 2009, 31 patients (23 males and 8 females) with a median age of 31 (range 16-77), who had undergone surgical drainage of pericardial effusion were enrolled in the study. Blunt trauma accounted for 27 (87.1%) insults, and penetrating injury accounted for 4 (12.9%). Patients were diagnosed by Focused Assessment with Sonography for Trauma (FAST) (8 patients), computerized tomography (7 patients), echocardiography (9 patients), and incidentally during surgery (7 patients). Notably, sixteen (51.7%) patients required surgical repair for traumatic cardiac ruptures, including 6 (19.6%) with pericardial defects who presented initially with hemothorax. The surgical approaches were subxiphoid in 8 patients (25.8%), thoracotomy in 7 (22.6%), and sternotomy in 19 (61.2%), including 3 conversions from thoracotomy. The survival to discharge rate was 77.4% (24/31). Concomitant cardiac repair, associated pericardial defects, and initial surgical approach did not affect survival, but the need for massive transfusion, cardiopulmonary cerebral resuscitation (CPCR), trauma score, and incidental discovery at surgery all had a significant impact on the outcome., CONCLUSIONS: Precise diagnoses of traumatic pericardial effusions are still challenging and easily omitted even with FAST, repeat cardiac echo and CT. The number of patients with traumatic pericardial effusion requiring surgical repair is high. Standardized therapeutic protocol, different surgical approaches have not impact on survival. Correct identification, prompt drainage, and preparedness for concomitant cardiac repair seem to be the key to better outcomes.

2366. Hubbard, K. A., et al. (1995). "Mandibular fractures in children with chin lacerations." Pediatric emergency care **11**(2): 83-85.

2367. Huber, A., et al. (1993). "[An unusual case of a blow-out fracture. Entrance of a bone fragment into the frontal lobe after a ski accident]." Ein ungewohnlicher Fall einer Blow-out-Fraktur. Einsprengung eines Knochenfragments ins Frontalhirn nach Skiunfall. **36**(4): 137-139.

Due to a ski accident a 16-year old girl suffered from headache, periorbital hematoma and ptosis of the right eyelid. No penetrating injury could be seen, but in the CT scan a blow-out fracture of the orbital roof and floor was verified. Since there was no evident lesion of the eye muscles, an operative indication could only be a neurosurgical one. Because of the traumatic connection between frontal cerebrum and sinus maxillaris we expected a CSF rhinorrhoea, which could not be confirmed.

2368. Hubschmann, O., et al. (1979). "Craniocerebral gunshot injuries in civilian practice--prognostic criteria and surgical management: experience with 82 cases." The Journal of trauma **19**(1): 6-12.

2369. Hubschmann, O. R. (2015). "Letter to the Editor: Predictors of outcome for gunshot wounds." Journal of neurosurgery **122**(6): 1511.

2370. Hueck, U., et al. (2020). "Forensic postmortem computed tomography in suspected unnatural adult deaths." European journal of radiology **132**: 109297.

PURPOSE: Our study sought to evaluate validity of forensic postmortem CT in establishing cause of death (COD) in suspected unnatural adult death based on the reference standard of autopsy., METHODS: In our prospective, single-center study, 64 of 94 consecutive corpses (70.7 % male, mean age: 47.4 years) who underwent CT and autopsy between November 2013 and April 2019 were included in the analysis. Primary objective was agreement between CT and autopsy on primary COD using kappa statistics. Secondary objectives were competing COD and specific pathological findings., RESULTS: Agreement on primary COD between forensic CT and autopsy without or in consideration of toxicological and histological findings was strong (85.9 % [55 of 64 corpses]; kappa=0.83 [95 %CI: 0.74 to 0.93] and 95.3 % [61 of 64 corpses]; kappa=0.94 [95 %CI: 0.84-1.04], respectively, McNemar p=0.03). Sensitivity and specificity of CT in identification of acute heart failure, intracranial bleeding, burns and heat shocks, gunshot wounds, polytrauma, cranio-cerebral trauma, and strangulation or hanging was 100 %, each. Acute respiratory failure was detected with a sensitivity and specificity of 100 % and 96.8 %, cuts and stab wounds with 95.2 % and 100 %, and intoxication, pneumonia, or gastrointestinal bleeding with 60.0 % and 100 %, respectively. Agreement on competing COD was moderate (51.6 %, [33 of 64 corpses]; kappa=0.47 [95 %CI: 0.40 to 0.53], p<0.001)., CONCLUSIONS: Forensic postmortem CT, complemented by external, toxicological, and histological examination was sufficiently valid to assess primary COD in the majority of suspected unnatural deaths with few restrictions.

2371. Huet, H., et al. (1996). "Radiological confirmation of brain death: digitised cerebral parenchymography. Preliminary report." Neuroradiology **38 Suppl 1**: S42-46.

Rates of organ procurement from brain dead subjects have fallen substantially in recent years. In France, the legal definition of brain death is based on electroencephalographic criteria in patients with clinical evidence of irreversible coma. However, sedative drugs used in intensive care units usually render the electroencephalogram uninterpretable, and in our medicolegal framework, it is necessary that intracerebral circulatory arrest be demonstrated. We discuss the value of the various available techniques and report our experience with digitised intra-arterial cerebral parenchymography. This simple, fast technique does not alter physiological conditions and provides high-quality images, ensuring prompt diagnosis, which is a prerequisite for optimal organ harvesting.

2372. Huey, E. D., et al. (2016). "Brain Regions Associated With Internalizing and Externalizing Psychiatric Symptoms in Patients With Penetrating Traumatic Brain Injury." The Journal of neuropsychiatry and clinical neurosciences **28**(2): 104-111.

A factor structure underlying DSM-IV diagnoses has been previously reported in neurologically intact patients. The authors determined the brain regions associated with factors underlying DSM-IV diagnoses and compared the ability of DSM-IV diagnoses, factor scores, and self-report measures to account for the neuroanatomical findings in patients with penetrating brain injuries. This prospective cohort study included 254 Vietnam War veterans: 199 with penetrating brain injuries and 55 matched control participants. Measures include DSM-IV diagnoses (from a Structured Clinical Interview for DSM), self-report measures of depression and anxiety, and CT scans. Factors underlying DSM-IV diagnoses were determined using an exploratory factor analysis and correlated with percent of brain regions affected. The ability of the factor scores, DSM-IV diagnoses, and the self-report psychiatric measures to account for the anatomical variance was compared with multiple regressions. Internalizing and externalizing factors were identified in these brain-injured patients. Damage to the left amygdala and bilateral basal ganglia was associated with lower internalizing factor scores, and damage to the left medial orbitofrontal cortex (OFC) with higher, and bilateral hippocampi with lower, externalizing factor scores. Factor scores best predicted left amygdala and bilateral hippocampal involvement, whereas DSM-IV diagnoses best predicted bilateral basal ganglia and left OFC involvement. Damage to the limbic areas involved in the processing of emotional and reward information, including structures involved in the National Institute of Mental Health's Research Domain Criteria Negative Valence Domain, influences the development of internalizing and externalizing psychiatric symptoms. Self-report measures underperformed DSM-IV and factor scores in predicting neuroanatomical findings.

2373. Huggins, A. B., et al. (2016). "Goat horn-induced intracranial emphysema and orbital injury." Orbit (Amsterdam, Netherlands) **35**(6): 355-356.

This is a case description of a male patient found to have orbital and intracranial emphysema, specifically with air in his cavernous sinuses bilaterally following penetrating trauma to the medial orbit from a goat's horn. There were no orbital or skull base fractures. Although the presence of traumatic intracranial emphysema is not uncommon, it is typically the result of direct communication of the cranial vault with the paranasal sinuses in the setting of associated fracture or, alternatively, from direct penetration and inoculation. We present a rare case of orbital emphysema with traumatic intracranial emphysema without these previously described associations and postulate a mech``anism behind its development.

2374. Huggins, R., et al. (2015). "The pattern of head and facial trauma associated with fatal blunt force assault." International journal of oral and maxillofacial surgery **44**: e82.

Violent assault to the head and facial region is a common cause of aesthetic and functional deficits of both temporary and permanent nature. This results in significant and immense pressure being placed on emergency and medical services and is accompanied with traumatic experiences for those involved. The severe cases where injuries are fatal, have widespread repercussions with devastating and prolonged outcomes. Awareness surrounding the increase in prevalence of interpersonal violence has become a major focus around Australia in recent years, especially in relation to alcohol and 'one-punch' deaths. Fatal injury patterns in Motor Vehicle Accidents, sporting incidents and facial trauma requiring in-patient admission, have previously been well described, however, those sustained in fatal assault have yet to be quantified. This study aims to identify the patterns of brain and facial injuries, specific risk factors for fatal outcomes, the mechanism of physical impact and the socio-demographic circumstances of the individuals involved. Between 2006 and 2015, the autopsy and pathology, clinical images, CT radiology and emergency service reports of 126 cases involving fatal blunt trauma assault to the head and facial region have been assessed. Results present in detail, the specific nature and frequency of intracranial bleed and penetrating brain injuries, facial and skull fractures, soft tissue lacerations and contusions and pharmacological agents present during the assault. These outcomes have important implications in identifying fatal injury patterns for medical and emergency personal, the etiology of fatal assault, the behavioral/social interactions that occur prior to fatal assault and to provide adjunct medical information into the circumstances surrounding the death for the medico-legal process.

2375. Hughes, B. D. and J. R. Vender (2006). "Delayed lead pulmonary emboli after a gunshot wound to the head. Case report." Journal of neurosurgery **105**(3 Suppl): 233-234.

Bullet fragment emboli are uncommon, and there have been only a few reports of intracranial-to-extracranial migration of these fragments. The authors present the case of an 11-year-old girl who was struck in the suboccipital

region with a "soft nose" bullet fired at close range. Several months later, the patient was found to have asymptomatic pulmonary emboli. Similar cases are reviewed, and a management strategy is recommended.

2376. Hughes, J. T. and B. Brownell (1968). "Traumatic thrombosis of the internal carotid artery in the neck." Journal of neurology, neurosurgery, and psychiatry **31**(4): 307-314.

2377. Hughes, S. M. (1987). "Sequelae of orbital fractures." Advances in ophthalmic plastic and reconstructive surgery **6**: 313-341.

Many injuries and complications of orbital fractures are instantaneous and unpreventable, some develop over time, and some are a result of surgery. Most complications can either be managed or prevented and are anticipated based on the fracture location and size. A thorough search for probable complications is mandatory, especially ocular injuries and intracranial complications. Most patients are carefully followed for 7-14 days, and the significant residual sequelae are managed. Some complications, however, require urgent care.

2378. Huiszoon, W. B., et al. (2012). "Fatal transorbital penetrating intracranial injury caused by a bicycle hand brake." International journal of emergency medicine **5**(1): 34.

A transorbital penetrating intracranial injury is a rare and severe traumatic brain injury. Patients with this type of injury may present dramatically, but often the injury is subtle and therefore easily overlooked and not recognized in the first place. We present the case of a 45-year-old female admitted to the emergency department after she fell with her bike and the bicycle brake handle penetrated her left eye. A computerized tomography of the cerebrum showed a fracture of the superior orbital roof with multiple bone fragments extending into the brain near the circle of Willis. A pneumocephalus and traumatic frontobasal, intraventricular and subdural hemorrhage was seen. The patient deteriorated suddenly and was transferred to a neurosurgical center where she underwent an emergency craniotomy with evacuation of the intracerebral hematoma and an intraventricular drain was placed. After surgery, the patient's condition deteriorated, and total compression of the brain stem occurred, upon which the patient was declared brain dead. Our case report shows that the Glasgow Coma Scale score at admission is not always a good predictor of the severity of the injury. Even when there is minimal suspicion of a penetrating intracranial injury, a computerized tomography should be performed immediately, independent of the patient's Glasgow Coma Scale score. A direct transfer to a specialized neurosurgical center is recommended because this injury often results in death due to fatal complications such as intracerebral hemorrhage, pneumocephalus and brain stem injury.

2379. Huk, A., et al. (2014). "Skull fracture: Indicator dangerous to life or predictor of intracranial injury?" Journal of neurotrauma **31**(5): A58-A59.

Introduction: In forensic science as well as in the scales (AIS, ISS) of assessment of the severity of injury based on anatomical principles a skull fracture is assessed as a life-threatening injury or a severe injury, which may conflict with clinical observations. The purpose of the work is to identify a skull fracture as an indicator of the severity of traumatic brain injury or as a predictor of intracranial lesions. Materials and methods: A retrospective analysis of cases treated in the institute of neurosurgery (280 patients) and autopsy material (131 autopsies) of patients with traumatic brain injury was conducted. All patients underwent CT and craniography. Statistical processing of the results was done using x2. Results: Analysis of the obtained data showed that the incidence of skull fractures depends on the sample of material being analyzed. Skull fractures were diagnosed in 102 cases (77.9%) at autopsy and in 85 cases (30.4%) in the clinic (x2 - 79.3, P= 0.0000). According to the sample of hospitalized patients, 57.6% of all skull fractures were observed in patients with mild traumatic brain injury. This can be explained by the fact that patients with mild traumatic brain injury outnumbered those with severe traumatic brain injury in the sample (208 vs. 29). Comparison of the incidence of fractures among patients with mild traumatic brain injury and those with severe traumatic brain injury yielded reliable statistical data showing that skull fractureswere predominant in patients with severe traumatic brain injury (x2 - 13.9; ? = 0.0001). Patients with mild traumatic brain injury had skull fractures predominantly in the cranial vault (x2 - 7; p = 0,008) and one bone (x2 - 5.8; p= 0,016) as compared with patients with severe traumatic brain injury. A reliable statistical connection was established between skull fractures and intracranial lesions (x2 - 3.8; p = 0,051) in patients with mild traumatic brain injury. Conclusion: It can be concluded that a linear fracture of the cranial vault is a risk factor

for potential intracranial lesions, but not a predictor of the severity of traumatic brain injury. It is proposed that a skull fracture be regarded as life-threatening only when it directly causes a potentially dangerous injury (open, penetrating TBI, multiple and comminuted fractures of the cranial vault, fractures of the skull base, pneumocephalus, liquorrhea).

2380. Hull, K. L. and R. Denton-Beaumont (2019). "An unsuspected intracranial foreign body on the acute medical unit." BMJ case reports **12**(7).

A 54-year-old man was referred to the acute medical unit with a suspected stroke after presenting to his general practitioner with altered speech, left sided facial droop and confusion. The patient had a new right sided swelling on the lateral aspect of his head but did not report any history of trauma. Imaging revealed a 9.2 cm nail entering via the right parietal bone with associated acute haemorrhage. After further discussion with the patient, he disclosed a suicide attempt with a nail gun 5 days prior to presentation. The nail was successfully removed by the neurosurgical team and the patient received rehabilitation and psychiatric assessment on the brain injury unit before going home.

2381. Humble, S. S., et al. (2018). "Prognosis of diffuse axonal injury with traumatic brain injury." The journal of trauma and acute care surgery **85**(1): 155-159.

BACKGROUND: Determine the prognostic impact of magnetic resonance imaging (MRI)-defined diffuse axonal injury (DAI) after traumatic brain injury (TBI) on functional outcomes, quality of life, and 3-year mortality., METHODS: This retrospective single center cohort included adult trauma patients (age > 17 years) admitted from 2006 to 2012 with TBI. Inclusion criteria were positive head computed tomography with brain MRI within 2 weeks of admission. Exclusion criteria included penetrating TBI or prior neurologic condition. Separate ordinal logistic models assessed DAI's prognostic value for the following scores: (1) hospital-discharge Functional Independence Measure, (2) long-term Glasgow Outcome Scale-Extended, and (3) long-term Quality of Life after Brain Injury-Overall Scale. Cox proportional hazards modeling assessed DAI's prognostic value for 3-year survival. Covariates included age, sex, race, insurance status, Injury Severity Score, admission Glasgow Coma Scale Score, Marshall Head computed tomography Class, clinical DAI on MRI (Y/N), research-level anatomic DAI Grades I-III (I, cortical; II, corpus callosum; III, brainstem), ventilator days, time to follow commands, and time to long-term follow-up (for logistic models)., RESULTS: Eligibility criteria was met by 311 patients, who had a median age of 40 years (interquartile range [IQR], 23-57 years), Injury Severity Score of 29 (IQR, 22-38), intensive care unit stay of 6 days (IQR, 2-11 days), and follow-up of 5 years (IQR, 3-6 years). Clinical DAI was present on 47% of MRIs. Among 300 readable MRIs, 56% of MRIs had anatomic DAI (25% Grade I, 18% Grade II, 13% Grade III). On regression, only clinical (not anatomic) DAI was predictive of a lower Functional Independence Measure score (odds ratio, 2.5; 95% confidence interval, 1.28-4.76], p = 0.007). Neither clinical nor anatomic DAI were related to survival, Glasgow Outcome Scale-Extended, or Quality of Life after Brain Injury-Overall Scale scores., CONCLUSION: In this longitudinal cohort, clinical evidence of DAI on MRI may only be useful for predicting short-term in-hospital functional outcome. Given no association of DAI and long-term TBI outcomes, providers should be cautious in attributing DAI to future neurologic function, quality of life, and/or survival., LEVEL OF EVIDENCE: Epidemiological, level III; Therapeutic, level IV.

2382. Hung, K.-H., et al. (2011). "Management of double-penetrating ocular injury with retained intraorbital metallic foreign body." Journal of the Chinese Medical Association : JCMA **74**(11): 523-526.

The prognosis of double penetrating ocular trauma is usually guarded. We report the good anatomical and functional outcome in a patient with double-penetrating ocular trauma associated with intraorbital foreign body. A 58-year-old man presented at the emergency room complaining of blurred vision of the left eye with stinging pain after he hammered an iron plate. Best-corrected visual acuity was hand movement/30 cm. Subconjunctival hemorrhage with one 1.4-mm laceration wound was noted over the nasal conjunctiva. Fundus examination showed vitreous hemorrhage with one whitish patch over the nasal retina. Orbital computed tomography scan revealed one metallic foreign body at the posterior nasal upper orbit. Double-penetrating globe injury with intraorbital foreign body was impressed, and immediate vitrectomy surgery with endolaser photocoagulation was carried out. One exit wound nasal to the disc was noted during operation. The intraorbital metallic foreign body was left alone. Vision recovered to 6/8.6 without ocular complication after a 20-month follow-up. Prompt, careful preoperative evaluation and meticulous vitrectomy intervention are essential in the successful management of such patients. Posteriorly located intraorbital metallic

foreign body should be managed conservatively. Long-term regular electroretinography evaluation is needed for possible retinal toxicity from intraorbital foreign body. Copyright © 2011. Published by Elsevier B.V.

2383. Hunt, C. D. (2002). "Civilian infratentorial gunshot injuries: Outcome analysis of 26 patients: Commentary." Surgical neurology **58**(3-4): 232-233.

2384. Hunt, H., et al. (2013). "Thromboelastography (TEG) and thromboelastometry (ROTEM) for trauma-induced coagulopathy in adult trauma patients with bleeding." Cochrane Database of Systematic Reviews **2013**(3).

This is the protocol for a review and there is no abstract. The objectives are as follows: To determine the diagnostic accuracy of global tests of haemostatic function (thromboelastography (TEG) and thromboelastometry (ROTEM)) in adult trauma patients with bleeding.

2385. Hunt, H., et al. "Thromboelastography (TEG) and rotational thromboelastometry (ROTEM) for trauma-induced coagulopathy in adult trauma patients with bleeding." (6).

Background, Trauma-induced coagulopathy (TIC) is a disorder of the blood clotting process that occurs soon after trauma injury. A diagnosis of TIC on admission is associated with increased mortality rates, increased burdens of transfusion, greater risks of complications and longer stays in critical care. Current diagnostic testing follows local hospital processes and normally involves conventional coagulation tests including prothrombin time ratio/international normalized ratio (PTr/INR), activated partial prothrombin time and full blood count. In some centres, thromboelastography (TEG) and rotational thromboelastometry (ROTEM) are standard tests, but in the UK they are more commonly used in research settings., Objectives, The objective was to determine the diagnostic accuracy of thromboelastography (TEG) and rotational thromboelastometry (ROTEM) for TIC in adult trauma patients with bleeding, using a reference standard of prothrombin time ratio and/or the international normalized ratio., Search methods, We ran the search on 4 March 2013. Searches ran from 1970 to current. We searched The Cochrane Library, MEDLINE (OvidSP), EMBASE Classic and EMBASE, eleven other databases, the web, and clinical trials registers. The Cochrane Injuries Group's specialised register was not searched for this review as it does not contain diagnostic test accuracy studies. We also screened reference lists, conducted forward citation searches and contacted authors., Selection criteria, We included all cross-sectional studies investigating the diagnostic test accuracy of TEG and ROTEM in patients with clinically suspected TIC, as well as case-control studies. Participants were adult trauma patients in both military and civilian settings. TIC was defined as a PTr/INR reading of 1.2 or greater, or 1.5 or greater., Data collection and analysis, We piloted and performed all review stages in duplicate, including quality assessment using the QUADAS-2 tool, adhering to guidance in the Cochrane Handbook for Diagnostic Test Accuracy Reviews. We analysed sensitivity and specificity of included studies narratively as there were insufficient studies to perform a meta-analysis., Main results, Three studies were included in the final analysis. All three studies used ROTEM as the test of global haemostatic function, and none of the studies used TEG. Tissue factor-activated assay EXTEM clot amplitude (CA) was the focus of the accuracy measurements in blood samples taken near to the point of admission. These CAs were not taken at a uniform time after the start of the coagulopathic trace; the time varied from five minutes, to ten minutes and fifteen minutes. The three included studies were conducted in the UK, France and Afghanistan in both civilian and military trauma settings. In two studies, median Injury Severity Scores were 12, inter-quartile range (IQR) 4 to 24; and 22, IQR 12 to 34; and in one study the median New Injury Severity Score was 34, IQR 17 to 43., Authors' conclusions, We found no evidence on the accuracy of TEG and very little evidence on the accuracy of ROTEM. The value of accuracy estimates are considerably undermined by the small number of included studies, and concerns about risk of bias relating to the index test and the reference standard. We recognise that the reference standards of PT and INR are imperfect, but in the absence of embedded clinical consensus these are judged to be the best reflection of current clinical practice. We are unable to offer advice on the use of global measures of haemostatic function for trauma based on the evidence on test accuracy identified in this systematic review. This evidence strongly suggests that at present these tests should only be used for research. We consider more thoroughly what this research could be in the Discussion section.

2386. Hunter, W. H. (1981). "Gunshot wound of the head: a fortunate outcome." Journal of the South Carolina Medical Association (1975) **77**(9): 447-448.

2387. Huntington, S. A. and M. K. Huntington (2016). "Heady Mystery: Intoxicated patient's misplaced memory hides undiscovered trauma." JEMS : a journal of emergency medical services **41**(10): 16-19.

2388. Huo, S., et al. (2013). "Fatal penetrating head injury by bamboo fragments." Legal medicine (Tokyo, Japan) **15**(2): 99-102.

Penetrating head injury by foreign body is relatively uncommon and has been scattered reported in the literature. In this case, a transorbital impalement wound inflicted by bamboo objects was discussed. A 61-year-old alcoholized man died from a transorbital intracranial wound due to penetration of the left orbit after falling from a slope beside the road. Although the facial impalement injury was small and unobtrusive, the penetrating trauma itself could induce lethal consequences, special attention should be paid to such kind of cases. The autopsy and pathological examination revealed subarachnoid hemorrhage, brain contusion and intraparenchymal hematoma. Some pieces of bamboo were also detected in the left anterior cranial fossa. Based on all of the evidence and information, we can draw a conclusion that the bamboo was the instrument causing the injuries and the case was considered as accident.

2389. Hurtado Torres, G. F., et al. (2007). "[Nutritional support in a pregnant woman with brain death. Case report and literature review]." Apoyo nutricio en una mujer embarazada y con muerte cerebral. Informe de un caso y revision de la literatura. **22**(4): 503-506.

The occurence of brain death in pregnancy represents a catastrophic entity although infrequent. The aims of continue medical management are focused in a double purpose: to preserve intrauterine product's life and fetal maturation until delivery and to consider the mother as a potential organ donor. Ethical considerations together with gestational age, fetal well being and relatives' wishes are cardinal for continuing medical support. Modern critical care units allow us to obtain favourable results, supported in scientifical reports that describe successful outcomes. Nutritional aspects plays a cardinal role in the medical management, allowing to preserve the mother's organs' viability and also to preserve fetal intrauterine growth and development.

2390. Husak, S., et al. (2016). "Delayed contralateral presentation of a carotid cavernous fistula following trauma." Canadian Journal of Neurological Sciences **43**: S47.

Background: We present a rare case of a left-sided carotid cavernous fistula (CCF) that presented 15 months post initial trauma with right-sided ophthalmic signs and symptoms. Highlighted is a contralateral endovascular approach to treating this traumatic CCF. Methods: Described is a case of a left-sided CCF caused by a selfinflicted gun shot wound to the head that was initially treated conservatively by neurosurgery and opthomology. The patient presented 15 months later with headache, acute right-sided periorbital swelling, severe right eye and facial pain. Results: Angiography confirmed the presence of a left-sided CCF with preferential drainage into the right cavernous sinus and right superior ophthalmic vein. The left internal carotid artery (ICA) was shown to be narrow and irregular. Multiple attempts to navigate the micro catheter through the vessel were unsuccessful. Instead, the fistula was embolized using a contralateral approach through the right internal carotid artery and across the anterior communicating artery. Imaging post-operatively confirmed successful occlusion of the CCF. Conclusions: This case is a rare example of a left-sided ICA occlusion secondary to trauma presenting 15 months after the initial injury with right-sided ophthalmic signs and symptoms. It is also one of only a few in the literature that describe successful treatment of traumatic CCF through a contralateral approach.

2391. Husseini, M. E., et al. (2019). "Perforating Brain Injury in A One-Year-Old Infant." Journal Medical Libanais **67**(2): 107-112.

Background : Perforating head injuries in children constitute only a small part of the total number of traumatic head injuries seen in the emergency department. Craniocerebral gunshot injuries are increasingly encountered by neurosurgeons in Lebanon, a country with increased gun culture, especially in Bekaa. Traumatic brain injury caused by a gunshot wound is the most devastating injury with a broad spectrum of symptoms and high rates of mortality and

morbidity. Case:We present a case of a 1-yearold male infant with a perforating brain injury. Although this kind of injuries has been previously reported, the present case is special, because the patient showed no neurological deficit after surgery, despite the dangerous trajectory of the bullet. Conclusion : The es-tablishment of management protocol in this kind of injuries is difficult because of the variability of reported cases. Although the current literature predicts poor outcomes in patients with gunshot injuring bi-hemispheres and ventricles, this may not apply equally to the pediatric population. The pediatric population tends to demonstrate more favorable outcomes following intracranial gunshot injury when compared with the adult population.

2392. Hussien, A., et al. (2021). "Incidence of post traumatic epilepsy in Khartoum State, Sudan between the period of December 2018 to January 2020." Journal of the neurological sciences **429**.

Background and aims: Epilepsy is one of the commonest neurological disorders. It has a strong association with trauma to the brain, constituting of 5% of epilepsy cases. To determine the prevalence of post-traumatic epilepsy among Sudanese patients and to demonstrate the relation between traumatic brain injury and occurrence of epilepsy. Methods: A descriptive hospital-based cross-sectional study, conducted in Bashiar, Omdurman, and Ibrahim Malik Teaching Hospitals in Khartoum state, in the period from December 2018 to January 2020. Patients were interviewed by general emergency team. Relevant history was obtained, and both biochemical and neuroimaging investigations were done. Results: 70 patients with history of traumatic brain injury (TBI), 6 (11.3%) developed post traumatic epilepsy (PTE). (82.9%) were males and (17.1%) were females. In the 6 patients who developed PTE, the mode of trauma in two of them was gunshots, two due to fall, one by an automobile accident and one had missing data. Out of them, one had subarachnoid hemorrhage, one had bilateral subdural hematoma and one developed massive epidural hemorrhage. Statistically significant correlation was found between TBI and number of comorbid conditions. Older age was associated with more severe TBI. Significant correlation reported between the etiology of TBI and occurrence of PTE. Significant correlation between higher GCS at the time of trauma and not having PTE. People with TBI and GCS more than 12 had 1.8 less chance to develop PTE. Conclusions: Traumatic brain injury constituting of type of trauma, etiology, formed of brain injury, and GCS at presentation, has a significant implications to occurrence of epilepsy.

2393. Hutchinson, P. J., et al. (2002). "Investigation of the effect of chlormethiazole on cerebral chemistry in neurosurgical patients: a combined study of microdialysis and a neuroprotective agent." British journal of clinical pharmacology **53**(3): 275-283.

AIMS: Promising pre-clinical results from laboratory studies of neuro-protective drugs for the treatment of patients with stroke and head injury have not been translated into benefit during clinical trials. The objective of the study was to assess the feasibility of administrating a potential neuro-protective drug (chlormethiazole) in conjunction with multimodality monitoring (including microdialysis) to patients with severe head injury in order to determine the effect of the agent on surrogate endpoints and penetration into the brain., METHODS: Multimodality monitoring including cerebral and peripheral microdialysis was applied to five head-injured patients on the neuro-intensive care unit. Chlormethiazole (0.8%) was administered as a rapid (10 ml min(-1)) intravenous loading infusion for 5 min followed by a slow (1 ml min(-1)) continuous infusion for 60 min. The following parameters were monitored: heart rate, mean arterial blood pressure, intracranial pressure, cerebral perfusion pressure, peripheral oxygen saturation, continuous arterial oxygen partial pressure, arterial carbon dioxide partial pressure, arterial pH, arterial temperature, cerebral tissue oxygen pressure, cerebral tissue carbon dioxide pressure, cerebral pH, cerebral temperature, electroencephalograph (EEG), bi-spectral index, plasma glucose, plasma chlormethiazole, and cerebral and peripheral microdialysis assay for chlormethiazole, glucose, lactate, pyruvate and amino acids., RESULTS: Despite achieving adequate plasma concentrations, chlormethiazole was not detected in the peripheral or cerebral microdialysis samples. The drug was well tolerated and did not induce hypotension, hyperglycaemia or withdrawal seizures. The drug did not change the values of the physiological or chemical parameters including levels of GABA, lactate/pyruvate ratio and glutamate. The drug did, however, induce EEG changes, including burst suppression in two patients., CONCLUSIONS: Chlormethiazole can be safely given to ventilated patients with severe head injury. There was no evidence of hypotension or withdrawal seizures. Combining a pilot clinical study of a neuro-protective agent with multimodality monitoring is feasible and, despite the lack of effect on physiological and chemical parameters in this study, may be a useful adjunct to the development of neuro-protective drugs in the future. Further investigation of the capability of microdialysis in this setting is required. By investigating the effect of a drug on surrogate end-points, it may be possible to identify promising agents from small pilot clinical studies before embarking on large phase III clinical trials.

2394. Huusko, S., et al. (1972). "Traumatic cerebellar lesions among brain-injured veterans 20-30 years after the injury. A follow-up study." Acta neurologica Scandinavica. Supplementum **51**: 249-251.

2395. Hwang, K. and S. Y. Oh (2020). "Orbital Roof Blowout Fracture With an Intact Orbital Rim: A Case Report." Eplasty **20**: e13.

Background: Fractures of the orbital roof not associated with fractures of the orbital rim are unusual. We describe the case of a blowout fracture of the orbital roof with an intact orbital rim, which was found after craniotomy for removal of epidural hematoma. Case: A 64-year-old man was referred to our emergency department from a local hospital. He fell down from a 3-m stepladder while pruning branches of a tree. Brain computed tomographic scan revealed acute epidural hematoma in both frontal convexities, and he underwent craniotomy at the local hospital. On follow-up brain computed tomography, an orbital roof fracture with a displaced bony fragment and hemorrhage was noticed in the left superior extraconal space. Thereafter, he was transferred to our department. Upon examination, movement of the extraocular muscles was normal. He did not complain of diplopia or decreased sensation of the face. He also did not have nasal stuffiness. Exophthalmometry revealed the same findings for both eyes (18 mm/18 mm). Facial computed tomographic scan before the second operation revealed a displaced orbital roof fracture segment. Under general anesthesia, craniotomy was performed and the epidural hematoma was evacuated. The displaced bony fragment was removed from the left anterior cranial fossa, and the anterior skull base was reconstructed with a titanium mesh plate. Conclusion: Through this case of blowout fracture of the orbital roof with an intact orbital rim, found after craniotomy, we should be aware of the possibility that an orbital roof fracture can be missed on conventional brain computed tomography.

2396. Hwang, Y.-S., et al. (2010). "Iron Foreign Body in the Optic Nerve without Ocular Siderosis." Journal of neuroimaging : official journal of the American Society of Neuroimaging **20**(2): 201-203.

BACKGROUND AND PURPOSE: An intraocular iron foreign body may cause many ocular complications, sometimes even blindness. Therefore, if possible, it should be removed to avoid ocular siderosis. We report a case in which a foreign body was trapped in the optic nerve and could not be removed. After a 2-year follow-up, no ocular siderosis or progressive deterioration in vision was found. This is the first case report of a foreign body in the optic nerve behind the eyeball in the PubMed literature., METHODS: The authors describe the case of a 33-year-old man with an ocular trauma history at work. A metal iron foreign body was trapped in the optic nerve behind the eyeball, which was demonstrated by computed tomography., RESULTS: There was no significant vision change and ocular siderosis by electroretinogram after 2 years of follow-up., CONCLUSIONS: Intra-optic-nerve foreign body may have a better ocular prognosis. Siderosis may not be seen in patients with optic nerve iron foreign body. Intraocular foreign body should be accurately studied before surgical procedures.

2397. Hylton, R. P., et al. (1970). "Actinomycosis: is it really rare?" Oral surgery, oral medicine, and oral pathology **29**(1): 138-147.

2398. Hymel, K. P., et al. (2010). "Head injury depth as an indicator of causes and mechanisms." Pediatrics **125**(4): 712-720.

OBJECTIVE: The goal was to measure differences in the causes, mechanisms, acute clinical presentations, injuries, and outcomes of children <36 months of age with varying "greatest depths" of acute cranial injury., METHODS: Children <36 months of age who were hospitalized with acute head trauma were recruited at multiple sites. Clinical and imaging data were collected, and caregivers underwent scripted interviews. Neurodevelopmental evaluations were completed 6 months after injury. Head trauma causes were categorized independently, and subject groups with varying greatest depths of injury were compared., RESULTS: Fifty-four subjects were enrolled at 9 sites. Twenty-seven subjects underwent follow-up neurodevelopmental assessments 6 months after injury. Greatest depth of visible injury was categorized as scalp, skull, or epidural for 20 subjects, subarachnoid or subdural for 13, cortical for 10, and subcortical for 11. Compared with subjects with more-superficial injuries, subjects with subcortical injuries more frequently had

been abused (odds ratio [OR]: 35.6; P < .001), more frequently demonstrated inertial injuries (P < .001), more frequently manifested acute respiratory (OR: 43.9; P < .001) and/or circulatory (OR: 60.0; P < .001) compromise, acute encephalopathy (OR: 28.5; P = .003), prolonged impairments of consciousness (OR: 8.4; P = .002), interhemispheric subdural hemorrhage (OR: 10.1; P = .019), and bilateral brain hypoxia, ischemia, or swelling (OR: 241.6; P < .001), and had lower Mental Developmental Index (P = .006) and Gross Motor Quotient (P < .001) scores 6 months after injury., CONCLUSION: For children <3 years of age, head injury depth is a useful indicator of injury causes and mechanisms.

2399. Hynes, A. M. (2021). "Finding the missing bullet: A case report of an unusual trajectory from the left scapula into the left orbit." Trauma case reports **35**.

Evaluating a traumatically injured patient requires a systematic evaluation that can rapidly detect life threatening injuries. When there is a discrepancy in the number of expected retained bullets, one must re-evaluate the initial work-up. This case consists of an extremely unusual trajectory course of a scapular wound where the ballistic then traversed off the scapula through the neck entering the para-pharyngeal space, travelling through the facial bones, and coming to rest within the left eye, itself. This case herein reinforces the importance for the evaluating provider to quickly recognize when the work-up is inconsistent with the initial assessment. Failure to recognize this discrepancy may lead to an inappropriate work-up with subsequent devastating life-threatening consequences.

2400. Iakovlev, V. N., et al. (2010). "[Transnasal wounds of the base of the skull encountered in the practical work of the otorhinolaryngologist]." Vestnik otorinolaringologii(6): 67-69.

The authors describe rare clinical observations of patients suffering transnasal injuries to the base of the skull. Based on their own experience, they propose practical recommendations for the management of such cases.

2401. Iannelli, A. and G. Lupi (2005). "Penetrating brain injuries from a dog bite in an infant." Pediatric neurosurgery **41**(1): 41-45.

Brain lesions due to dog bites are not frequent and mainly concern infants in the first years of their life because they are short in height, the size of the infant's head is relatively large compared to the body and the skull bones are thin. We report the case of an infant with bilateral skin, skull and brain injuries secondary to a dog bite, and review the relative reports in the literature. We stress the need to consider the possibility of penetration into the intracranial compartment occurring in cases of dog bites of the scalp, because these wounds on the scalp and the skull may appear relatively limited, small in size and slight, in spite of associated potentially dangerous deeper lesions involving the intracranial structures that may be missed on the first observation. Infection is the main possible complication, and may be the cause of permanent and serious neurological deficits. Prompt diagnosis and therapy are mandatory to avoid complications and to achieve good clinical results. Copyright 2005 S. Karger AG, Basel.

2402. Iarlykov, S. A. and N. N. Kretinin (1992). "[A foreign body in the frontal lobe]." Inorodnoe telo v lobnoi dole golovnogo mozga.(4): 30-31.

2403. Ibayashi, K., et al. (2012). "[A case of a penetrating brain injury due to an explosion of a construction machine]." No shinkei geka. Neurological surgery **40**(5): 421-427.

Penetrating brain injury caused by a high speed projectile is rather rare in Japan, known for its strict gun-control laws. We report a case of a 55-year-old male, who was transferred to our hospital with a foreign body in the brain due to penetrating head injury, which was caused by an explosion of a construction machine. Neurological examination demonstrated severe motor aphagia with no apparent motor paresis. The patient had a scalp laceration on his left forehead with exposed cerebral tissue and CSF leakage. Head CT scan and plain skull X-ray revealed a 20 mmx25 mm bolt which had penetrated due to the explosion of the machine. The anterior wall of the left frontal sinus was fractured resulting in dural laceration, and scattered bone fragments were seen along the trajectory of the bolt. Digital subtraction angiography showed no significant vascular injuries including superior sagittal sinus. We performed open surgery, and successfully removed the bolt along with the damaged frontal lobe. The patient had no infection or seizure after the surgery, and was transferred for further rehabilitation therapy. We performed a cosmetic cranioplasty six months later.

Surgical debridement of the damaged cerebral tissue along the trajectory led to successful removal of the bolt with no further neurological deficit.

2404. Ibebuike, K., et al. (2012). "Spontaneous intracranial bullet migration: A complication of penetrating cranial gunshot wound: Case report and review of the literature." Journal of Neurological Sciences **28**(4): 619-626.

Spontaneous migration of retained bullets in the brain is a recognized rare complication of penetrating cranial gunshot wounds to the brain. The authors report one rare case in a 55-year old male patient who presented with a penetrating cranial gunshot wound and a retained bullet. He had a dense right hemiplegia and expressive aphasia on admission. Skull x-ray confirmed the retained intracranial bullet, which on CT scan was located at the left parietaloccipital region. He was managed conservatively. A repeat CT scan 17 days post injury showed spontaneous migration of the bullet to the left occipital pole adjacent to the superior sagittal sinus and near to the Torcula Herophili. He had a remarkable improvement of his right sided weakness but had severe receptive and expressive language deficits. This case highlights the need to watch out for the occurrence of spontaneous migration of intracranial bullets after a penetrating cranial gunshot wound and when detected management decisions should be individualized.

2405. Icer, M., et al. (2017). "Factors affecting dural penetration and prognosis in patients admitted to emergency department with cranial gunshot wound." European journal of trauma and emergency surgery : official publication of the European Trauma Society **43**(5): 611-615.

PURPOSE: To explore the effect of admission physical examination findings, anamnesis, and computed tomography on dural penetration and prognosis in patients with cranial gunshot wound (CGW)., METHODS: In this study, the medical data of 56 subjects who were admitted to the Emergency Department of Dicle University Hospital with CGWs between January 2011 and December 2013 were retrospectively reviewed. The effects of type of incident (suicidal vs non-suicidal), pupil diameter and light reflex, hemodynamic status, type (bullet or pellet), velocity, trajectory of foreign material, trauma scores, and imaging findings on dural penetration and mortality were explored., RESULTS: The mean age of the study population was 24.8 +/- 13.50 years. Thirty (53.6 %) patients had penetrating injuries and 26 (46.4 %) had non-penetrating injuries; 9 (16.1 %) patients died and 47 (83.9 %) survived. Suicidal injury, pupil diameter and light reflex, bullet as foreign material, and high velocity and lateral trajectory of foreign material significantly affected dural penetration and mortality ($p < 0.05$). In addition, dural penetration, bilobar, multilobar, or bihemispheric involvement of brain parenchyma, presence of intracranial hemorrhage, subarachnoid hemorrhage, ventricular hemorrhage, fracture, shift, edema, and trauma scores significantly affected mortality ($p < 0.05$)., CONCLUSIONS: In CGWs, dural penetration and prognosis can be predicted by physical examination findings and patient characteristics on initial admission.

2406. Ichinose, N., et al. (2009). "[Multiple penetrating head injury by 8 nails: a case report]." No shinkei geka. Neurological surgery **37**(12): 1209-1213.

A case report of penetrating head injury due to 8 nails and a review of multiple penetrating head injury by nails were described. The patient who was a 48-year-old man with a history of for psychiatric care was transferred to our emergency room on May 2007. He had shot his head with 8 nails using a nail-gun in a suicide attempt. His family called an ambulance. His conscious level was 1 on the Japan Coma Scale and 15 on the Glasgow Coma Scale with monoplegia of the right lower extremity and hypoesthesia of the right extremities. X-ray films of his head revealed 8 nails penetrating his cranium. The CT scan showed thin hematoma on the right convexity. Angiography didn't demonstrate any evidence of vascular injury. Under general anesthesia, all nails were removed after craniotomy. His post-operative course was good and he was discharged home with minimal deficits. Penetrating head injury with nail-gun use is sometimes seen, but cases with multiple nails are rare. Operative strategies were discussed in the review. It also suggested the need for the care of mental or background problems.

2407. Iczkiewicz, J., et al. (2007). "Osteopontin expression in activated glial cells following mechanical- or toxin-induced nigral dopaminergic cell loss." Experimental neurology **207**(1): 95-106.

Osteopontin (OPN) is a glycosylated phosphoprotein that regulates both oxidative stress and inflammatory processes. OPN is present in the rat substantia nigra (SN) and both protein and mRNA levels are up-regulated following a

pro-inflammatory insult produced by lipopolysaccharide. We now report on the effects of lesioning the SN using 6-hydroxydopamine (6-OHDA) and mechanical vehicle-induced lesioning on OPN expression. Intranigral administration of 6-OHDA induced a marked time-dependent loss of tyrosine hydroxylase (TH) positive nigral cells. Vehicle administration also produced a loss of TH positive cells. This was small compared to 6-OHDA and due to mechanical damage during surgery. 6-OHDA and mechanical-induced cell loss was accompanied by an increase in OPN protein and mRNA expression. Both 6-OHDA and mechanical lesions resulted in equivalent time-dependent increases in OX-42 positive microglial cells. However, the elevation was far less marked following mechanical damage compared to 6-OHDA-induced cell death. 6-OHDA lesioning induced a slow up-regulation of GFAP positive astroglial cells but this was not present following mechanical damage. Importantly, both 6-OHDA and mechanical lesions resulted in an up-regulation in ED1 positive macrophages of equivalent magnitude and time course. There was co-localisation of OPN with ED1 positive cells but not TH, OX-42 or GFAP cells following both toxin and mechanical lesions. Nigral TH positive cell death of toxin or mechanical origin increases OPN expression in parallel with the up-regulation of ED1 positive macrophages. The increase in OPN/ED1 expression is independent of the extent of cell death. OPN appears to be an important regulator of nigral cell survival through its association with inflammatory events and its manipulation may provide a means of achieving neuroprotection in Parkinson's disease.

2408. Iddrisu, M. D., et al. (2022). "SUCCESSFUL HEART TRANSPLANT WITH A SINGLE LEAFLET MITRAL VALVE DONOR: A CASE REPORT." Journal of the American College of Cardiology **79**(9): 3148.

Background: Single leaflet mitral valve (MV) apparatus are extraordinarily rare congenital defects, previously thought to be incompatible with life beyond the neonatal period. There is no literature about progression of cardiac dysfunction in this structural abnormality Case: 19-year-old male ceased after gunshot wound. Appropriate protocol determined brain dead and family agreed with organs donation. TTE showed large anterior MV leaflet attached to the posteromedial papillary muscle. TEE corroborated findings, with small anterolateral papillary muscle without a chordae. Organ transplantation certified this heart as appropriate for donation. Surgery for organ harvest was performed. Organ donor network reported successful transplantation in similarly aged patient. Recipient recovered uneventfully with total independence and functionality Decision-making: In this case the donor had no previous cardiac history without dysfunction of the native single leaflet MV. It is uncertainty that the recipient will not develop MV disease in the future or how fast the transplanted valve will start to deteriorate, however, the low mortality risk and the good prognosis of a young heart in a young recipient were decisive to pursue transplantation. “True” parachute and parachute-like asymmetric MV were ruled out Conclusion: Inclusion of hearts with asymptomatic single leaflet MV is possible. This measurement may provide a higher volume of donor hearts [Formula presented]

2409. Ide, C. H. and R. W. Webb (1971). "Penetrating transorbital injury with cerebrospinal orbitorrhea." American journal of ophthalmology **71**(5): 1037-1039.

2410. Ignat'ev, N. V. (1996). "[The possibility for the carrying out of active deeds by the victim with the presence of foreign bodies in the brain]." Vozmozhnost' sovershenіia aktivnykh deistvii poterpevshim pri nalichii inorodnykh tel v golovnom mozge. **39**(4): 31-33.

2411. Ihama, Y., et al. (2012). "A transnasal intracranial stab wound by a plastic-covered umbrella tip." Forensic science international **214**(1-3): e9-e11.

A 48-year-old man died from a transnasal intracranial stab wound caused by an umbrella. The track of the stab passed from the right nostril, through the sphenoid sinus, the left side of the sella turcica and anterior clinoid process, and finally reached the surface of the brain. The stab wound crossed the left internal carotid artery, causing an exsanguination and aspiration of blood into the airway, resulting in death. It is extremely rare that an umbrella tip used during a struggle would stab the nostril of the victim. Transnasal intracranial stab wounds can be overlooked and require sensitive handling.

2412. Ihedioha, U., et al. (2017). "The use of CT angiography for preoperative evaluation of large foreign body retention following penetrating trauma." BMJ case reports **2017**.

2413. Ijaz, L. and M. Nadeem (2014). "Transorbital penetrating brain injury to frontal lobe by a wheel spoke." Journal of pediatric neurosciences **9**(3): 267-269.

Penetrating brain injury (PBI) is rare and the severest form of head injury with a high morbidity and mortality. A 3.5-year-old girl presented with PBI with a wheel spoke. Computerized tomography scan with three-dimensional skull reconstruction depicted its extent from the medial side of the roof of the right orbit to the right frontal lobe with a cavitation around the spoke. The spoke was removed by manipulation under general anesthesia from the entry site without a formal craniotomy. Postoperative outcome was uneventful.

2414. Ijaz, L. and M. M. Nadeem (2014). "Transorbital penetrating brain injury to frontal lobe by a wheel spoke." Journal of pediatric neurosciences **9**(3): 267-269.

Penetrating brain injury (PBI) is rare and the severest form of head injury with a high morbidity and mortality. A 3.5-year-old girl presented with PBI with a wheel spoke. Computerized tomography scan with three-dimensional skull reconstruction depicted its extent from the medial side of the roof of the right orbit to the right frontal lobe with a cavitation around the spoke. The spoke was removed by manipulation under general anesthesia from the entry site without a formal craniotomy. Postoperative outcome was uneventful.

2415. Ikematsu, K., et al. (2008). "Temporal expression of immediate early gene mRNA during the supravital reaction in mouse brain and lung after mechanical asphyxiation." Forensic science international **179**(2-3): 152-156.

In forensic pathology, the reactions that occur in the body from somatic death to cell death are commonly termed "supravital reactions". There are many reports of grossly visible and microscopic supravital reactions; however, few papers are available on the supravital reaction concerning gene expression. The aim of this study was to examine the gene expression of immediate early genes (IEGs) including c-fos, fos-B and c-jun in mechanically asphyxiated mouse brain and lung after somatic death and to identify the IEGs expressed at the point of supravital reaction in the brain and lung. Our results confirm that the expression of IEGs changed after death during supravital reaction and that the alterations differed according to the cause of death and the types of organ examined. In addition, IEG expression significantly increased following mechanical asphyxia. These results suggest that there is a specific pattern of gene expression following asphyxia. It is therefore important to identify the specific genes involved, as this may give significant information to aid in the post-mortem diagnosis of strangulation and hanging.

2416. Ildan, F., et al. (1994). "The nonsurgical management of a penetrating orbitocranial injury reaching the brain stem: case report." The Journal of trauma **36**(1): 116-118.

Penetrating and perforating periorbital puncture wounds by lead pencils are not rare, but ones that reach the brain stem are extremely unusual. We recently treated a patient with of this type of injury. A newly sharpened lead pencil was accidentally introduced through the subconjunctiva at the inner canthus of the right eye. It passed along the medial border of the globe transorbitally and went through the superior orbital fissure into the temporal fossa, then continued through the lateral side of the sella and posterior clinoid, reaching the brain stem. The entire pencil was removed inch by inch without incident under CT control. Meanwhile, the operative team remained ready in case of emergency bleeding. The patient's postoperative course was uneventful, but the initial neurologic deficit of the patient remained fixed.

2417. Ilkko, E., et al. (1998). "Spontaneous migration of foreign bodies in the central nervous system." Clinical radiology **53**(3): 221-225.

The authors present four cases where foreign bodies within the central nervous system had spontaneously migrated. Two of these were surgical clips and two were bullets. The clips seemed to pass intradurally into the lumbar region with minor or no symptoms. Possible explanations for the migration are the circulation of CSF and the gravity. A new observation was that an infection may develop at the site where the foreign body had been situated before

migration. From the clinical point of view, the removal of foreign bodies from the intradural space is not indicated, if the patient has no connected symptoms.

2418. Imam, A. M., et al. (2013). "Synergistic effects of fresh frozen plasma and valproic acid treatment in a combined model of traumatic brain injury and hemorrhagic shock." Journal of Surgical Research **179**(2).

Introduction: Traumatic brain injury (TBI) and hemorrhagic shock (HS) are major causes of trauma related deaths, and are especially lethal as a combined insult. Previously we have shown that early administration of fresh frozen plasma (FFP) reduced the size of brain lesion and associated swelling in a swine model of combined TBI+HS. We have also separately shown that the addition of valproic acid (VPA) to the resuscitation protocol attenuates inflammatory markers in the brain and attenuates the degree of TBI. The current study was performed to determine whether a combined FFP+ VPA treatment strategy would exert a synergistic effect in a clinically relevant large animal model of TBI+HS. Methods: Yorkshire swine (42-50 kg) were instrumented to measure hemodynamic parameters, intracranial pressure and brain tissue oxygenation. TBI was created through a 20 mm craniotomy, using a custom-designed, computer-controlled cortical impactor: 15 mm cylindrical tip impactor at 4 m/s velocity, 100 ms dwell time and 12 mm penetration depth. The TBI created was synchronized with the initiation of volume-controlled hemorrhage (40 ± 5% of total blood volume). After a 2 hour period of shock, animals were randomized to one of three resuscitation groups (n=5/gr): 1) normal saline (NS), 2) Fresh Frozen Plasma (FFP), 3) FFP and VPA 300 mg/kg (FFP+VPA). The resuscitative volume for FFP was equivalent to the shed blood, whereas NS was 3X this volume. VPA treatment was started an hour after hemorrhage. Animals were monitored for 6 hours post-resuscitation. At this time the brains were harvested, sectioned into 5mm slices and stained with TTC (2, 3, 5-Triphenyltetrazolium chloride) to quantify the lesion size (mm 3) and brain swelling (% change compared to uninjured side). Results: The combined TBI + HS model resulted in a highly reproducible brain injury. As shown in Figure lesion size and brain swelling in the FFP+VPA group (1459 ± 218 mm3, and 13 ± 1.2% respectively) were significantly smaller than the NS group (3285 ± 130.8 mm 3 $p < 0.001$, and 37 ± 1.6%; $p < 0.001$ respectively). The decrease in lesion size and swelling in the combined treatment group was also significant when compared to the FFP alone group (2160 ± 202.6 mm3; $p < 0.05$ and 22 ± 1 %; $p < 0.001$ respectively). Conclusions: In a large animal model of TBI + HS, treatment with a combination of FFP and VPA leads to a significant reduction in the size of brain lesion as well as swelling, compared to FFP alone or NS. This novel synergistic effect should be explored further to develop effective treatments for these devastating insults (Figure Presented).

2419. Imamoto, K. and C. P. Leblond (1977). "Presence of labeled monocytes, macrophages and microglia in a stab wound of the brain following an injection of bone marrow cells labeled with 3H-uridine into rats." The Journal of comparative neurology **174**(2): 255-279.

2420. Imrie, F. R., et al. (2008). "Surveillance of intraocular foreign bodies in the UK." Eye (London, England) **22**(9): 1141-1147.

AIMS: To estimate the incidence of penetrating injuries with retained intraocular foreign bodies (IOFBs) in the United Kingdom, and to provide epidemiological data on the aetiology, management, and visual outcome of such injuries., METHODS: Cases were identified prospectively by active surveillance through the British Ophthalmological Surveillance Unit reporting card system, for the 12-month period June 2004 to May 2005 inclusive. Questionnaire data were obtained from UK ophthalmologists at presentation and 6 months following presentation., RESULTS: Data were available on 97 patients at presentation and 95 patients at follow-up. The minimum estimated incidence of IOFBs in the United Kingdom identified in this study was 0.16 per 100 000. All patients were male. Hammering was the most common mechanism of injury, occurring in 62% of patients. The IOFB was found in the anterior segment in 24%, the posterior segment in 73%, and involved both segments in 3%. Endophthalmitis was diagnosed in 9% of patients. Best-corrected visual acuity of the injured eye at final follow-up was 6/12 or better in 67%, 6/18 to 6/60 in 11%, and worse than 6/60 in 22%. Prognostic factors for a poor visual outcome included poor visual acuity at presentation, prolapse of intraocular tissue, development of endophthalmitis, development of retinal detachment, and large size of IOFB., CONCLUSIONS: The incidence of IOFB in the United Kingdom appears to have reduced compared to previous studies. The majority of patients (67%) retain good visual acuity in the injured eye; however, a significant minority (22%) sustain long-term severe visual loss.

2421. Imshenetskaia, V. F. (1976). "[Methicillin penetration into the cerebrospinal fluid of patients]." Proniknovenie metiltsillina v spinmomozgovuiu zhidkost' bol' nykh **21**(8): 745-747.

Penetration of methicillin through the blood-liquor barrier in neurosurgical patients was studied. When administered in a dose of 2 gm the drug penetrated through the barrier in 1/3 of all observations within 1 to 3 hours. Increased liquor pressure in the patients resulted in prolongation of the antibiotic effect in the cerebrospinal fluid. The methicillin levels in the liquor were no sufficient for the growth inhibition of most methicillin sensitive staphylococci.

2422. Inamasu, J., et al. (2011). "Fulminant ependymitis following intraventricular rupture of brain abscess." Journal of infection and chemotherapy : official journal of the Japan Society of Chemotherapy **17**(4): 534-537.

A 48-year-old man with a history of a penetrating brain injury was referred with a presumptive diagnosis of bacterial meningitis. Examination revealed a brain abscess in addition to meningitis. Blood and cerebrospinal fluid (CSF) cultures were negative for bacteria, and empirical IV antibiotic therapy with vancomycin (VCM) and meropenem was initiated. Despite initial improvement, however, his condition rapidly deteriorated into coma following intraventricular rupture of the abscess and hydrocephalus. Thereafter, an emergency ventriculostomy was performed and the abscess was evacuated. Bacterial cultures of the pus were negative. To manage the hydrocephalus, 150-200 ml of CSF were drained daily. Intraventricular administration of VCM (20 mg q.d.) was added to the IV antibiotic therapeutic regimen after surgery. Although the primary abscess rapidly decreased in size, ependymitis developed in the fourth ventricle. This new lesion, which resulted from CSF dissemination from the primary abscess, was refractory to treatment, and eventually disappeared after the intraventricular VCM dosage was increased from 20 to 30 mg and continued for 30 days. A possible reason for the development of fulminant ependymitis and why it was refractory to treatment despite the shrinkage of the primary lesion may be that physiological CSF flow from the lateral to the fourth ventricle was lost due to CSF drainage, and the stagnant CSF flow coupled with an insufficient VCM level in the fourth ventricle facilitated the rapid growth of pathogens. Although intraventricular antibiotic administration is efficacious for treating ruptured brain abscesses, it may be associated with the unexpected development of secondary lesions.

2423. Inci, S., et al. (2006). "Unrecognized intracerebral glass particle mimicking cavernoma: case report." Neurosurgery **58**(1): E203-E203.

OBJECTIVE AND IMPORTANCE: Although the presence of a foreign body in the cranium after a head injury is a well-known entity, cases of retained intracranial foreign bodies causing a delayed onset of neurological symptoms are rare. To our knowledge, an unrecognized intracerebral glass particle mimicking a cavernoma has not been previously reported in the literature., CLINICAL PRESENTATION: We report a unique case regarding an intracranial foreign body. A 39-year-old patient presented with new-onset epilepsy. The patient had no history of trauma. According to the magnetic resonance imaging findings and the patient's clinical course, the responsible lesion was considered to be a temporal cavernoma., INTERVENTION: During the operation, surprisingly, a glass particle was found within the temporal lobe. The glass had penetrated the cranium during a minor head injury and had remained undetected for 33 years. The patient was seizure-free without medication during 3 years of follow-up., CONCLUSION: Intracranial small foreign bodies can be difficult to diagnose, especially in patients with no history or a vague history of head trauma. Patients with long-standing retained foreign bodies may remain clinically well until complications arise. Intracranial foreign bodies may mimic other pathologies clinically and radiologically.

2424. Ingle, S. S. and S. Nagpure (2016). "Effectiveness of mannitol therapy in patients of cerebral oedema caused by traumatic brain injury" - a retrospective study." Research Journal of Pharmaceutical, Biological and Chemical Sciences **7**(3): 292-296.

Truamatic Brain Injury: It occurs when sudden trauma causes damage to brain, can result when head suddenly and violently hits objects or when objects pierces the skull. In India estimated 16 lacks persons sustain head injury each year with 2 lacks deaths. Estimated Prevalence in India is 9.7 million, out of which 16% sustain sever TBI. Contributing to leading cause of morbidity, mortality, disability and socioeconomic losses in India and other developing countries. As a result of TBI brain function is temporarily or permanently impaired leading to cerebral oedema in 85% cases. Mannitol: Mannitol, an osmotic diuretic is the mainstay of treatment for cerebral oedema. Rapid iv Mannitol reduces intra-cranial pressure and cerebral edema by reducing brain mass. Considering its cost-effectiveness and rapid action to decrease the

intra-cranial pressure in critical conditions like traumatic brain injury it is fabricated to assess the efficacy of mannitol therapy in trumatic brain injury. To find out optimal duration of mannitol therapy according to grading of severity of TBI. 1 Grading patients according to severity of the brain injury based on Glassglow coma scale 2. Assessing optimal use of mannitol by considering duration of mannitol therapy TYPE OF STUDY: It is a retrospective study. STUDY SETTING: Case records of patients admitted from Aug 2014 to Aug 2015, in AVBRH Hospital sawangi who received Mannitol therapy SAMPLE SIZE: 40 patients. DATA COLLECTION: Data was collected from case papers available at medical report department of AVBRH hospital in structured format STUDY DESIGN: 1. Case records of patients admitted from Aug 2014 to Aug 2015, in AVBRH Hospital sawangi who received Mannitol therapy were assessed at medical report department of AVBRH hospital 2. Depending upon GCS scale written on case paper at time of admission patients were graded as mild, moderate and sever grades of severity 3. With the start of mannitol therapy till the day when GCS scale scored 15/15 was considered to be the total duration of mannitol therapy required to reduce edema effectively. This study suggest stage wise or severity wise treatment regimen of mannitol should be followed to decrease mortality as well as morbidity. Categorization of the patients with TBI is very important as per the severity of TBI with the help of GCS which is a clinical tool designed to assess severity of TBI. This study has certain limitations as it is Retrospective study with less sample size, more Prospective studies with large sample size is required to make this study more evident.

2425. Ingole, P. D., et al. (2014). "Comparison of intermaxillary fixation screw versus eyelet interdental wiring for intermaxillary fixation in minimally displaced mandibular fracture: a randomized clinical study." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **72**(5): 958.e951-957.

PURPOSE: The aim of the present randomized study was to evaluate the efficacy of intermaxillary fixation screw (IMFS) versus eyelet interdental wiring for intermaxillary fixation (IMF) in minimally displaced mandibular fractures., MATERIALS AND METHODS: A total of 50 patients with a minimally displaced mandibular fracture were enrolled, with 25 patients randomly selected for each group. In group I (study group, n = 25), the patients were treated using IMFS, and in group II (control group, n = 25), they received eyelet interdental wiring. Both techniques were assessed for the following parameters: time required for placement and removal of each type of IMF technique, time required for placement of IMF wires, postoperative occlusion, stability of the IMF wire, local anesthesia requirement during removal of each fixation type, oral hygiene status, glove perforation rate, and complications associated with both techniques. The collected data were analyzed using Student's unpaired t test or chi2 test. P < .05 was considered significant and the Statistical Package for Social Sciences software, version 10, was used for analysis., RESULTS: The average time required for placement in groups I and II was 17.56 and 35.08 minutes, respectively (P = .000). The time required for placement of the IMF wire in group I was 2.1 minutes and in group II was 6 minutes. The oral hygiene status was assessed, and the mean plaque index score for groups I and II was 1.44 and 2.12, respectively (P = .00). The glove perforation rate was much less in group I than in group II. Finally, the most common complication in both groups was mucosal growth., CONCLUSIONS: The results established the supremacy of IMFS compared with eyelet interdental wiring. Thus, we have concluded that IMFS, in the present scenario, is a safe and time-saving technique. IMFS is a cost-effective, straightforward, and viable alternative to cumbersome eyelet interdental and other wiring techniques for providing IMF, with satisfactory occlusion during closed reduction or intraoperative open reduction internal fixation of fractures. In addition, oral hygiene can be maintained, and the glove perforation rate was very low using IMFS. The relatively small sample size and limited follow-up period were the study limitations.

2426. Ingvar, M., et al. (1994). "Immunohistochemical markers for neurons and astrocytes show pan-necrosis following infusion of high-dose NMDA into rat cortex." Experimental neurology **128**(2): 249-259.

This study pertains to the transition between selective neuronal necrosis and the development of cerebral infarction (pan-necrosis). We infused the neuron selective excitotoxin N-methyl-D-aspartate (NMDA) at a relatively high concentration (10 microliters of 50 mM NMDA in phosphate buffer, pH 7.4) into the rat cortex. Local injection of lactic acid and a minor stab wound in the cortex were used as a reference. The tissue damage was evaluated with immunohistochemical markers for neurons (MAP2, parvalbumin) and for astrocytes (GFAP and S100 protein). The stab wound and infusion of lactic acid led to a small distinct area of pan-necrosis with a sharp border to the surrounding tissue. The NMDA lesions were characterized by a center of pan-necrosis with loss of all tissue elements that were larger and less distinctly demarcated than the other lesions. This study shows that activation of NMDA receptors per se can

induce pan-necrosis, and we conclude that the transition from selective neuronal necrosis to infarction depends on the intensity of the neuronal damage process.

2427. Inman, J. and Y. Ducic (2012). "Intracranial free tissue transfer for massive cerebrospinal fluid leaks of the anterior cranial fossa." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **70**(5): 1114-1118.

PURPOSE: The management of large skull base defects with refractory cerebrospinal fluid (CSF) leaks treated with intracranially placed free tissue transfers was examined., MATERIALS AND METHODS: A retrospective review of all cases of CSF leak presenting to the senior author from 1997 to 2008 in a private tertiary care referral practice was performed. Patients with intracranially placed free flaps were specifically examined for this review., RESULTS: In total 109 patients with skull base defects larger than 4 cm(2) or intractable CSF leaks were identified. Eighty-eight patients underwent reconstruction with local tissue flaps or free tissue grafts. Persistent massive leaks were repaired with 11 intracranial free tissue transfers. CSF fistulas were successfully closed in each instance, with no cases of flap failure or major complications., CONCLUSIONS: Intracranial placement of nonskin-bearing free tissue is an excellent treatment alternative for massive CSF leaks and refractory CSF fistulas related to large skull base defects.

2428. Inokuchi, S., et al. (2018). "[Frontal Base Penetrating Brain Injury by a Gardening Scissors:A Case Report]." No shinkei geka. Neurological surgery **46**(11): 999-1005.

A 43-year-old woman accidentally fell from a 1.5-m height with gardening scissors, and the cutting edge of the scissors pierced into her skull base through the left nasal cavity. After she pulled the scissors out by herself, her consciousness immediately deteriorated. She was transferred to Juntendo University Shizuoka Hospital by an ambulance helicopter. Intracerebral hematoma in the right frontal lobe caused by the middle cerebral artery injury was detected using brain computed tomography. Emergent hematoma evacuation with decompressive craniectomy was performed. In this procedure, cerebrospinal fluid(CSF)leakage was repaired using a multi-layered flap technique, which placed both the free autologous dura mater and pedicled temporalis muscle flaps into the damaged skull base space. After the surgery, CSF drainage was managed to control both intracranial pressure and CSF leakage. Upon discussion, several clinical issues can be highlighted. First, the gardening scissors were pulled out by the patient herself. Second, the foreign material penetrating the intracranial space might have conferred a high infection risk. Finally, it might be difficult to repair the severe damage inflicted upon the skull base by the large gardening scissors. In conclusion, it was considered that favorable results were obtained by the emergent surgical intervention and by repairing the skull base through forming a multi-layered flap with a combination of free and pedicled tissues.

2429. Iob, I., et al. (1983). "Traumatic cerebral aneurysm in pediatric age. Case report." Journal of neurosurgical sciences **27**(3): 187-190.

Cerebral aneurysm following head trauma in pediatric age is a rare complication particularly in the absence of skull fractures or penetrating brain wounds as in the present case. In the presence of rapid worsening of neurological conditions after head trauma, one may take into consideration this complication among other possible vascular accidents.

2430. Iovieno, A., et al. (2014). "Late-onset peripheral ulcerative sclerokeratitis associated with alkali chemical burn." American journal of ophthalmology **158**(6): 1305-1309.e1304.

PURPOSE: To report delayed-onset peripheral ulcerative keratitis (PUK) following alkali injury., DESIGN: Retrospective case series., METHODS: setting: Single institution (Cornea and External Disease Service, Moorfields Eye Hospital). participants: Six eyes of 5 patients with PUK and associated anterior scleritis that had a history of ocular alkali injury. observationprocedure: Patients were identified among PUK patients seen at Moorfields Eye Hospital over a 20-year period. main outcomes measures: Patients' demographics, clinical features, treatment, and outcomes., RESULTS: Recurrent PUK with scleritis following alkali burns occurred in 5 male patients/6 eyes (median age: 22 years, range 18-38) several years after the chemical trauma (average: 6.4 years; range 3-12). Management of PUK in these patients was similar to PUK arising from other etiologies., CONCLUSIONS: In this series of patients there was no evidence of an

underlying vasculitic cause for the PUK. A localized autoimmune response may, however, be involved in the pathogenesis of these cases, as seen in an animal model of chemical injury or in late mustard gas keratitis. We hope that this case series will bring this newly described condition to the attention of ophthalmologists and that this may assist in their treatment, which, in this series, required systemic immunosuppressive therapy.

2431. Irfan, F. B., et al. (2010). "Craniocerebral gunshot injuries in preschoolers." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **26**(1): 61-66.

INTRODUCTION: Gunshot wounds (GSW) to the head are the most lethal form of trauma; unfortunately, the frequency of children being involved in such form of trauma is increasing at an alarming rate worldwide. We present our experience with four children from 2 to 3 years of age with craniocerebral GSW admitted to the neurosurgery service at a tertiary care hospital., METHODS: For this study, four children, 2 to 3 years old, injured solely from bullet injuries to the head were selected. Their history, arrival Glasgow Coma Scale (GCS), clinical presentation at the time of arrival in ER, radiological findings, management, and follow-up reviewed., RESULTS: Out of four children, only one did not survive. The bullet entrance wound was in the parietal region in robbery-related incidences, and, in three cases, the injury was bihemispheric. The time taken to reach the emergency department was less than 2 h for all patients except one. Of four patients, three presented with GCS between 3 and 5 while 1 presented with GCS well above ten., CONCLUSION: Our results show that even in children presenting with low GCS<5, an early act of aggressive surgical intervention can prove to be a life-saving measure.

2432. Irimia, A. and J. D. Van Horn (2015). "Epileptogenic focus localization in treatment-resistant post-traumatic epilepsy." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **22**(4): 627-631.

Pharmacologically intractable post-traumatic epilepsy (PTE) is a major clinical challenge for patients with penetrating traumatic brain injury, where the risk for this condition remains very high even decades after injury. Although over 20 anti-epileptic drugs (AED) are in common use today, approximately one-third of epilepsy patients have drug-refractory seizures and even more have AED-related adverse effects which compromise life quality. Simultaneously, there have been repeated recommendations by radiologists and neuroimaging experts to incorporate localization based on electroencephalography (EEG) into the process of clinical decision making regarding PTE patients. Nevertheless, thus far, little progress has been accomplished towards the use of EEG as a reliable tool for locating epileptogenic foci prior to surgical resection. In this review, we discuss the epidemiology of pharmacologically resistant PTE, address the need for effective anti-epileptogenic treatments, and highlight recent progress in the development of noninvasive methods for the accurate localization of PTE foci for the purpose of neurosurgical intervention. These trends indicate the current emergence of promising methodologies for the noninvasive study of post-traumatic epileptogenesis and for the improved neurosurgical planning of epileptic foci resection.

2433. Irmak, N. A., et al. (2019). "Analysis of maxillofacial traumas in an emergency clinic." Kuwait Medical Journal **51**(2): 168-171.

Objective: To examine epidemiology, fracture pattern and the relation between fracture pattern and Duke facial trauma severity index in patients admitted for maxillofacial traumas Design: Retrospective study Setting: Emergency Department, Ankara Numune Education and Research Hospital, Turkey Subjects: Four hundred and twenty-eight patients who presented with a diagnosis of maxillofacial trauma Intervention: Medical treatment of patients with maxillofacial trauma Main outcome measure: Epidemiology, fracture pattern and the relation between fracture pattern and Duke facial trauma severity index Results: Of the 428 patients, 185 cases with at least one fracture of the maxillofacial bones were included in the study, 147 (79.5%) males and 38 (20.5%) females. Distribution of gender showed significant difference ($p < 0.001$). Age range was 8 – 90 years and average age was 38.69 ± 14.6 years. The most frequent cause of maxillofacial trauma was violence. The most frequent age range was 21-30 years old (28.6%, n = 53). The most frequent cause of maxillofacial trauma was violence in male cases and traffic accidents in female cases. There was a statistically significant relationship between gender and etiology (chi-square test, $p < 0.003$). There were a total of 268 facial fractures in the cases. Nasal bone fractures (21%) were the most common fractures. Violence was the most common cause of nasal bone, orbital floor and medial wall, zygomatic arch and Le-Fort II fractures. Falling was the most

common cause of frontal sinus, zygomaticomaxillar complex and maxillary sinus fractures. The most detected fracture was isolated upper midface fractures (51.4%). There was a statistically significant relationship between upper midface fractures and violence (Z test, p <0.001). There was also a statistically significant difference between midface fractures and violence and falling (Z test, p <0.002). Conservative treatment was applied to 66.5% of the cases and surgical treatment was applied to 33.5% of the cases. Conclusion: Maxillofacial fractures were significantly more common in males in the third decade of life, in the nasal bone, were caused by violence and treated with conservative treatments.

2434. Irshad, K., et al. (1998). "Unsuspected penetrating maxillo-orbitocranial injury: a case report." Canadian journal of surgery. Journal canadien de chirurgie **41**(5): 393-397.

A healthy 37-year-old man presented to the emergency room, complaining of blunt trauma to his mandible from a tree branch. Plain radiographs and computed tomography demonstrated a penetrating orbitocranial foreign body with the maxillary sinus as the entry site. The foreign body was a chain-saw file. It was extracted successfully through the oral cavity. The patient's recovery was uncomplicated and he suffered no neurologic or opthalmic sequelae.

2435. Isaac, A., et al. (2013). "Penetrating injury to the parapharyngeal space caused by a BB gun in a pediatric patient." Journal of Pediatric Surgery Case Reports **1**(2): 25-27.

Non-powder firearm related trauma to the head and neck has the potential for significant morbidity and mortality. This is especially so in children, whose injuries tend to be particularly under reported and trivialized. We present a case of penetrating trauma in a three-year-old boy caused by a BB gun pellet fired in close range to the face, entering the right side of the head and landing within 3 mm of the carotid bifurcation, fortunately, without major neurovascular injury. Due to potential morbidity related to surgical exploration of the parapharyngeal space, a non-surgical approach was observed. The patient suffered no functional deficit from the injury. This case demonstrates the merits of the non-surgical approach to head and neck trauma. The literature pertaining to the epidemiology of this injury is reviewed, including the advantages and disadvantages of surgical and non-surgical management.

2436. Isaacs, A. M., et al. (2015). "Penetrating intracranial nail-gun injury to the middle cerebral artery: A successful primary repair." Surgical neurology international **6**: 152.

BACKGROUND: Penetrating nail-gun injuries to the head are rare, however, the incidence has been gradually rising over the last decade. While there is a large volume of case reports in the literature, there are only a few incidences of cerebrovascular injury. We present a case of a patient with a nail-gun injury to the brain, which compromised the cerebral vasculature. In this article, we present the case, incidence, pathology, and a brief literature review of penetrating nail-gun injuries to highlight the principles of management pertaining to penetration of cerebrovascular structures., CASE DESCRIPTION: A 26-year-old male presented with a penetrating nail-gun injury to his head. There were no neurological deficits. Initial imaging revealed that the nail had penetrated the cranium and suggested the vasculature to be intact. However, due to the proximity of the nail to the circle of Willis the operative approach was tailored in anticipation of a vascular injury. Intraoperatively removal of the foreign body demonstrated a laceration to the M1 branch of the middle cerebral artery (MCA), which was successfully repaired., CONCLUSION: To our knowledge, this is the first reported case of a vascular arterial injury to the MCA from a nail-gun injury. It is imperative to have a high clinical suspicion for cerebrovascular compromise in penetrating nail-gun injuries even when conventional imaging suggests otherwise.

2437. Isaji, T., et al. (2016). "[Multi-Layered Closure of Transorbital Penetrating Brain Injury without Bone Reconstruction: A Case Report]." No shinkei geka. Neurological surgery **44**(2): 115-119.

A 26-year-old man was injured in a motor vehicle accident. He sustained a compound orbital fracture with brain contusion. The brain tissue protruded through the orbit. Computed tomography showed a long contusion with a moderate amount of hematoma in the right frontal lobe. No foreign body was observed in the cranium. On 3D CTA, the major cerebral vessels were found to be intact. An urgent surgery was first performed by neurosurgeons and subsequently by ophthalmologists. The periosteum was left on the skull. A frontal periosteal, a right temporal fascial, and a right temporal muscular flap were prepared. After debridement and irrigation, the dural tear was closed with the

right periosteal and fascial flaps. Finally, the frontal fascia was used to cover the orbital defect. The patient's clinical course was favorable. The patient was able to walk when discharged 46 days after the surgery. A penetrating brain injury through the orbit is rare, and its treatment is not established. A key to successful management of this injury is immediate assessment. Foreign bodies in the cranium, especially metal, should be checked for immediately. The cerebral vessels should also be evaluated. Usually, a surgical intervention is necessary. Since bone reconstruction can be associated with a risk of infection, a multi-layered closure, as described in this report, could prevent leakage of cerebrospinal fluid and subsequent meningitis.

2438. Isakov, V. D., et al. (2005). "[Injuries inflicted by non-barrel self-defense guns]." Sudebno-meditsinskaia ekspertiza **48**(4): 32-34.

2439. Isfort, A. (1965). "[The surgeon and skull injuries]." Der Chirurg und das Schadeltrauma. **84**: 1-128.

2440. Ishikawa, E., et al. (2000). "Intracerebellar penetrating injury and abscess due to a wooden foreign body--case report." Neurologia medico-chirurgica **40**(9): 458-462.

A 4-year-old boy presented with chopstick penetration into the cerebellum via the temporal squamosa and tentorium cerebelli, which resulted in a cerebellar abscess 1.5 years after the injury. The neuroimaging appearance of the wooden chopstick were unusual, hyperdense on computed tomography, and isointense on T2-weighted and hypointense on T2-weighted magnetic resonance imaging. Abscess aspiration and continuous drainage was performed with real-time intraoperative ultrasound guidance. The chopstick fragment was surgically removed and the patient discharged with minor neurological deficits. Wooden foreign body may show changes in properties after a long period of intraparenchymal retention. Extra care is required to remove wooden foreign bodies because of the high risk of infection.

2441. Ishisaka, E., et al. (2017). "Radiological findings of transorbital penetrating intracranial injury in a child." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **33**(11): 2061-2064.

In penetrating injuries, woods are known to be difficult to detect with radiological imaging studies, because the wood density are known to be extremely close to the value of air on CT. Adjustment of CT window and reconstruction of a 3D image from CT images allowed us to more accurately distinguish wood from air and to find the fragment of the wooden chopstick. It is particularly useful in transorbital penetrating injury.

2442. IŞik, H. S. and C. Özdemir (2011). "Unusual delayed presentation of celebratory gunshot injury; case report." Journal of Neurological Sciences **28**(1): 120-122.

Celebratory gunshot fire is a common problem all around the world, especially in the undeveloped and developing countries. People shoot into the air for celebration something, such as any kind of sports game, like football, new years, wedding ceremony or special national days. These celebrations generally occur in the crowded places or public housing areas and that can be result undesirable injuries. Here, we present an unusual delayed injury, a 13 years-old boy presented 7 days after an unrecognized celebratory gunshot injury with complaints of headache and vomiting.

2443. Iskhakov, O. S., et al. (2006). "[Relationship of the mechanism of injury to the types of brains damage and outcomes in children with isolated and mixed brain injury]." Zhurnal voprosy neirokhirurgii imeni N. N. Burdenko(2): 26-31.

2444. Islam, M. R., et al. (2022). "The perplexing postsurgical complication of carotid-jugular fistula: A bitter experience." Surgical neurology international **13**.

Background: Vascular injuries occur in approximately 25% of all penetrating neck traumas, with carotid artery injuries being particularly lethal. Penetrating neck injuries are potentially fatal. Vascular injuries occur in approximately

25% of cases, which can lead to the formation of arteriovenous fistulas. Case Description: The authors present a case of delayed open surgery to repair a carotid-jugular fistula that resulted in an unprecedented complication, as well as a brief review of the condition's diagnosis and treatment options. Conclusion: This case report suggests us that, penetrating neck injuries should be thoroughly evaluated for arteriovenous fistulae. To avoid complications, common carotid-jugular fistulas must be treated as soon as possible. Postoperative complications can be effectively managed with prompt action.

2445. Israr, S., et al. (2016). "Complex vascular sequelae in patients secondary to penetration trauma: An educational perspective from a large level-1 trauma hospital." Emergency radiology **23**(6): 538.

Learning Objectives/Aims: Chicago is a city plagued with violent attacks that lead to traumatic injuries; a trauma center's role is to focus on decreasing the mortality rate when these acute emergencies inevitably present. We aim to educate residents and attending physicians about the classifications and sub-classifications of the occult but deadly complications of penetration injuries. Recognize that prompt use of various radiological techniques, sometimes a multimodality approach is critical in reducing morbidity and mortality in these cases. Background: This is a retrospective case review of gunshot and stab cases presenting to our level 1 trauma center. The primary imaging modalities used for analysis were CT angiogram, CT, and MRI. Complications were categorized as arterial, venous, or uncommon vascular injuries. Arterial injuries were further classified as pseudoaneurysms (most common), dissections, occlusions, extravasations, and AV fistulas Types of venous injuries: cerebral venous occlusions, bullet fragment embolus. Content: Rupture of splenic artery pseudoaneurysms approach a mortality of 100 %, thus early recognition with CT and/or CTA is vital. Pseudoaneurysms are the most common sequela in penetration injuries to the head and neck. AV fistulas and pseudoaneurysms commonly occur simultaneously after trauma.Many of the vascular complications secondary to traumatic injuries are adequately treated with angiographic embolization or surgery. Summary: There are characteristic imaging features of vascular injuries that can help the clinician discern when conservative treatment is not enough. CT venogram is most often used currently to evaluate traumatic head injuries. Early indirect signs that are present in venous occlusion are often subtle, like edema of the gyri. When there is no exit wound and there is no bullet fragment in the expected area on plain film, then a CT scan or angiography should be performed to rule out a bullet embolus.

2446. Itshayek, E., et al. (2010). "Stiletto stabbing: penetrating injury to the hypothalamus with hyperacute diabetes insipidus." Clinical neurology and neurosurgery **112**(10): 924-926.

Diabetes insipidus (DI) is a well documented complication observed after traumatic head injuries. We report a case of hyperacute onset DI in a 19-year-old male who sustained a hypothalamic-pituitary injury when he was stabbed in the head with a 30-cm long thin-bladed knife. At CT, our patient showed significant hemorrhagic contusions of the lower hypothalamus. He developed polydipsia, polyuria, and mild hypernatremia in the Emergency Department. Diagnostic digital subtraction angiography showed a hypervascular congestive pituitary gland with prominent draining veins. On the third day his hypernatremia became severe (183mEq/L). He was managed with parenteral fluids and a regimen of intranasal DDAVP (1-desamino 8-d-arginine vasopressin), leading to improved plasmatic sodium levels, urine output, and urinary specific gravity. In patients presenting with hyperacute posttraumatic DI, emergency room physicians and neurosurgeons should rule out direct injury to the hypothalamus and/or the posterior lobe of the pituitary, and initiate early pharmacological treatment.

2447. Ivanova, M. S., et al. (2008). "[Long-time presence of foreign substance in cranial cavity]." Sudebno-meditsinskaia ekspertiza **51**(3): 29-30.

2448. Iversen, J. M., et al. (2013). "[Penetrating head trauma]." Penetrerende hodetraume. **133**(10): 1083.

2449. Ivy, R. H. (1970). "Single tubed pedicle in the form of a loop." Plastic and reconstructive surgery **45**(6): 601-602.

2450. Iwakura, M., et al. (2005). "Knife blade penetrating stab wound to the brain--case report." Neurologia medico-chirurgica **45**(3): 172-175.

A 28-year-old man attempted to kill himself with a knife stab into the parietal area. Neuroimaging showed no vascular impairment except slow venous flow around the knife due to tamponading. After obtaining informed consent, the knife was removed through a craniotomy without new brain injury. Postoperative neurological findings showed no deficit. Follow-up angiography revealed no vascular impairment. No infection occurred. Brain stab wounds cause numerous complications, such as intracranial hemorrhage, injury of important vessels, and infections. Minimal blade movement during removal and precautions to prevent massive hemorrhage are essential.

2451. Izci, Y., et al. (2005). "Comparison of clinical outcomes between anteroposterior and lateral penetrating craniocerebral gunshot wounds." Emergency medicine journal : EMJ **22**(6): 409-410.

OBJECTIVE: To investigate and compare, using a retrospective clinical study, the clinical outcomes of penetrating craniocerebral gunshot wounds (PCGW) with respect to the trajectory of penetration in the axial plane., METHODS: In total, 22 patients with PCGW caused by conflict, suicide attempt, or accidental firing were included in this study. They were divided into two groups: anteroposterior and lateral. All patients underwent surgical treatment following emergency intervention., RESULTS: Of the 22 patients, 16 had anteroposterior and 6 had lateral penetrating injury. Four patients with anteroposterior and five patients with lateral injury died despite surgical treatment. Mortality rate was 25% in the anteroposterior and 83% in the lateral injury group., CONCLUSION: We found that lateral PCGW is the most devastating type of missile injury to the head.

2452. Izci, Y., et al. (2003). "The clinical, radiological and surgical characteristics of supratentorial penetrating craniocerebral injuries: a retrospective clinical study." The Tohoku journal of experimental medicine **201**(1): 39-46.

Penetrating craniocerebral injuries (PCIs) are the most fatal injuries of the head that usually have a poor outcome. From the parenchymal destructions to ventricular lacerations, a wide variety of damages occurs during the injury. Surgical treatment is still the mainstay of the management in these patients. Twenty-two consecutive patients with supratentorial PCIs were retrospectively evaluated. Conflicts were the main causes of such injuries followed by suicide attempts and accidental gunfires. Shrapnel and bullet were the most wounding agents. All of the patients underwent surgical treatment following clinical and radiological evaluations. Nine of them were died and 7 were rehabilitated because of severe neurological deficits.

2453. Izvin, A. I., et al. (2011). "[A rare case of a gunshot wound in the ethmoid bone with the right-hand frontobasal skull fracture]." Vestnik otorinolaringologii(2): 70-72.

2454. Jabaly-Habib, H. Y., et al. (2002). "An intraorbital injury from an occult wooden foreign body." Journal of pediatric ophthalmology and strabismus **39**(5): 300-302.

2455. Jabbari, B., et al. (1987). "Clinical and radiological correlates of somatosensory evoked potentials in the late phase of head injury: a study of 500 Vietnam veterans." Electroencephalography and clinical neurophysiology **67**(4): 289-297.

Somatosensory evoked potentials were obtained after median nerve stimulation in 500 Vietnam veterans surviving penetrating head wounds 12-16 years earlier and 76 age-matched, uninjured controls. The results were studied in relation to neurologic history and findings, anatomical data provided by CT scan, and information derived from electroencephalograms. Thirty-five percent of head-injured individuals had abnormal SEPs and 76% of SEP abnormalities consisted of absence of N20 or N20/P25 complex. SEP abnormality correlated (P greater than 0.001) with the extent of total brain volume loss, sensory deficits (especially position and cortical discriminatory modalities), hemiparesis, organic mental disorder, CT evidence of parietal or thalamic injury, and centro-parietal EEG abnormalities. Recovery from hemiparesis was correlative with patients who subsequently had normal SEPs.

2456. Jabbari, B., et al. (1986). "Clinical and radiological correlates of EEG in the late phase of head injury: a study of 515 Vietnam veterans." Electroencephalography and clinical neurophysiology **64**(4): 285-293.

Electroencephalograms were obtained in 515 Vietnam veterans 12-16 years after penetrating head injury, and the results were correlated with a variety of clinical and radiological parameters. Forty-two percent of EEGs were abnormal; 9% disclosed epileptiform findings (EF). EF correlated highly (P = 0.0001) with the extent of brain volume loss (defined by CT), posttraumatic epilepsy, and organic mental disorder. 'Seizure persistence' was higher and duration of posttraumatic epilepsy was longer in patients with 'prominent EF.' All patients with anterior temporal or central spike foci experienced posttraumatic seizures. Focal slowing correlated significantly with focal neurologic deficits such as hemisensory deficit or hemiparesis and Broca's aphasia as well as with seizures and residual organic mental disorder. Total or near total recovery from original hemiparesis was noted in 70% of the patients with normal EEG and 32% of the patients with focally slow tracings.

2457. Jabbarinejad, R., et al. (2021). "Determinants of caregiver burden in male patients with epilepsy following penetrating traumatic brain injury." Epilepsy & behavior : E&B **116**: 107768.

PURPOSE: We determined burden of caring for patients with post-traumatic epilepsy (PTE) following penetrating traumatic brain injury (TBI) and identified factors predicting higher burden., METHOD: We assessed 331 caregiver-veteran dyads in Phase 2 (136 PTE, 136 non-PTE, and 59 HC dyads), 133 in Phase 4 (47 PTE, 56 non-PTE, and 30 HC dyads) - 30years later, and 46 dyads in the follow-up study (18 PTE, 19 non-PTE, and 9 HC). Caregiver's burden was measured by Zarit Burden Index and a questionnaire. Veterans completed demographic, mental and physical well-being, quality-of-life, and medical-related information. Caregivers provided information about burden and their assessments of cognitive decline and neuropsychiatric status of the veterans., RESULTS: PTE caregivers perceived significantly more burden than comparison groups at all phases. Bivariate analyses revealed that caregiver distress due to the veteran's neuropsychiatric state including cognitive decline, apathy, and disinhibition and the veteran's characteristics including older age at epilepsy onset and role limitation due to physical problems were associated with higher burden. Finally, we revealed disinhibition distress, and role imitation due to physical problems as the predictors in a model of caregiver burden., CONCLUSION: Elevated PTE caregiver burden is persistent across the life span suggesting that caregivers could benefit from counseling and targeted psychosocial interventions to reduce their burden.

2458. Jablonska, A., et al. (2013). "Different methods of immunosuppresion do not prolong the survival of human cord blood-derived neural stem cells transplanted into focal brain-injured immunocompetent rats." Acta neurobiologiae experimentalis **73**(1): 88-101.

Cerebrovascular diseases are the leading cause of severe disability worldwide, with an enormous financial burden for society. There is growing evidence that stem cell-based therapy may positively influence recovery from stroke. Cord blood is an attractive source of ontogenetically young, yet safe, stem cells. Conceptually, preclinical studies in which donor cells were of human origin have been the most valuable, and thus, it is likely that these cells will be used in clinical trials. Unfortunately, immunological barriers impede discordant xenotransplantations. We have previously observed acute rejection of cord blood derived neural stem cells (HUCB-NSC) after transplantation to the brains of intact animals. Since it was reported recently that a brain lesion may actually improve the chances of graft survival, in this study, we used infarcted animals as graft recipients. In ongoing studies, we tested three immunosuppressive regimes: group I received cyclosporine A (CsA: 10 mg per kg i.p.); group II received a triple-drug therapy (CsA: 10 mg per kg i.p., azathioprine: 5 mg per kg i.p., and methylprednisolone: 1.5 mg per kg i.m.); group III included rats that were formerly desensitized with HUCB, group IV had not undergone immunosuppression. Animals were sacrificed at five time-points: 1, 3, 7, 14, and 21 days post-transplantation to evaluate graft survival and the time-course of immunological response. We observed a gradual decrease in the number of transplanted cells, with complete disappearance by day 14, surprisingly, with no difference among the experimental groups. The involvement of the innate immune system in the process of graft rejection dominated over an adaptive immunoresponse, with the highest activity on day 3, and subsequent fading of immune cell infiltration. In this work, we have shown that none of our immunosuppressive strategies proved adequate to prevent rejection of human stem cell grafts after transplantation into immunocompetent animals.

2459. Jackowski, C., et al. (2004). "Visualization and quantification of air embolism structure by processing postmortem MSCT data." Journal of forensic sciences **49**(6): 1339-1342.

Venous air embolism (VAE) is an often occurring forensic finding in cases of injury to the head and neck. Whenever found, it has to be appraised in its relation to the cause of death. While visualization and quantification is difficult at traditional autopsy, Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) offer a new potential in the diagnosis of VAE. This paper reports the findings of VAE in four cases of massive head injury examined postmortem by Multislice Computed Tomography (MSCT) prior to autopsy. MSCT data of the thorax were processed using 3D air structure reconstruction software to visualize air embolism within the vascular system. Quantification of VAE was done by multiplying air containing areas on axial 2D images by their reconstruction intervals and then by summarizing the air volumes. Excellent 3D visualization of the air within the vascular system was obtained in all cases, and the intravascular gas volume was quantified.

2460. Jackson, A. M., et al. (2008). "Answer to last month's radiology case and image: Keyhole Fracture of the Skull (Case # 31 appears at the end of this article)." Military medicine **173**(12): xix-xx.

2461. Jackson, C., et al. (2012). "Perfluorocarbon emulsion improves cerebral tissue oxygenation after penetrating ballisticlike brain injury in rat." Journal of neurotrauma **29**(10): A214.

Introduction Cerebral ischemia is a common secondary sequela of traumatic brain injury (TBI). The aim of this study is to analyze the pharmacological effect of the normobaric perfluorocarbon (PFC) emulsion (PerftecTM) in the rat penetrating ballistic-like brain injury (PBBI) on cerebral oxygenation using continuous brain oxygen tension (PbtO2, LICOX) monitoring. Methods Adult SD rats received unilateral PBBI and were assigned into one of three groups (n = 7/group). Under anesthesia and controlled ventilation, a small burr hole was made at the right parietal skull and a PbtO2 monitor was inserted into the parietal brain tissue. Another burr hole was made at the right frontal skull for PBBI. After stabilization of the PbtO2 monitor (> 20min), the PBBI probe was inserted and rapidly inflated to induce injury. (1) PFC group: Fifteen minutes post-injury, PFC emulsion (10ml/kg) was infused at a rate of 0.5ml/min through the femoral vein catheter. (2) Vehicle group: An equivalent volume of saline was infused at a rate of 0.5ml/min. (3) Sham control group: Received craniotomy and equivalent saline infusion without PBBI. PbtO2, MAP, and arterial blood gases were compared among the three groups. Data was expressed as percentage change from baseline. Results There were no significant differences in MAP and arterial blood gas data among the three groups. Compared to the sham control group, cerebral oxygen tension was significantly decreased in the PBBI vehicle group. Tissue oxygenation was significantly improved in the PFC group ($p < 0.05$) but not in the vehicle group. At the end of the recording, PbtO2 in the PFC group was significantly higher than in the vehicle group (last 10 minutes; 23.54 - 0.65 vs 20.05 - 0.38 mmHg). Conclusions This study suggests the efficacy of PFC as a therapeutic strategy targeted to abolish/reduce the hypoxia observed in PBBI. Further, volumetric histopathology and cell count studies are under way.

2462. Jackson, F. E., et al. (1965). "Utilization of pulsed sonic beams (echoencephalogram) for detection of fragments of bone indriven into the brain." Military medicine **130**(11): 1107-1109.

2463. Jacob, B., et al. (1989). "Multiple suicidal gunshots to the head." The American journal of forensic medicine and pathology **10**(4): 289-294.

We report two cases of suicide by multiple gunshots to the head. The first victim (of two shots) fired the first shot, which was observed, into his mouth, leading to damage to the left optic nerve and frontal lobe. The man still was able to drive his car home, where he shot himself in his right temple. He died 2 days later. The second victim (of three shots) was a 58-year-old man who was found dead on his bed. Reconstruction of the case disclosed that the first shot had passed through his tongue and slightly damaged the second cervical vertebral body. He then shot himself in his right temple, leading to damage of the temporal lobe. Finally, he shot himself in his left temple, resulting in destruction of the pons. In the first case, an amateurishly modified 8-mm blank revolver firing 6.35-mm- (.25)-caliber ammunition was used; in the second case, a rifle firing 5.6-mm (.22)-caliber ammunition with a reduced charge was used. In both cases, low-energy transfer to brain tissue by the initial bullets was due to low bullet energy or due to the bullets' missing the brain or vital centers.

2464. Jacob, J. T., et al. (2005). "Transorbital penetrating brainstem injury in a child: case report." Journal of neurosurgery **102**(3 Suppl): 350-352.

The authors present the unusual case of a 9-year-old girl who sustained injury to her brainstem as a result of the orbital penetration of a metal projectile (nail) into the juxtamedullary region. This case and others reported in the literature associate this type of injury with relatively minor complications. Thorough imaging of the intracranial contents and surgical removal of the projectile is recommended.

2465. Jacob, O. J., et al. (1999). "Late complications of arrow and spear wounds to the head and neck." The Journal of trauma **47**(4): 768-773.

2466. Jacobi, G. (1992). "[Post-traumatic epilepsy]." Posttraumatische Epilepsien. **140**(9): 619-623.

There might be 3 different forms of epilepsy following head injury: earliest seizures with occasional characteristics, early seizures prompting considerations of differential diagnosis, and, late seizures which might have a chronic course = posttraumatic epilepsy proper. The risks to have posttraumatic epilepsy for a child suffering from head injury are: penetrating cranial trauma, early seizures, intracranial hemorrhage, unconsciousness > 24 hours, depressed fracture with dural laceration and unconsciousness > 24 hours, fractures on the base of the skull, focal synchronous activity in the EEG which is related to the site of brain injury. If a or > or = 2 of b-g are given we recommend prophylactic antiepileptic therapy: in the younger (< 5 years) with a low dose of phenobarbital and in the elder (> 5 years) carbamazepine for at least 2 years of treatment.

2467. Jacobi, K. W. (1975). "[Early keratoplasty after perforating injury of the cornea (author's transl)]." Fruhe Keratoplastik nach perforierenden Hornhautverletzungen **167**(3): 427-434.

A report is given of experiences with early penetrating keratoplasty after perforating injury of the cornea, lens, and vitreous. 10x0-nylon through- and through sutures were used. The technique of operation and the results of treated cases are demonstrated with photos.

2468. Jacobs, B., et al. (2012). "Sucessful treatment with temsirolimus in a patient with cutane and retinal relapse of mantle cell lymphoma." Onkologie **35**: 45.

Introduction: Mantle cell lymphoma frequently presents with extranodal involvement as cutaneous manifestations or cerebral lesions. The mTOR inhibitor temsirolimus, which was recently approved for treatment of relapsed or refractory mantle cell lymphoma, penetrates the blood-brain barrier and may be therefore suitable for treatment of CNS-involvement. Methods: We report here a patient with cutaneous and retinal manifestations of a relapsed mantle cell lymphoma, responding to treatment with temsirolimus. Results: A 71-year old patient presented with blastoid mantle cell lymphoma stage IV (bone marrow, cervical/ abdominal lymph nodes). He was treated with 3 cycles of R-CHOP and R-DHAP respectively and was consolidated with radiotherapy. High dose chemotherapy was not feasible because of significant comorbidities and complications during initial treatment. A good partial remission was achieved. 1 month later, suspected cutaneous recurrence was successfully treated with local steroids. After nearly one year, the patient relapsed with retroperitoneal lymphomas, splenomegaly and ascites. Second line therapy with Rituximab-Bendamustine was started. After 6 cycles, a complete response was achieved. Three weeks later, the patient presented with several new cutaneous lesions on his left arm, impaired peripheral vision of his left eye and new pararenal lymphoma. Ophthalmologic examination was consistent with retinal and vitreous body involvement. Biopsy of the cutaneous nodules confirmed infiltration of blastoid mantle cell lymphoma. Therapy with temsirolimus was started and led to rapid improvement of the peripheral vision, complete response of the cutaneous lesions and partial response of the abdominal lymph nodes. Ophthalmologic examination revealed only small residual lesions in the retina, consistent with cicatrices, and no residual vitreous body infiltration. Therapy was well tolerated. The patient remained stable without any signs of progression up to now for at least 5 months under continuous therapy. Conclusion: We report here for the first time a patient with retinal and vitreous body involvement of relapsed mantle cell lymphoma, successfully

treated with temsirolimus. This case suggests that temsirolimus could be a useful agent for treatment of cerebral manifestations of mantle cell lymphoma.

2469. Jacobs, D. G., et al. (1995). "Transcranial gunshot wounds: cost and consequences." The American surgeon **61**(8): 647-644.

Poor outcomes following transcranial gunshot wounds (TC-GSW) and the perception of significant financial loss have led some institutions to adopt a fatalistic attitude towards these patients. This study was undertaken to define those factors predictive of mortality following TC-GSW as well as to determine the costs and benefits associated with providing care to these individuals. We reviewed the medical records of 57 TC-GSW patients seen at our Level I Trauma Center between January 1990 and December 1992. Overall mortality was 75 percent, and was statistically associated with an admission Glasgow Coma Score of 4 or less, a respiratory rate of less than 10, and self-inflicted wounds. Complete financial information was available for 37 of the 57 patients. Reimbursements for this group were $306,156 and exceeded costs by $62,257. Organ donation efforts were successful in 44.2 per cent of the nonsurvivors (19/43), yielding 60 organs and 29 tissues for transplantation. Nonsurvivors who became organ donors were clinically and demographically indistinguishable from those in whom organs/tissues could not be retrieved. Despite the poor outcome following TC-GSW, vigorous resuscitation and stabilization is justified in all patients, in that nearly one half of nonsurvivors will become organ and/or tissue donors. Concerns regarding excessive monetary looses by treating facilities are unfounded.

2470. Jacobs, G. B., et al. (1977). "Brain abscess associated with facial trauma." International surgery **62**(4): 236-237.

2471. Jacobs, H. G. (1977). "[Excentric orthopantomography of the temporomandibular joint region as an additional diagnostic aid in traumatology]." Die exzentrische Orthopantomographie der Kiefergelenkregion als zusatzliche Orientierungsmoglichkeit in der Traumatologie **32**(5): 391-395.

2472. Jacobs, J. B. and M. S. Persky (1980). "Traumatic pneumocephalus." The Laryngoscope **90**(3): 515-521.

2473. Jacobs, L. M., et al. (1985). "Crowbar impalement of the brain." The Journal of trauma **25**(4): 359-361.

The management of impaled foreign objects is always a challenge. Stabilization of the object, control of hemorrhage, and adherence to the basic principles of airway and breathing control are hallmarks of prehospital management. Once the patient is in the hospital, a careful assessment of the involved vital structures is essential before removal is attempted. A penetrating injury to the left hemisphere of the brain with a crowbar is presented. This case demonstrates the characteristics of these injuries in terms of extrication, assessment, management of complications, and neurologic sequelae.

2474. Jacobs, N. A. and L. H. Morgan (1988). "On the management of retained airgun pellets: a survey of 11 orbital cases." The British journal of ophthalmology **72**(2): 97-100.

Relevant factors determining the management of inaccessible retained lead airgun pellets are discussed in relation to 11 orbital cases. Although the injuries were of between one month's and 26 years' standing, serum lead levels were normal at under 350 micrograms/l in all instances. This is attributable to the modern alloy composition of the ammunition in question. It is concluded that surgical intervention may be indicated only where there is a mechanical disturbance of ocular motility allied with good visual function.

2475. Jacobson, A. S., et al. (2009). "Asymptomatic lower extremity deep venous thrombosis resulting in fibula free flap failure." The Laryngoscope **119**(6): 1085-1087.

OBJECTIVES/HYPOTHESIS: The successful harvest and transplant of a fibular flap depends on many factors, including healthy inflow and outflow systems. A contraindication to harvesting a fibular flap is disease of the lower

extremity arterial system; therefore, preoperative evaluation of the arterial system is routine. Preoperative evaluation of the venous system is not routine, unless there is clinical suspicion of venous disease., METHODS: Retrospective chart review., RESULTS: Two cases of occult deep venous thrombosis (DVT) were encountered intraoperatively resulting in nontransplantable flaps., CONCLUSIONS: This finding represents a serious concern, and we believe that venous imaging should be considered in patients with significant risk factors for harboring an occult DVT. Laryngoscope, 2009.

2476. Jadhao, S., et al. (2021). "Study of shirogat (head region) avedhyasira and marma with special reference to adhipati and shankha as avedhyasira and sadhyapranharmarma." European Journal of Molecular and Clinical Medicine **8**(1): 214-221.

Ayurved is science of healthy life, which has its unique and useful basic concepts. Out of these concepts, Avedhyasira and Marma-Vigyan are important structural concepts which are described by AcharyaSushrutin SushrutaSamhitaSharirsthan and by AcharyaVagbhat in AstangHridayaSharirsthan. Without studying Avedhyasira and Marma, Surgeon cannot perform skilled and perfect surgery as well as for physician it will be definitely difficult to treat the patients without knowing the perfect location of these structures. In our present study we emphasized on Avedhyasira and Marmain the head region. Specially Adhipati and Shankhathese two structures which are studying in the text as Marma and Avedhyasira are the same, which in the modern texts are given as vital parts. With the help of correlation with modern anatomy, here we try to explain exact anatomicalstructure mentioned as Adhipati and ShankhaAvedhyasiraand sadhyapranharMarma. In ancient time AcharyaSushrut and Vagbhat have clearly mentioned these structures from which incision should not be taken and more care should be taken as they are vital parts and fatal of life. Injury to these structures may cause death also.

2477. Jafari, A. A., et al. (2022). "Paroxysmal sympathetic hyperactivity during traumatic brain injury." Clinical neurology and neurosurgery **212**: 107081.

Traumatic brain injury (TBI) is one of the leading causes of disability, morbidity, and mortality worldwide. Some of the more common etiologies of TBI include closed head injury, penetrating head injury, or an explosive blast head injury. Neuronal damage in TBI is related to both primary injury (caused by mechanical forces), and secondary injury (caused by the subsequent tissue and cellular damages). Recently, it has been well established that Paroxysmal Sympathetic Hyperactivity (PSH), also known as "Sympathetic Storm", is one of the main causes of secondary neuronal injury in TBI patients. The clinical manifestations of PSH include recurrent episodes of sympathetic hyperactivity characterized by tachycardia, systolic hypertension, hyperthermia, tachypnea with hyperpnea, and frank diaphoresis. Given the diverse manifestations of PSH and its notable impact on the outcome of TBI patients, we have comprehensively reviewed the current evidence and discussed the pathophysiology, clinical manifestations, time of onset and duration of PSH during TBI. This article reviews the different types of head injuries that most commonly lead to PSH, possible approaches to manage and minimize PSH complications in TBI and the current prognosis and outcomes of PSH in TBI patients.

2478. Jaja, B. N. R. and P. O. Eghwrudjakpor (2014). "Effect of demographic and injury etiologic factors on intensive care unit mortality after severe head injury in a low middle income country." Annals of African medicine **13**(4): 204-209.

BACKGROUND: Low- and middle-income countries bear the mortality burden of head injury compared with high-income countries. Not much has been studied about predictors of poor outcome after head injury in these countries. This study describes and quantifies the effect of demographics and injury causative factors on mortality in a cohort managed in a Nigerian tertiary hospital intensive care., MATERIALS AND METHODS: A retrospective study was undertaken of all patients admitted into intensive care with severe head injury at the University of Port Harcourt Teaching Hospital, Nigeria between 1 st January, 1997 and 31 st December, 2006. Logistic regression analysis was performed to examine the effect of age, gender and injury etiology on risk of intensive care unit (ICU) mortality., RESULTS: The number of ICU admission for severe head injury was 231 patients with a male to female ratio of 2.8:1. Patients' mean age and standard deviation was 31.2 +/- 15.5 years. The mortality rate was 52.8%. Road traffic injury was the most common etiologic factor (84%). Logistic regression analysis indicated a 56% increase in the risk of ICU mortality between the ages of 21 and 40 years. The effect of age was found to be nonlinear (likelihood ratio P = 0.033). On multivariable analysis, patient's gender (odds ratio 1.07; 95% confidence interval: 0.56-1.97) and etiology of injury were not significantly associated with risk of mortality. Gender was not a modifier of the effect of age (P = 0.218).,

CONCLUSION: The study indicated a strong prognostic effect of age. Gender and etiology of injury had no effect on ICU mortality among study cohort.

2479. Jakobsen, L. K., et al. (2018). "[Insufficient CT scan in visualizing an intracerebral parenchymal damage in a six-month-old boy]." Ugeskrift for laeger **180**(7).

A six-month-old boy fell over, and a crochet hook penetrated his skin underneath his left eye. The hook was removed, and an emergency physician found a Glasgow Coma Scale score of 6-7. A CT scan showed no cerebral or ophthalmic injury. However, the patient was persistently apathic with head- and gaze direction towards the left and a facial nerve palsy. An MRI showed a linear intracerebral lesion stretching through pons into the cerebellar vermis. The patient had neuropaediatric rehabilitation and recovered fully within months. The case is an example of CT scan being insufficient in visualizing intracerebral parenchymal damage.

2480. Jamal, Z., et al. (2021). "Head injury predominance of fire arm injury with temporal bone fracture." Pakistan Journal of Medical and Health Sciences **15**(2): 604-605.

Objective: To identify in patients the causes of head injury and fractured bone in the head. Study Design: Retrospective study Place and Duration of Study: Department of Radiology and Department of Forensic Medicine, Peoples Medical College/Hospital, Nawabshah, Shaheed Benazirabad, Sindh, Pakistan from 1stJanuary 2018 to 31stDecember 2018. Methodology:Six hundred and twenty one cases of fire arm injuries were evaluated. Results:Majority of patients come from rural dwellers, 89 (54.6%) compared to 74 (45.4%) proportionately from urban dwellers. Firearm injury is the leading cause of injury in 61 (36.1%) of cases. Temporal bone 96 (56.8 %) is the most head injured as shown in Conclusion: Most of the patients are from rural areas and among them is the most common cause of head injury is fire arm injury, and temporal bone is also harmed by cranial bone injury.

2481. Jamali, M., et al. (2021). "Multiple Brain Abscesses by an Air Gun Shot: A Case Report." Brazilian Neurosurgery **40**(4): E404-E407.

Introduction Low-velocity penetrating brain injury is not prevalent. In some conditions such as childhood, and with the penetration of a pellet in weak spots of skull, low-velocity penetrating brain injury is expected; however, high-velocity projectiles have also been reported as the cause of severe brain injuries. One of the complications of penetrating brain injury is infection, in which different types of microorganisms play a role. The Streptococcus genus is the leading cause of abscess formation in non-traumatic patients. Multiple brain abscesses are not common. Case Presentation A 10-year-old boy with penetrating brain injury caused by an air gun pellet, who developed signs and symptoms of high intracranial pressure 18 days after the trauma. After the imaging scans and the detection of multiple brain abscesses and severe brain edema, prompt surgical intervention was performed for all three lesions in a single operation. The culture of a pus specimen was positive for Streptococcus species, and, with adequate antibiotic therapy, the patient was discharged from the hospital in good condition. Conclusion Brain injury with air gun shot is not prevalent. The penetration of a low-velocity air gun pellet in weak points of the skull (such as the orbit, the squamous portion of the temporal bone, and the cranial suture), specially in children, can cause significant brain injuries.

2482. James, C. A. (1997). "Magnetic resonance angiography in trauma." Clinical neuroscience (New York, N.Y.) **4**(3): 137-145.

Following blunt or penetrating trauma to the head and neck, a variety of traumatic vascular injuries may occur. Often the clinical presentation of a craniocervical arterial injury is delayed and neuroimaging studies are necessary to evaluate for delayed findings of intracranial infarction or hemorrhage. In this setting, magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) may allow a prompt noninvasive diagnosis of craniocervical vascular injury. MRA may be helpful in selecting those patients requiring conventional angiography and allows a noninvasive follow-up evaluation of arterial injury following institution of therapy.

2483. James, G., et al. (2006). "A case of self-inflicted craniocerebral penetrating injury." Emergency medicine journal : EMJ **23**(5): e32.

2484. Jamjoom, A. B., et al. (1989). "Airgun injuries of the brain." Injury **20**(6): 344-346.

Brain injuries caused by airguns are serious. The optimal management is wound exploration, excision of contaminated tissues and removal of loose bone fragments. In addition, careful monitoring, prophylactic antibiotics and anticonvulsants are required. The outcome is dictated by the importance of the intracranial structures which the pellet transects and the development of complications. Removal of the pellet is desirable only if easily accessible. We report five cases, of which four survived without deficits and one remained severely handicapped.

2485. Jamous, M. A. (2019). "Outcome of Craniocerebral Penetrating Injuries: Experience from the Syrian War." Journal of neurological surgery. Part A, Central European neurosurgery **80**(5): 345-352.

OBJECTIVES: Gunshot wounds to the brain are the most fatal of all firearm injuries. The aim of this study was to evaluate mortality and morbidity in patients with penetrating craniocerebral gunshot injuries and to identify risk factors that affect the outcome., PATIENTS AND METHODS: A retrospective review from June 2012 to November 2013 of 44 Syrian patients with gunshot wound to the head was performed. A thorough physical examination and computed tomography (CT) of the brain was obtained for all patients at the time of admission. Associated systemic injuries were found in 19 patients (43%). Surgical intervention was performed in 25 patients (57%); the remaining patients were managed conservatively. The patients were followed for a period of 1 to 15 months (range: 6 +/- 2 months). Univariate analysis of patient age, sex, type of penetrating object, Glasgow Coma Scale (GCS) score and pupil size on admission, brain CT findings, presence of systemic injuries, and surgical intervention on the patient outcome was performed., RESULTS: Eleven patients (25%) had a bullet injury; the remaining 33 (75%) patients had blast injuries. Initial brain CT revealed different types of skull fractures, intracerebral hemorrhage, and brain edema in all patients. The mortality rate during the follow-up period was 25%. Of the survivors, 25 patients (76%) had a good recovery, eight patients (24%) had a mild disability, and none had a severe disability. The significant factors determining outcome in this series were GCS on admission ($p < 0.005$) and positive pupil reaction to light ($p < 0.05$). The patient age, sex, CT findings, systemic injuries, neurosurgical intervention, and hospital length of stay were not significant prognostic factors ($p > 0.05$)., CONCLUSIONS: Among various variables, GCS and pupil reactivity were the outcome predictors in patients with penetrating craniocerebral injuries. Age, sex, type of penetrating object, CT findings, and surgical intervention did not have a significant effect on survival for these kinds of injuries.

2486. Janas, A., et al. (2019). "Higher DAI grade correlates with worse short term outcome in pediatric traumatic brain injury." Neurocritical care **31**(1): S300.

Introduction Traumatic brain injury (TBI) is the leading cause of disability in children. Neuroimaging is essential for the acute evaluation of moderate-severe TBI, although its prognostic utility is unclear. Magnetic resonance imaging (MRI) allows for detailed characterization of diffuse axonal injury (DAI), the hallmark pathology described in non-penetrating TBI. Higher DAI grade in adults correlates with worse outcome, but this association has not been rigorously tested in children. We hypothesize that acute Rotterdam Score and DAI grade predict short-term functional outcome in children with acute TBI. Methods Patients admitted to Stanford Children's Hospital for acute TBI were identified via retrospective chart review based on ICD9 and ICD10 codes for TBI. Inclusion criteria were age >1mo and <19yrs with blunt, closed head trauma and MRI brain obtained during hospitalization. Exclusion criteria included history of epilepsy, prior TBI, developmental delay, and penetrating or non-accidental trauma. The first head CT and brain MRI obtained during hospitalization were used for analysis of Rotterdam Score and DAI grade, respectively. Discharge destination (home versus facility) was used as a marker of short-term functional outcome. Results Multiple logistic regression analysis on cohort of 44 children revealed that lower GCS and ventriculostomy were independent predictors for discharge to acute rehabilitation (OR 1.6 and 27, respectively) versus discharge home. Neuroimaging analysis revealed that more severe DAI significantly correlated with discharge to a rehabilitation facility ($p=0.011$), while Rotterdam CT score did not correlate with discharge destination ($p=0.106$). Conclusions Our study demonstrates that higher DAI grade is associated with worse short-term outcome in pediatric patients with closed head trauma, similar to findings in adults. Further studies are needed to better understand the short-and long-term prognostic value of acute neuroimaging in pediatric TBI.

2487. Janatpour, Z. C., et al. (2019). "Inadequate Decompressive Craniectomy Following a Wartime Traumatic Brain Injury - An Illustrative Case of Why Size Matters." Military medicine **184**(11-12): 929-933.

Traumatic brain injury has been called the "signature injury" of the wars in Iraq and Afghanistan, and the management of severe and penetrating brain injury has evolved considerably based on the experiences of military neurosurgeons. Current guidelines recommend that decompressive hemicraniectomy be performed with large, frontotemporoparietal bone flaps, but practice patterns vary markedly. The following case is illustrative of potential clinical courses, complications, and efforts to salvage inadequately-sized decompressive craniectomies performed for combat-related severe and penetrating brain injury. The authors follow this with a review of the current literature pertaining to decompressive craniectomy, and finally provide their recommendations for some of the technical nuances of performing decompressive hemicraniectomy after severe or penetrating brain injury.

2488. Janeke, J. B. (1984). "An unusual craniofacial injury. A case report." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde **66**(5): 190.

A 13-year-old White boy was operated on for a penetrating craniofacial injury caused by a speargun fishing harpoon. The missile penetrated the left nasal ala, traversed the maxillary sinus and the postero-medial wall of the latter and penetrated the posterior nasopharyngeal soft tissue and mucous membrane, almost abutting the anterior surface of the atlas. At an emergency procedure the missile was retrieved via a combined lateral rhinotomy/Caldwell-Luc approach. In spite of the horrific appearance of the accident there was no neurological deficit and vascular findings were minimal.

2489. Janez-Garcia, L., et al. (2018). "Occult Orbital Injury with Dagger Fragment with Resulting Pneumocephalus." Case reports in ophthalmological medicine **2018**: 5093417.

Penetrating injuries of the cranium are relatively uncommon, only 0.4% of all head injuries. In patients with disturbed conscious level, an extensive examination should be performed in the emergency unit to rule out transorbital penetrating brain injury. A 25-year-old male was attacked with a dagger. He presented with ethylic intoxication and the physical examination demonstrated a small skin injury on the lateral canthus of the left eye with a large periocular hematoma which prevented eyelid opening. Cranial CT scan showed a metallic intraorbital foreign body consisting of a fragment of a dagger which perforated the eyeball, and penetrated through the superomedial wall of the orbit into the anterior cranial fossa. Reconstruction of the eyeball was performed and the fragment was removed. Orbital injuries with a knife in situ are very unusual. Early identification and removal of retained foreign bodies are essential.

2490. Jankovic, S., et al. (2000). "Craniocerebral war missile injuries: clinical and radiological study." Acta neurochirurgica **142**(1): 101-102.

In this study we reviewed the initial clinical and radiological management and early outcomes of 176 consecutive patients from the war in Croatia.

2491. Jankovic, S., et al. (1997). "Early intracranial infections after brain missile injuries--the role of computer tomography in diagnosis and treatment." Acta medica Croatica : casopis Hravatske akademije medicinskih znanosti **51**(4-5): 233-237.

During the war in Croatia, from August 1991 until December 1994, 138 soldiers were treated at the Split University Hospital for different brain injuries inflicted by missiles. Nine of these 138 patients developed intracranial infection. This retrospective study reports on the outcome of these 9 intracranial infections caused by penetrating missile head injuries. In case of clinically suspected infection, computerized tomography scan was obtained at two time points during the course of infection in the same patient. Scans were obtained with and without contrast media, 7 to 14 days after the injury and the 4 weeks later. The role of computerized tomography in the detection and follow-up of various intracranial infections and long-term consequences were evaluated.

2492. Jankovic, S., et al. (1998). "Orbitocranial war injuries: report of 14 cases." Military medicine **163**(7): 490-493.

OBJECTIVE: In this study, we review the initial clinical and radiological management and early outcomes of 14 patients with orbitocranial war injuries treated at the University Hospital Split between 1991 and 1995., METHODS: This investigation involves 14 patients (13 soldiers and 1 civilian) with orbitocranial war injuries. The mean patient age was 31 years (range, 23-54 years). The penetrating object was a metal shrapnel fragment in 8 patients and a bullet in 6 patients. The results of clinical and radiological management were retrospectively analyzed., RESULTS: The mean time from the moment of wounding to hospital admission was 6 hours (range, 1-30 hours). The mean Glasgow Coma Scale score was 8 (range, 3-14). Craniotomy was the basic neurosurgical procedure, and three patients were treated with simple scalp wound debridement and closure. Osteoplastic operations of the orbital bones were performed in 13 patients. Enucleation/evisceration was performed in 6 patients (42.8%). At discharge, the mean Glasgow Outcome Scale score was 13, and 1 patient died in the hospital. Blindness (including amaurosis and anophthalmus) was present in nine eyes (8 patients), light-perception positivity and projection positivity were present in four eyes, and visual acuity was at 0.1 in 1 patient., CONCLUSION: An early multidisciplinary therapeutic approach and computed tomography as a diagnostic procedure are necessary for a good result in the treatment of orbitocranial war injuries.

2493. Jankovic, S., et al. (1998). "Clinical and radiological management of wartime eye and orbit injuries." Military medicine **163**(6): 423-426.

OBJECTIVE: The purpose of this study is to present our experience in treating 191 patients with eye and orbit injuries that occurred during the war in Croatia and Bosnia and Herzegovina., METHODS: The authors retrospectively reviewed the clinical and radiological management of wartime eye and orbit injuries in patients hospitalized at Clinical Hospital Split., RESULTS: Seventy-nine percent of the war eye and orbit injuries were caused by fragments of explosive devices, 9.9% by high-velocity missiles, and 8.4% by other objects. Most of the patients were admitted to the hospital within 24 hours of injury. The total number of injured globes was 222; 48.2% of globes had intrabulbar (mostly magnetic) foreign bodies, and 13% had extrabulbar intraorbital foreign bodies. Extensive wounds (perforation, double perforation, rupture, and evisceration/ enucleation) were encountered in 74% of patients, and 26% of patients had slight trauma. There was a statistically significant correlation between admission within the first 12 hours and postoperative visual acuity (Chi 2 = 3.93; p = 0.0474)., CONCLUSION: Along with clinical examination, computed tomography is the most important diagnostic procedure in preoperative evaluation of various forms of globe and orbit injuries. The admission time is the most important factor in determining postoperative visual acuity.

2494. Januário, J. G. d. O. M. S., et al. (2021). "Non-fatal Bihemispheric Penetrating Brain Injury from a Crossbow Arrow with Good Clinical Outcome: Case Report." Brazilian Neurosurgery **40**(2): e179-e182.

Crossbow injuries to the head have seldom been reported in the literature, and they represent a unique type of penetrating brain injury (PBI) in which a low-velocity arrow results in an intracranial fragment larger than most high-velocity projectiles, usually with a lethal outcome. We present the case of a 34-year-old man who attempted suicide with a self-inflicted cranial injury from a crossbow arrow, with a right parietal point of entry and a palpable subcutaneous tip in the left parietal region. The emergency team reported a Glasgow coma scale (GCS) score of 15, and the patient was brought sedated and intubated. Computed tomography (CT) imaging scans showed that the arrow crossed both parietal lobes, with mild subarachnoid hemorrhage and small cerebral contusions adjacent to its intracranial path. Careful retrograde removal of the penetrating arrow was performed in the CT suite, followed by an immediate CT scan, which excluded procedure-related complications. The patient woke up easily and was discharged 3 days later with mild left hand apraxia and no other neurologic deficits. To the best of our knowledge, there are no similar case reports describing both good clinical outcome and rapid discharge after a bihemispheric PBI. Individualizing the management of each patient is therefore crucial to achieve the best possible outcome as PBI cases still represent a major challenge to practicing neurosurgeons worldwide.

2495. Jaquins-Gerstl, A. and A. C. Michael (2009). "Comparison of the brain penetration injury associated with microdialysis and voltammetry." Journal of neuroscience methods **183**(2): 127-135.

Emerging evidence suggests that differences between microdialysis- and voltammetry-based estimates of extracellular dopamine in the brain might originate in the different penetration injury associated with each technique. To address this issue in a direct fashion, microdialysis probes and voltammetric microelectrodes were implanted in the

rat striatum for 1, 4, or 24 h. Tissues were perfused with a suspension of fluorescently labeled nanobeads to assess blood vessels near the implant. Tissue sections (30 microm) were labeled with antibodies for PECAM, an endothelial cell marker, or GFAP, a glial marker. In non-implanted control tissue, blood vessels were reliably double-labeled with nanobeads and antiPECAM. Tissue near microdialysis probe tracks exhibited ischemia in the form of PECAM immunoreactive blood vessels devoid of nanobeads. Ischemia was most apparent after the 4-h implants. Probe tracks were surrounded by endothelial cell debris, which appeared as a diffuse halo of PECAM immunoreactivity. The halo intensity decreased with implant duration, indicative of an active wound-healing process. Consistent with this, after 24-h implants, the probe tracks were surrounded by hyperplasic and hypertrophic glia and glial processes were extending towards, and engulfing, the track. Carbon fiber microelectrodes produced a diffuse disruption of nanobead labeling but no focal disruption of blood vessels, no PECAM immunoreactive halo, and no glial activation. These findings illuminate the differences between the extent and nature of the penetration injuries associated with microdialysis and voltammetry.

2496. Jaquins-Gerstl, A., et al. (2011). "Effect of dexamethasone on gliosis, ischemia, and dopamine extraction during microdialysis sampling in brain tissue." Analytical chemistry **83**(20): 7662-7667.

Microdialysis sampling of the brain is an analytical technique with numerous applications in neuroscience and the neurointensive care of brain-injured human patients. Even so, implanting microdialysis probes into brain tissue causes a penetration injury that triggers gliosis (the activation and proliferation of glial cells) and ischemia (the interruption of blood flow). Thus, the probe samples injured tissue. Mitigating the effects of the penetration injury might refine the technique. The synthetic glucocorticoid dexamethasone is a potent anti-inflammatory and immunosuppressant substance. We performed microdialysis in the rat brain for 5 days, with and without dexamethasone in the perfusion fluid (10 muM for the first 24 h and 2 muM thereafter). On the first and fourth day of the perfusion, we performed dopamine no-net-flux measurements. On the fifth day, we sectioned and stained the brain tissue and examined it by fluorescence microscopy. Although dexamethasone profoundly inhibited gliosis and ischemia around the probe tracks it had only modest effects on dopamine no-net-flux results. These findings show that dexamethasone is highly effective at suppressing gliosis and ischemia but is limited in its neuroprotective activity.

2497. Jardeleza, C., et al. (2021). "A chopstick snapped in two: A serious pediatric transoral impalement injury requiring external approach (open neck) operative intervention." Otolaryngology Case Reports **21**.

This case report presents a 27-month old child with an oral cavity impalement injury with a retained foreign body and potential great vessel injury. Whilst these oropharyngeal injuries are not uncommon in these subset of patients, most are managed conservatively with minimal injury of the puncture site. This unusual case describes a patient with a retained snapped wooden chopstick through the oral cavity into the parapharyngeal space and adjacent to skull base. Potential external carotid artery and internal jugular vein injury were also identified on imaging. A management algorithm for these potentially catastrophic injuries has been provided.

2498. Jardim, E. C. G., et al. (2011). "Foreign body in preauricular region." The Journal of craniofacial surgery **22**(4): 1531-1533.

Foreign bodies, although they are often found throughout the body, to a lesser degree in the face, still constitute a diagnostic challenge for the trauma surgeon. Its removal means danger of damaging important facial anatomic structures, even if its exact position from the image data was known. So, the objective is to describe a clinical report of a patient (42 years of age, male sex) who experienced falling to the ground, attended by the Department of Surgery and Traumatology Bucco-Maxillo-Facial Surgery, Faculty of Dentistry of Aracatuba, Sao Paulo State University, and 2 days after the trauma, he reported difficulty in mouth opening and pain. After clinical evaluation, we observed the presence of injury in the left preauricular region already in the process of healing. During the intraoral physical examination, a limitation of the mouth opening was noted. Radiographic posteroanterior and profile of the face showed 2 radiopaque foreign bodies in the left side, lying apparently at the region of the mandibular condylar process. Under local anesthesia, foreign body removal was carried from there with access to it through the preexisting facial injury. Further clinical examinations showed an improvement in mouth opening, absence of pain complaints, and/or functional complaints.

2499. Jarho, L. (1973). "Korsakoff-like amnesic syndrome in penetrating brain injury. A study of Finnish war veterans." Acta neurologica Scandinavica. Supplementum **54**: 3-156.

2500. Jarrahy, R., et al. (2001). "Retained foreign body in the orbit and cavernous sinus with delayed presentation of superior orbital fissure syndrome: case report." The Journal of craniofacial surgery **12**(1): 82-86.

Reports of delayed onset of neurological symptoms after penetrating intracranial trauma are rare. We present the case of a patient who presented with superior orbital fissure syndrome 72 hours after reported trauma to the right eye. Subsequent workup revealed a foreign body located within the orbit, passing through the superior orbital fissure and into cavernous sinus, impinging on the right cavernous carotid artery. Evidence of an intraorbital abscess was also present. Surgical management consisted of a combination of frontopterional and orbital approaches to fully expose both the cavernous sinus and the orbital contents. The foreign body was removed and the abscess was drained. The carotid artery was found to be intact. At 10-month follow-up examination, a slight ptosis and medial gaze of the right eye persist. All other symptoms have resolved.

2501. Javadi, S. A. H., et al. (2021). "Long-Term Outcome Following Decompressive Craniectomy in Pediatric Penetrating Blast Brain Injury; a Prospective Study." Archives of Neuroscience **8**(4).

Background: Brain penetrating blast injury is a leading cause of early death due to excessively elevated intracranial pressure (ICP), culminating in trans-tentorial herniation. The role of craniectomy to decrease ICP and secondary injuries has been controversial particularly in pediatric patients. Three cases of pediatric penetrating blast injuries undergoing decompressive craniectomy are reported in Methods: The current study was a prospective series, including fifteen cases of pediatric blast-related brain injury referred to the emergency ward during a period of two years. Three survived patients had a Glasgow Coma Scale (GCS) of four along with anisocoric pupillary light reflex (PLR). Decompressive craniectomy and ventriculostomy (EVD) were performed. The patients underwent ICP monitoring for two weeks. Results: Early postoperative GCS (5 days) was 7/15 in all three patients. Two weeks and one month's GCS were 9 and 14, respectively. After three months, cranioplasty was performed. Long-term follow-up detected no major motor deficits after one year and was associated with excellent school performance. Neuroplasticity resulted in contralateral dominancy and handedness in one case. Conclusions: Survivors of pediatric blast brain injury had a favorable outcome after decompressive craniectomy in the current paper. However, there was a limited number of patients, and the results could not be generalized. Further research in this regard with larger sample size is recommended.

2502. Javeed, F., et al. (2020). "Outcome of cranial firearm injuries in civilian population based on a novel classification system." Surgical neurology international **11**.

Background: Cranial firearm injuries (CFAIs) are expected to be frequent during warfare; however, it is becoming increasingly common among civilian population in our part of the world. these injuries are associated with significant morbidity and mortality in addition to financial loss. the objective of our study is to evaluate the pattern of gunshot injuries to cranium and their outcome. Methods: the study was conducted on 114 patients presenting with CFAIs to Jinnah Postgraduate Medical Centre, Karachi, Pakistan, between June 2015 and January 2019. Patients were evaluated with respect to age, gender, pattern of injury, Glasgow coma scale on arrival, radiological and clinical assessment, surgical intervention, and Glasgow outcome score measured at 6 months follow-up. Results: Among patients with cranial gunshot, injuries most were males (76.3%). More than 50% patients aged between 18 and 35 years. About 46.5% of patients presented with moderate traumatic brain injury commonly involving the temporal lobe (36.8%). Of total 114 patients, 84.2% were managed conservatively but wound debridement was done in all patients. At 6 months, the overall mortality in our patients was 33.3%. Patients with good outcome (GOS 4 and 5) were 30.7% and 35.9% patients had bad outcome (GOS 2 and 3). Complication rate was 14.9% and the most common complication was disseminated intravascular coagulation in 5.2%. Conclusion: Surgical intervention has no significant benefit over conservative management on long-term mortality and should be limited to patients with large intracranial hematomas and intraventricular hematomas causing hydrocephalus.

2503. Jaworski, D. M., et al. (1999). "Intracranial injury acutely induces the expression of the secreted isoform of the CNS-specific hyaluronan-binding protein BEHAB/brevican." Experimental neurology **157**(2): 327-337.

Hyaluronan (HA) plays an important role in tissue reorganization in response to injury. The mechanisms by which HA participates in these processes are likely to include HA-binding proteins. Previously, we reported the cloning and initial characterization of a central nervous system (CNS)-specific HA-binding protein, BEHAB (brain enriched hyaluronan binding), which was independently cloned in another laboratory and named brevican. BEHAB/brevican mRNA is expressed in the ventricular zone coincident with the initial proliferation and migration of glial cells and in surgical samples of human glioma, where glial-derived cells proliferate and migrate. To determine whether BEHAB/brevican is also expressed during the cellular proliferation and migration associated with CNS injury, we have examined BEHAB/brevican expression during reactive gliosis. BEHAB/brevican occurs as secreted and cell-surface, glycosylphosphatidylinositol (GPI)-anchored, isoforms. The secreted, but not the GPI-anchored, isoform is up-regulated in response to a stab wound to the adult rat brain. The temporal regulation and spatial distribution of BEHAB/brevican expression parallel the gliotic response and the expression of the intermediate filament protein nestin. The up-regulation of BEHAB/brevican in response to CNS injury suggests a role for this extracellular matrix molecule in reactive gliosis. Glial process extension, a central element in the glial response to injury, may require the reexpression of both cytoskeletal and matrix elements that are normally expressed during the glial motility seen in the immature brain.

2504. Jayadevan, R., et al. (2014). "A case of penetrating glass foreign body within the renal cortex." Urology **83**(6): e13.

A 32-year-old patient sustained a penetrating injury to the left flank and kidney after a fall backward onto a glass table. On computed tomography imaging, a 12x10x4 cm glass shard was identified penetrating the renal cortex. The patient was taken to the operating room to remove the foreign object. A rubber-shodded clamp was used to successfully remove the glass shard without complication. Although we commonly encounter stab wounds at our trauma center, the penetrating object is rarely present. The presence of the glass object resulted in a technically challenging and rare case.

2505. Jayamanne, D. G. and R. W. Bell (1994). "Non-penetrating corneal foreign body injuries: factors affecting delay in rehabilitation of patients." Journal of accident & emergency medicine **11**(3): 195-197.

A review of 783 patients with non-penetrating, superficial corneal foreign bodies (FBs), indicated that delay in rehabilitation was related to two factors: (1) the size of the abrasion following removal of the FB, larger abrasions requiring longer duration of antibiotic ointment, and (2) inadequate removal of corneal rust. Allergy to chloramphenicol 1% ointment (5.5 in 1000), commonly used in the management of corneal abrasions, is unpredictable and can also impair rapid rehabilitation.

2506. Jazayeri, M. A., et al. (2017). "Management of impacted intramyocardial shrapnel due to gunshot wound." Journal of the American College of Cardiology **69**(11): 2481.

Background: Intramyocardial shrapnel due to gunshot wound (GSW) poses a unique management challenge due to a paucity of data for optimal therapy, particularly with respect to embolization and stroke. Case: A 32-year-old male veteran with a history of alcohol abuse and depression was admitted after a self-inflected GSW to the left chest. There was concern for direct cardiac injury from bullet fragments. Electrocardiogram demonstrated diffuse inferolateral ST-segment elevation, and cardiac troponin I was 8.8 ng/mL. Transthoracic echocardiogram showed preserved ejection fraction, apical dyskinesis, and several 7-mm apical-inferior echodense masses. Non-operative management was pursued due to hemodynamic stability. On day 7 a facial droop was noted. Head CT showed evolving bilateral subcortical infarcts without hemorrhage. Transesophageal echocardiogram demonstrated prior dyskinesis but no intracardiac thrombus or shunt. CT coronary angiogram confirmed the presence of multiple bullet fragments in the left ventricular (LV) myocardium and pericardial space without cavitary filling defect. Decision-Making: His course was complicated by ischemic stroke in bilateral middle cerebral artery territories with a possible cardioembolic mechanism in the context of LV apical dyskinesis. Without compelling indication to remove the shrapnel due to overall clinical stability, and with a general lack of understanding regarding the long term evolution of intramyocardial shrapnel vis-à-vis potential migration, myocardial rupture, and pericardial tamponade, a clinical decision was made following discussions with

Neurology and Surgery colleagues that the potential risks of systemic anticoagulation likely outweighed any conferred benefit in the absence of intracardiac thrombus. The patient was discharged to a rehabilitation facility on day 21 with no further complication 12 months later. Conclusions: Management of intramyocardial shrapnel presents a complex clinical conundrum due to high potential for morbidity with invasive and conservative approaches. Multimodal cardiac imaging and a Heart Team approach may inform decision-making in an otherwise challenging risk-benefit analysis.

2507. Jaźwiec, A. M. and E. D. Komorowska Timek (2022). "The importance of a lifeboat-median artery forearm flap in Goldenhar Syndrome." European Journal of Plastic Surgery **45**(1): 197-201.

We present a case of a 32-year-old male with left-sided Goldenhar Syndrome and delta phalanx of the thumb, who was offered free tissue transfer from the forearm to address an intra-oral soft tissue deficiency. Despite the presence of appropriately developed right radial artery, used in previous facial reconstruction, the left radial artery occurred to be hypoplastic. He ultimately underwent free flap transfer based on the anomalous persistent left median artery. We suggest that in face of an unusual hand anatomy, flexible flap creation techniques that allow a lifeboat strategy of adjusting flap design should be considered preoperatively. Level of evidence: Level V, therapeutic study.

2508. Jean, W. C., et al. (2001). "Gunshot wound to the head resulting in a vertebral artery pseudoaneurysm at the base of the skull." The Journal of trauma **50**(1): 126-128.

2509. Jedrzejewski, B., et al. (2018). "Pseudoaneurysm of the Superficial Temporal Artery--Two Case Reports of a Rare Entity." Craniomaxillofacial Trauma and Reconstruction Open **2**(1): E70-E75.

In this paper, the authors present two case reports with patients who presented at different institutions for traumatic aneurysmal dilation of temporal vessels. The first case is a 18-year-old male who presented to plastic surgery following attempted excision by an outside provider after a fist fight. The second case is a 22-year-old male who presented to plastic surgery while inpatient after gunshot wound to the face. The differences in the cases are highlighted by the different approaches to the management of the lesions with direct incision and embolization respectively.

2510. Jelača, B., et al. (2022). "Minimally invasive treatment of transorbital penetrating injury of skull base and cavernous sinus - A case report." Vojnosanitetski pregled **79**(3): 301-304.

Introduction. A transorbital intracranial injury with a foreign body can be a very complex and controversial therapeutic problem. The orbit's content is susceptible to penetrating trauma, and neurovascular skull base structures are at high risk from injury. There are some traditional cranial surgical approaches and more recently reported different endoscopic approaches for treating this kind of injury. Case report. We presented a case of a 30-year-old male who had an accident at work when a piece of wood hit him in his head and entered through the medial aspect of his left orbit with skull base and cavernous sinus injury. Rapid and complete radiological and clinical assessments were performed, and the patient was treated in a minimally invasive manner. The foreign body was manually extracted with an endoscopic and endovascular team ready to treat adverse events. No postoperative complications were reported, and visual acuity increased at the one-month follow-up. Conclusion. Penetrating wounds of the orbit represent a challenge that requires a multidisciplinary assessment and well-organized management. Combined endoscopic minimally invasive approaches should be considered during the treatment of this kind of injury.

2511. Jeng, T. C., et al. (2008). "Delayed traumatic intracranial haemorrhage and progressive traumatic brain injury in a major referral centre based in a developing country." The Malaysian journal of medical sciences : MJMS **15**(4): 56-67.

A repeat Computer Tomographic (CT) brain after 24-48 hours from the 1(st) scanning is usually practiced in most hospitals in South East Asia where intracranial pressure monitoring (ICP) is routinely not done. This interval for repeat CT would be shortened if there was a deterioration in Glasgow Coma Scale (GCS). Most of the time the prognosis of any intervention may be too late especially in hospitals with high patient-to-doctor ratio causing high mortality and morbidity. The purpose of this study was to determine the important predictors for early detection of Delayed Traumatic Intracranial Haemorrhage (DTICH) and Progressive Traumatic Brain Injury (PTBI) before deterioration of GCS

occurred, as well as the most ideal timing of repeated CT brain for patients admitted in Malaysian hospitals. A total of 81 patients were included in this study over a period of six months. The CT scan brain was studied by comparing the first and second CT brain to diagnose the presence of DTICH/PTBI. The predictors tested were categorised into patient factors, CT brain findings and laboratory investigations. The mean age was 33.1 +/- 15.7 years with a male preponderance of 6.36:1. Among them, 81.5% were patients from road traffic accidents with Glasgow Coma Scale ranging from 4 - 15 (median of 12) upon admission. The mean time interval delay between trauma and first CT brain was 179.8 +/- 121.3 minutes for the PTBI group. The DTICH group, 9.9% of the patients were found to have new intracranial clots. Significant predictors detected were different referral hospitals (p=0.02), total GCS status (p=0.026), motor component of GCS (p=0.043), haemoglobin level (p<0.001), platelet count (p=0.011) and time interval between trauma and first CT brain (p=0.022). In the PTBI group, 42.0% of the patients were found to have new changes (new clot occurrence, old clot expansion and oedema) in the repeat CT brain. Univariate statistical analysis revealed that age (p=0.03), race (p=0.035), types of admission (p=0.024), GCS status (p=0.02), pupillary changes (p=0.014), number of intracranial lesion (p=0.004), haemoglobin level (p=0.038), prothrombin time (p=0.016) as the best predictors of early detection of changes. Multiple logistics regression analysis indicated that age, severity, GCS status (motor component) and GCS during admission were significantly associated with second CT scan with changes. This study showed that 9.9% of the total patients seen in the period of study had DTICH and 42% had PTBI. In the early period after traumatic head injury, the initial CT brain did not reveal the full extent of haemorrhagic injury and associated cerebral oedema. Different referral hospitals of different trauma level, GCS status, motor component of the GCS, haemoglobin level, platelet count and time interval between trauma and the first CT brain were the significant predictors for DTICH. Whereas the key determinants of PTBI were age, race, types of admission, GCS status, pupillary changes, number of intracranial bleed, haemoglobin level, prothrombin time and of course time interval between trauma and first CT brain. Any patients who had traumatic head injury in hospitals with no protocol of repeat CT scan or intracranial pressure monitoring especially in developing countries are advised to have to repeat CT brain at the appropriate quickest time .

2512. Jeng, T. C., et al. (2008). "Delayed traumatic intracranial haemorrhage and progressive traumatic brain injury in a major referral centre based in developing country." Malaysian Journal of Medical Sciences **15**(4): 56-57.

A repeat Computer Tomographic (CT) brain after 24-48 hours from the 1st scanning is usually practiced in most hospitals in South East Asia where intracranial pressure monitoring (ICP) is routinely not done. This interval for repeat CT would be shortened if there was a deterioration in Glasgow Coma Scale (GCS) most of the time the prognosis of any intervention may be too late especially in hospitals with high patient to doctor ratio causing high mortality and morbidity. The purpose of this study was to determine the important predictors for early detection of Delayed Traumatic Intracranial Haemorrhage (DTICH) and Progressive Traumatic Brain Injury (PTBI) before deterioration of GCS occurred as well as the most ideal timing of repeated CT brain for patients admitted in Malaysian hospitals. A total of 81 patients were included in this study over a period of six months. The CT scan brain were studied by comparing the first and second CT brain to diagnose the presence of DTICH/PTBI. The predictors tested were categorized into patient factors, CT brain findings and laboratory investigations.The mean age was 33.1 ± 15.7 years with a male preponderance of 6.36:1. Among them, (81.5%) of them were patients from road traffic accidents with Glasgow Coma Scale ranging from 4-15 (median of 12) upon admission. The mean time interval delay between trauma and first CT brain was 179.8 ± 121.3 minutes for the PTBI group. The DTICH group, (9.9%) of the patients were found to have new intracranial clots. Significant predictors detected were different referral hospitals (p=0.02), total GCS status (p=0.026), motor component of GCS (p=0.043), haemoglobin level (p<0.001), platelet count (p=0.011) and time interval between trauma and first CT brain (p=0.022). In the PTBI group, (42.0%) of the patients were found to have new changes (new clot occurrence, old clot expansion and edema) in the repeat CT brain. Univariate statistical analysis revealed that age (p=0.03), race (p=0.035), types of admission (p=0.024), GCS status (p=0.02), pupillary changes (p=0.014), no. of intracranial lesion (p=0.004), haemoglobin level (p=0.038), prothrombin time (p=0.016) as the best predictors of early detection of changes. Multiple Logistics regression analysis indicated that age, severity, GCS status (motor component) and GCS during admission were significantly associated with second CT scan with changes. This study showed that 9.9% of the total patients seen in the period of study had DTICH and 42% had PTBI. In the early period after traumatic head injury, the initial CT brain did not reveal the full extent of haemorrhagic injury and associated cerebral edema. Different referral hospitals of different trauma level, GCS status, motor component of the GCS, haemoglobin level, platelet count and time interval between trauma and the first CT brain were the significant predictors for DTICH. Whereas the key determinants of PTBI were age, race, types of admission, GCS status, pupillary changes, number of intracranial bleed, haemoglobin level, prothrombin time and of course time interval between trauma and first CT brain. Any patients who had traumatic

head injury in hospitals with no protocol of repeat CT scan or intracranial pressure monitoring especially in developing countries are advised to have to repeat CT brain at the appropriate quickest time.

2513. Jenkins, M. T. (1978). "At Parkland Hospital, tragic memories remain. Interview by Brenda Stone." American medical news **21**(46): 1-6.

2514. Jenkins, R., et al. (2017). "Inpatient factors are more strongly associated with tracheostomy than admission characteristics in traumatic brain injury." Neurocritical care **27**(2): S82.

Introduction Recent studies suggest benefits for early tracheostomy in patients with traumatic brain injury (TBI), yet data regarding who will require tracheostomy is lacking. Methods We performed a retrospective analysis of adult TBI patients requiring ICU admission for > 72 hours and mechanical ventilation for > 24 hours between January 2014 and December 2014. Patients who had lifesustaining measures withdrawn were excluded. Admission and inpatient variables were compared. Multivariable logistic regression analyses were used to assess admission and inpatient factors associated with receiving a tracheostomy and to develop models predictive of tracheostomy. Results There were 209 patients (78% men, mean 48 years-old, median GCS 8) meeting study criteria with tracheostomy performed in 94 (45%). Admission predictors of tracheostomy included GCS, Marshall score, injury mechanism, PaO2/FiO2 ratio, and number of quadrants on chest x-ray with consolidation. Inpatient factors associated with tracheostomy included the requirement for an external ventricular drain (EVD), number of operations, pneumothorax, inpatient dialysis, aspiration, reintubation, and the presence of hospital acquired infections. Multiple logistic regression analysis demonstrated that the development of hospital acquired infection (adjusted odds ratio [AOR], 4.78; 95% confidence interval [CI], 2.18-10.48; p < .001), number of operations (AOR, 1.47; 95% CI, 1.2-1.78; p < .001), pneumothorax (AOR, 2.64; 95% CI, 1.08-6.48; p = .034), reintubation (AOR, 7.18; 95% CI, 2.50- 20.54; < .001), penetrating TBI (AOR, 0.14; 95% CI, 0.03- 0.60; p=0.008) and placement of EVD (AOR, 6.73; 95% CI, 3.03- 14.95; < .001) were independently associated with patients undergoing tracheostomy. A model of inpatient variables only was more strongly associated with tracheostomy than one with admission variables only (ROC AUC 0.90 vs. 0.72, P<0.001) and did not benefit from addition of admission variables (ROC AUC 0.91 vs 0.90, P=0.76). Conclusions Potentially modifiable inpatient factors have a stronger association with tracheostomy than do admission characteristics.

2515. Jennett, B. (1975). "The donor doctor's dilemma: observations on the recognition and management of brain death." Journal of medical ethics **1**(2): 63-66.

2516. Jennett, B. and C. Hessett (1981). "Brain death in Britain as reflected in renal donors." British medical journal (Clinical research ed.) **283**(6287): 359-362.

The diagnostic mix of 1228 brain-dead renal donors in Britain was similar to that of 479 cases of brain death recently reported from three neurosurgical units. About half the donors came from non-teaching hospitals without a neurosurgical unit, many of them small and distant from the centre. The different circumstances that preceded brain deaths were examined--namely, diagnosis and whether the fatal ictus of brain damage occurred when the patient was already in hospital--to explain why donors spend varying times on the ventilator. Head injuries accounted for half the donors, and intracranial haemorrhage for almost a third. While many potential donors are not made available, the size of the pool has been overestimated, particularly in regard to head injury. Reduction in organ donation since "Panorama" has been very uneven, with some places increasing their yield; this suggests reluctance of doctors to initiate donation rather than relatives withholding permission.

2517. Jensen, K. O., et al. (2020). "Is there any difference in the outcome of geriatric and non-geriatric severely injured patients?—a seven-year, retrospective, observational cohort study with matched-pair analysis." Journal of Clinical Medicine **9**(11): 1-10.

Geriatric trauma is expected to increase due to the lifestyle and activity of the aging population and will be among the major future challenges in health care. Therefore, the aim of this study was to investigate differences between polytraumatized geriatric and non-geriatric patients regarding mortality, length-of-stay and complications with

a matched pair analysis. We included patients older than 17 years with an Injury Severity Score (ISS) of 16 or more admitted to our level 1 trauma center between January 2008 and December 2015. The cohort was stratified into two groups (age < 70 and ≥ 70 years). One-to-one matching was performed based on gender, ISS, mechanism of injury (penetrating/blunt), Glasgow coma scale (GCS), base excess, and the presence of coagulopathy (international normalized ratio (INR) ≥ 1.4). Outcome was compared using the paired t-test and McNemar-test. A total of 1457 patients were identified. There were 1022 male (70%) and 435 female patients. Three hundred and sixty-four patients (24%) were older than 70 years. Matching resulted in 57 pairs. Mortality as well as length-of-stay were comparable between geriatric and non-geriatric polytraumatized patients. Complication rate (34% vs. 56%, p = 0.031) was significantly higher in geriatric patients. This indicates the possibility of similar outcomes in geriatric polytraumatized patients receiving optimal care.

2518. Jenzer, A. C., et al. (2020). "Traumatic Facial Tattoo Injuries From Gunpowder and Ammunition: A Case Series." Craniomaxillofacial Trauma and Reconstruction **13**(4): 133-137.

Background and Overview: Gunpowder inclusion injuries are rare occurrences in the civilian sector but are more frequently encountered in the military setting. The authors report a case series of 3 active duty military service members treated by an Army hospital's Oral & Maxillofacial Surgery service for the removal of embedded gunpowder particles so as to avoid traumatic tattooing. Case Description: Three otherwise healthy active duty military service members were treated for gunpowder inclusion injuries incurred while conducting live fire training exercises at a state-side military installation between 2018 and 2019. All 3 males presented with injuries of the same etiology: Their weapons malfunctioned, and while visually inspecting the action, a round exploded close to the face. This peppered the face with gunpowder particles that were both superficially and deeply embedded. Treatment focused on individual removal using fine forceps. The patients were followed up and healed quickly without any complications, specifically without traumatic tattooing from the gunpowder injuries. Conclusion and Practical Implications: Gunpowder inclusion injuries should be addressed quickly to remove the particles before epidermal healing occurs, thus avoiding the complication of traumatic tattooing. This surgical team recommends meticulous fine forceps removal as the treatment of choice for larger particles.

2519. Jeon, Y. H., et al. (2014). "Serious penetrating craniocerebral injury caused by a nail gun." Journal of Korean Neurosurgical Society **56**(6): 537-539.

Penetrating cerebral injuries caused by foreign bodies occur rarely due to the substantial mechanical protection offered by the skull. Throughout most of history, the brain, residing in a "closed box" of bone, has not been vulnerable to external aggression. Recently, we encountered a serious penetrat-ing craniocerebral injury caused by a nail gun. Total excision of the offending nail via emergency craniotomy was performed, but the patient's neurologic status was not improved in spite of aggressive rehabilitative treatment. Here, we report on this troublesome case in light of a review of the relevant literature.

2520. Jernigan, S., et al. (2013). "Penetrating intracranial injury treated with fluoroscopically-guided noninvasive removal." Journal of neurointerventional surgery **5**: A66-A67.

Background Spear-like penetrating injuries with retained intracranial foreign bodies have been previously managed with craniotomy and removal in the OR. In this case, with the foreign body traversing both hemispheres, with potential haemorrhage from a large region, we opted for extraction in the angiography suite, with haemorrhage to be managed using endovascular means. Case Report This 20 month-old fell directly onto a pencil, which penetrated her right superomedial orbital wall. She was grossly neurologically intact, other than right eye movements on arrival to the emergency department. A CTA was performed, showing that 14 cm of the pencil were intracranial, traversing the right orbitofrontal region and much of the left hemisphere. The left MCA was narrowed, but there was no intracranial haemorrhage. The right globe appeared intact. The patient was brought to the angiography suite and the pencil was slowly extracted under flouroscopic-guidance and repeated angiography, first in the left hemisphere, and then in the right, once the tip had crossed the midline. Pre- and post-pull angiography demonstrated near normalisation of the caliber of the left MCA after the pencil was removed. The patient initially had mild rightsided hemiparesis, with near complete resolution on follow-up. Vision and extraocular movements are intact. Discussion Due to a potentially wide field of sites of haemorrhage in both hemispheres, we opted to extract this foreign object in the angiography suite

rather than the OR. The patient remarkably tolerated the initial injury with minimal deficits and there was no morbidity related to the extraction. (Figure presented).

2521. Jeromel, M., et al. (2014). "Endovascular embolization of posttraumatic orbital arteriovenous fistula using percutaneous and surgically exposed approach." Journal of Vascular and Interventional Radiology **25**(5): 811.e827-811.e828.

Purpose: Orbital arteriovenous fistula (AVF) is a rare condition that can appear spontaneously or posttraumatically. Endovascular embolization represents effective treatment; however, the approach to the fistula could be challenging. A case of a patient with posttraumatic orbital AVF, treated with combined percutaneous and surgically exposed approach, is presented (Figure 1). Material and Methods: A 52-year-old patient was admitted to an emergency department after a gunshot wound to the right orbitotemporal region. Surgical treatment with enucleation of the affected eye was performed, while retro-orbital intracranial injuries were treated conservatively. A postoperative imaging revealed a posttraumatic AVF in the posterior aspect of the affected orbit. Angiographic study confirmed lowflow communication between small feeders (originating from facial and superficial temporal artery) and the superior ophthalmic vein (Figure 2). The patent achieved a very good clinical recovery with minor neurological deficit. However, due to a progressive variceal enlargement of draining veins, the decision about endovascular treatment was made. The endovascular treatment was performed as a 2-stage procedure. A transarterial approach through a femoral artery was used first. The liquid embolization agent (ethylene vinyl alcohol copolymer) was applied through a selectively catheterized facial artery, resulting in partial reduction of flow to the fistula. An additional transvenous approach through a femoral vein was made with attempt to catheterize an angular vein, which proved to be technically impossible. A second stage endovascular procedure was performed with direct placement of a cannula in the angular vein under surgical exposure (Figure 3). The approach was used as an alternative to transorbital puncture, which in our case was not possible due to previous enucleation. A catheterization of the superior ophthalmic vein and additional transarterial supraselective catheterization of the superficial temporal artery enabled embolization of the fistula. Results: Angiography at the end of the procedure showed almost complete cessation of flow through the fistula, with a tendency to further spontaneous closure (Figure 4). Magnetic resonance imaging after 1 month revealed complete obliteration of the fistula. Conclusions: Endovascular treatment of posttraumatic fistulas could be challenging. A multidisciplinary approach using all possible vascular accesses (percutaneous and surgically exposed) is mandatory. (Figure Presented).

2522. Jewsbury, H. and R. Haslett (2011). "An unexpected injury--cerebral laceration with stiletto." BMJ case reports **2011**.

2523. Jewsbury, H. and D. O'Duffy (2011). "The best treatment can be no treatment: retained retro-orbital air gun pellet following attempted suicide." BMJ case reports **2011**.

2524. Jha, R. M., et al. (2021). "Glibenclamide Treatment in Traumatic Brain Injury: Operation Brain Trauma Therapy." Journal of neurotrauma **38**(5): 628-645.

Glibenclamide (GLY) is the sixth drug tested by the Operation Brain Trauma Therapy (OBTT) consortium based on substantial pre-clinical evidence of benefit in traumatic brain injury (TBI). Adult Sprague-Dawley rats underwent fluid percussion injury (FPI; n = 45), controlled cortical impact (CCI; n = 30), or penetrating ballistic-like brain injury (PBBI; n = 36). Efficacy of GLY treatment (10-mug/kg intraperitoneal loading dose at 10 min post-injury, followed by a continuous 7-day subcutaneous infusion [0.2 mug/h]) on motor, cognitive, neuropathological, and biomarker outcomes was assessed across models. GLY improved motor outcome versus vehicle in FPI (cylinder task, $p < 0.05$) and CCI (beam balance, $p < 0.05$; beam walk, $p < 0.05$). In FPI, GLY did not benefit any other outcome, whereas in CCI, it reduced 21-day lesion volume versus vehicle ($p < 0.05$). On Morris water maze testing in CCI, GLY worsened performance on hidden platform latency testing versus sham ($p < 0.05$), but not versus TBI vehicle. In PBBI, GLY did not improve any outcome. Blood levels of glial fibrillary acidic protein and ubiquitin carboxyl terminal hydrolase-1 at 24 h did not show significant treatment-induced changes. In summary, GLY showed the greatest benefit in CCI, with positive effects on motor and neuropathological outcomes. GLY is the second-highest-scoring agent overall tested by OBTT and the only drug to

reduce lesion volume after CCI. Our findings suggest that leveraging the use of a TBI model-based phenotype to guide treatment (i.e., GLY in contusion) might represent a strategic choice to accelerate drug development in clinical trials and, ultimately, achieve precision medicine in TBI.

2525. Ji, K. S., et al. (2019). "Endoscopic endonasal reconstruction of extensive anterior skull base defect from gunshot wound." Journal of Neurological Surgery, Part B: Skull Base **80**.

Introduction: Ballistic injuries involving the skull base can be challenging to manage. Significant bone and soft tissue loss in addition to tissue ischemia, infection, and necrosis can complicate reconstruction. Thorough debridement with transfer of vascularized tissue is an important aspect of management. We describe a case of a patient who presented with a gunshot wound (GSW) to the face causing extensive damage to the anterior skull base and surrounding structures. Method: Case report. Results: A 34-year-old male presented with a GSW to the right face. On arrival, he had a Glasgow coma scale score of 6. The bullet had entered through the right nasal bridge, traversing the right nasal cavity and orbit, and shattering the anterior skull base to penetrate the frontal and parietal lobes. Computed tomography demonstrated acute intracranial hemorrhage in addition to middle cerebral artery dissection, right globe rupture, and destruction of the cribriform and orbital roof with herniation of brain tissue through the anterior skull base defect ([Fig. 11). After emergent bilateral decompressive frontotemporal craniectomy, endoscopic endonasal debridement and reconstruction of the skull base were performed six days later. Intraoperatively, necrotic brain matter was seen protruding from the right nostril ([Fig. 21). Necrotic brain tissue mixed with bony partitions in the nasal cavity was debrided, leaving a defect of the entire right anterior skull base including the orbital roof. An abdominal fat graft was used to fill the large intracranial dead space, and duraplasty using collagen matrix was performed. A nasoseptal flap was then draped over the ethmoid roof and the medial orbit. The patient made an extensive recovery, sustaining mildly diminished cognitive capacity and left hemiparesis. The patient returned 5 months after surgery, and the reconstruction was found to be fully healed on endoscopy ([Fig. 3]). Conclusion: This case demonstrates the utility of the endoscopic endonasal approach to debride and reconstruct an extensive anterior skull base defect resulting from GSW (Figure Presented) .

2526. Ji, T. F., et al. (2017). "[Huge glass foreign body penetrating into the infratemporal fossa through the maxillary sinus:a case report]." Lin chuang er bi yan hou tou jing wai ke za zhi = Journal of clinical otorhinolaryngology, head, and neck surgery **31**(17): 1372-1373.

We report a rare case of glass foreign body penetrating into the infratemporal fossa through the maxillary sinus. The patient felt a little difficulty to open mouth. Both CT and DSA are helpful in diagnosis and treatment. It was important to keep the foreign body stability and integrity, through the modified Weber incision around the original traumatic wound and removal of anterior wall of the maxillary sinus around the foreign body. Copyright© by the Editorial Department of Journal of Clinical Otorhinolaryngology Head and Neck Surgery.

2527. Jia, H. and T. Sun (2004). "Extranodal NK/T-cell lymphoma mimicking cellulitis." Leukemia & lymphoma **45**(7): 1467-1470.

NK/T-cell lymphoma is difficult to diagnose because there is no characteristic cytology to help the diagnosis in tissue sections, particularly when there is polymorphic cellular infiltration in the early stage of the disease. However, the nasal type of extranodal NK/T-cell lymphoma has a characteristic histologic pattern, which is angiocentric, angioinvasive and angiodestructive. Therefore, many cases of this tumor may show extensive necrosis that mimics infectious process. Furthermore, because the immunosuppressive status of these patients, they may, in fact, have superimposed infections. We are reporting a case that presented as cellulitis and only after careful examination with immunohistochemistry that a correct diagnosis of extranodal NK/T-cell lymphoma, nasal type, was established. Since this lymphoma is incurable and immunophenotyping is instrumental for the diagnosis and prediction of the prognosis, a high index of suspicion for this tumor is needed when an angiocentric lesion is found in the midline of the head and neck region, and a thorough immunohistological study should always be conducted in these cases.

2528. Jiang, C. and S. Bavishi (2018). "Use of olanzapine for central vestibular dysfunction in a traumatic brain injury patient: A case report." PM and R **10**(9): S98.

Description: The patient sustained a gunshot wound to the head. Initial Glasgow Coma Scale was 14, with unknown duration of loss of consciousness. The bullet entered the left ear, traversed the inferior portion of the left cerebellar hemisphere, and terminated in the midline occipital region. Other significant findings included a subdural hematoma along the posterior foramen magnum. He underwent a left suboccipital craniotomy for posterior fossa decompression. Otolaryngology performed a left mastoid wound exploration with no significant findings. He also developed anxiety and nightmares which was briefly treated with olanzapine. He was eventually admitted to inpatient rehabilitation and at that time was having symptoms of dizziness that did not interfere with his function. His anxiety and nightmares had resolved so olanzapine was discontinued. Within two days of this medication change, his dizziness worsened. On further evaluation the symptoms he described were consistent with vertigo. Physical therapy performed vestibular testing and confirmed that this was a central vestibular dysfunction. His symptoms developed into intractable nausea and vomiting, which did not respond to ondansetron, prochlorperazine, scopolamine patch, or meclizine. He could not tolerate therapies or even a clear liquid diet. Setting: Inpatient rehabilitation facility Results: After more than a week of trialing different medications, olanzapine 2.5mg daily was started, given its off-use label for nausea in cancer patients. The patient's vertigo, nausea, and vomiting improved after one day of treatment. After three days, his symptoms were nearly completely resolved. Discussion: While olanzapine was initially started for anxiety in this case, it is likely that it was also helping with his vertigo. To our knowledge, this is the first case demonstrating that the use of olanzapine can improve vertigo related to central vestibular dysfunction. Conclusions: Olanzapine may be an option to treat central vestibular dysfunction in traumatic brain injury patients.

2529. Jian-Wei, L., et al. (2015). "The clinical characteristics of alcohol-related ocular rupture." Graefe's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle Ophthalmologie **253**(8): 1307-1311.

PURPOSE: To evaluate the characteristics and outcomes of drunken patients treated for ocular rupture, and to compare these results to patients injured without alcohol consumption., DESIGN AND METHODS: The medical records of 182 patients with or without alcohol consumption before injury who were treated and followed up because of ocular rupture at the Affiliated Hospital of Weifang Medical University from October 2007 to October 2011 were evaluated retrospectively. The characteristics and outcomes of 45 alcohol-related injury patients were compared with the rest in the cohort. The clinical data included in this study were: anatomic sites and length of the wound, involvement of ocular adnexa injuries, evisceration rate, and final mean visual acuity., RESULTS: Wound locations were significantly different between the alcohol-related group and the non-alcohol-related one. Compared with the non-alcohol-related ocular rupture population, the anatomic sites of the drunken patients were more likely to be located at zone I and zone II (60.0 vs 40.1 %; chi2 = 5.39,P < 0.05). The difference of wound length between the alcohol-related group and the non-alcohol-related one was significant. The alcohol-related patients had a longer wound length (Z = -8.590,P < 0.05). Compared with the non-alcohol population, the alcohol-consuming patients were more likely to suffer adnexa injuries (84.4 vs 59.8 %; chi2 = 5.86,P < 0.05), and had worse final visual acuities (Z = -7.195,P < 0.05). The evisceration rate of the alcohol-related patients was significantly higher than the non-alcohol patients (24.4 vs 9.4 %; chi2 = 6.62,P < 0.05)., CONCLUSIONS: Drinking more easily leads to injury of the front part of eyes. Moreover, the drunken patients had a worse visual acuity outcome, longer wound length, higher evisceration rate, and were more prone to endure adnexa injuries. The importance of prevention and education to recognize the hazards of drinking cannot be overemphasized.

2530. Jimenez, C. M., et al. (2013). "Risk factors for intracranial infection secondary to penetrating craniocerebral gunshot wounds in civilian practice." World neurosurgery **79**(5-6): 749-755.

OBJECTIVE: To determine risk factors for intracranial infection secondary to penetrating craniocerebral gunshot wounds (PCGWs) in civilian practice, in patients who underwent surgery with removal of bullet fragments, wound debridement, and watertight dural closure., METHODS: An observational, analytical, prospective, cohort-type study was conducted with follow-up in a group of patients with PCGWs caused by a low-velocity projectile admitted between January 2000 and November 2010. There were 160 patients, 59 of whom were administered prophylactic antibiotics based on the decision of the treating neurosurgeon. Average follow-up time was 39 months (range, 3-92 months)., RESULTS: Infection occurred in 40 patients (25%); 20 patients received antibiotics (20 of 59 [33.9%]), and 20 patients did not receive antibiotics (20 of 101 [19.8%]). Three variables were independent risk factors for infection: (i) persistence of parenchymal osseous or metallic fragments after surgery (P < 0.0001, relative risk [RR] 7.45); (ii) projectile trajectory through a natural cavity with contaminating flora (P = 0.03, RR 2.84); and (iii) prolonged hospitalization time (P < 0.0001,

RR 3.695)., CONCLUSIONS: Administration of prophylactic antibiotics was not associated with the incidence of intracranial infection secondary to PCGWs. Projectile trajectory through potentially contaminating cavities, persistence of intraparenchymal osseous or metallic fragments after surgery, and prolonged hospital stay were independent risk factors for intracranial infection.

2531. Jimenez, I. A., et al. (2021). "Surgical stabilization of traumatic elbow joint luxation and proximal ulnar fracture in a silvery langur (Trachypithecus cristatus)." Journal of the American Veterinary Medical Association **259**(12): 1466-1470.

CASE DESCRIPTION: A 3-year-old 5-kg sexually intact female silvery langur housed in a single-species group at a zoological institution was presented because of acute trauma to the left forelimb., CLINICAL FINDINGS: Radiography of the left forelimb revealed a type II Monteggia fracture (proximal ulnar fracture with cranial displacement and caudal luxation of the radial head). During surgery, disruption of the annular ligament and rupture of the lateral collateral ligament were noted., TREATMENT AND OUTCOME: The langur underwent open reduction and internal fixation of the ulnar fracture and placement of a radioulnar positional screw, a prosthetic lateral collateral ligament, and a temporary hinged type 1A external skeletal fixator. The langur was returned to group housing, underwent behavioral training, and was periodically anesthetized for physical therapy sessions to improve range of motion of the left elbow joint. The external skeletal fixator was removed 4 weeks after surgery, and the radioulnar positional screw was removed 6 weeks after surgery. Three months after surgery, the range of motion of the langur's left elbow joint was considered normal, and the animal returned to normal activity., CLINICAL RELEVANCE: For the captive silvery langur of the present report, surgical stabilization and postoperative management of a type II Monteggia fracture of the left forelimb were successful with recovery of elbow joint function. These techniques may be applied to other captive nonhuman primates, including those that brachiate or are members of social species that must be housed with conspecifics in the postoperative period to maintain group dynamics.

2532. Jinkins, J. R., et al. (1992). "Value of acute-phase angiography in the detection of vascular injuries caused by gunshot wounds to the head: analysis of 12 cases." AJR. American journal of roentgenology **159**(2): 365-368.

A study of the angiographic findings in consecutive civilian patients with cranial gunshot wounds examined in the acute stage has not been done. Most prior clinical studies have evaluated the findings in survivors in the subacute or chronic stages and have often been of war-time casualties. We determined the clinicoradiologic features of six cases of posttraumatic intracranial aneurysm, vascular occlusion, or arteriovenous fistula caused by penetrating missiles among 12 civilian patients who were examined in the acute posttraumatic stage (within 48 hr of injury) during a 1-year period. Three internal carotid/vertebral artery aneurysms, one external carotid artery aneurysm, one combined aneurysm/arteriovenous fistula of the vertebrobasilar circulation, and one cerebral venous occlusion were identified. The 50% overall prevalence of major vascular lesions in this series of civilian patients with penetrating missile injuries examined in the acute stage suggests these injuries are more common than previously suspected. It may indicate that selective cerebral angiography should be considered in the evaluation of the cranial vascular system of such persons.

2533. Jithoo, R., et al. (2001). "Penetrating nail gun injury of the head and chest with incidental pericallosal artery aneurysm." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde **91**(4): 316-317.

2534. Jo, C., et al. (2010). "Bullet embolus to the pulmonary artery after gunshot wound to the face: case report and review of literature." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **68**(3): 504-507.

2535. Joashi, U. C., et al. (1999). "Poly(ADP ribose) polymerase cleavage precedes neuronal death in the hippocampus and cerebellum following injury to the developing rat forebrain." The European journal of neuroscience **11**(1): 91-100.

Transient unilateral forebrain hypoxia-ischaemia (HI) in 14-day-old rats produces infarction and delayed neuronal death in the frontal cortex. Cell death can also be observed in regions distant from the primary injury, a phenomenon known as diaschisis. While apoptosis is involved in selective neuronal death, its role in infarction and diaschisis remains poorly understood. Here, we have investigated the proteolytic cleavage of poly(ADP ribose)

polymerase (PARP) and the occurrence of apoptosis in the hippocampus and the cerebellum following either HI or traumatic brain injury. We demonstrate that: (i) in vitro, PARP is cleaved during apoptosis but not necrosis in cultured neuronal (N1E) cells and Swiss 3T3 fibroblasts; (ii) following HI, apoptotic cells can be detected by 4 h after injury in the hippocampus; (iii) in the ipsilateral hippocampus the appearance of cells with apoptotic morphology is preceded by a dramatic increase in PARP cleavage in the same region, starting immediately following HI and persisting for 24 h; (iv) HI also induces apoptosis in the cerebellum and, as in the hippocampus, the appearance of cells with apoptotic morphology is preceded by PARP cleavage that is greater on the side ipsilateral to forebrain injury; and (v) similarly, traumatic brain injury to the forebrain leads to PARP cleavage and apoptosis in the cerebellum. We conclude that HI injury or traumatic injury to the developing rat forebrain leads to PARP cleavage in directly affected areas and in sites distant from the primary injury that precedes the appearance of cells with apoptotic morphology. Our results are consistent with a role for apoptotic cell death in infarction and in diaschisis resulting from forebrain injury to the developing brain.

2536. John, S. S., et al. (2008). "Missed diagnosis of a wooden intra-orbital foreign body." Indian journal of ophthalmology **56**(4): 322-324.

Intraorbital foreign bodies often present a confusing clinical picture. Wooden foreign bodies are notorious for remaining quiescent for a long time, before presenting with a variety of complications. The wound of entry may often be small and self-sealing. Wooden foreign bodies also show a propensity to break during attempted removal. Intraorbital wood is often not detected by standard diagnostic tests like the computed tomography scan, adding to the diagnostic dilemma. The presence of an intraorbital mass with a discharging sinus should evoke suspicion of a retained organic foreign body, regardless of the time interval between the trauma and current presentation. It is imperative to maintain a high index of suspicion in such cases to avoid misdiagnosis. We report an unusual case of a missed wooden intraorbital foreign body, which spontaneously extruded after five years.

2537. Johnson, B. W., et al. (2015). "Combat-related facial burns: analysis of strategic pitfalls." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **73**(1): 106-111.

PURPOSE: Burns constitute approximately 10% of all combat-related injuries to the head and neck region. We postulated that the combat environment presents unique challenges not commonly encountered among civilian injuries. The purpose of the present study was to determine the features commonly seen among combat facial burns that will result in therapeutic challenges and might contribute to undesired outcomes., MATERIALS AND METHODS: The present study was a retrospective study performed using a query of the Burn Registry at the US Army Institute of Surgical Research Burn Center for all active duty facial burn admissions from October 2001 to February 2011. The demographic data, total body surface area of the burn, facial region body surface area involvement, and dates of injury, first operation, and first facial operation were tabulated and compared. A subset analysis of severe facial burns, defined by a greater than 7% facial region body surface area, was performed with a thorough medical record review to determine the presence of associated injuries., RESULTS: Of all the military burn injuries, 67.1% (n = 558) involved the face. Of these, 81.3% (n = 454) were combat related. The combat facial burns had a mean total body surface area of 21.4% and a mean facial region body surface area of 3.2%. The interval from the date of the injury to the first operative encounter was 6.6 +/- 0.8 days and was 19.8 +/- 2.0 days to the first facial operation. A subset analysis of the severe facial burns revealed that the first facial operation and the definitive coverage operation was performed at 13.45 +/- 2.6 days and 31.9 +/- 4.1 days after the injury, respectively. The mortality rate for this subset of patients was 32% (n = 10), with a high rate of associated inhalational injuries (61%, n = 19), limb amputations (29%, n = 9), and facial allograft usage (48%, n = 15) and a mean facial autograft thickness of 10.5/1,000th in., CONCLUSIONS: Combat-related facial burns present multiple challenges, which can contribute to suboptimal long-term outcomes. These challenges include prolonged transport to the burn center, delayed initial intervention and definitive coverage, and a lack of available high-quality color-matched donor skin. These gaps all highlight the need for novel anti-inflammatory and skin replacement strategies to more adequately address these unique combat-related obstacles.

2538. Johnson, D., et al. (2017). "Acute and subacute microRNA dysregulation is associated with cytokine responses in the rodent model of penetrating ballistic-like brain injury." The journal of trauma and acute care surgery **83**(1 Suppl 1): S145-S149.

BACKGROUND: MicroRNAs (miRNAs) are small stable RNAs that regulate translational degradation or repression of genes involved in brain trauma-mediated inflammation. More recently, miRNAs have emerged as potential novel TBI biomarkers. The aim of this study was to determine if a select set of miRNAs (miR-21, Let-7i, miR-124a, miR-146a, miR-107) that were previously associated with TBI models and clinical studies would be dysregulated and correlated to inflammatory cytokine abundance in the rat penetrating ballistic-like brain injury (PBBI) model., METHODS: Adult male Sprague-Dawley rats received a unilateral frontal 10% PBBI, which produces a temporary cavity. Sham animals received a craniotomy only. Ipsilateral brain tissue and serum were collected 4 hours to 7 days post-injury. Quantitation of miR-21, Let-7i, miR-124a, miR-146a, or miR-107 levels was conducted using Taqman PCR assays normalized to the endogenous reference, U6 snRNA. Brain tissue derived from matching cohorts was used to determine 1L-1beta and IL-6 levels by enzyme-linked immunosorbent assay., RESULTS: Brain tissue Let-7i and miR-21 increased at 4 hours and 1 day, whereas miR-124a and miR-107 were enhanced only 1 day post-injury. MiR-146a displayed a biphasic response and increased 1 day and 7 days, whereas elevation of miR-21 was sustained 1 day to 7 days after PBBI. Pathway analysis indicated that miRNAs were linked to inflammatory proteins, IL-6 and IL-1beta. Confirmation by enzyme-linked immunosorbent assay indicated that both cytokines were increased and peaked at 1 day, but fell at 3 days through 7 days after PBBI, indicating an inverse relationship with miRNA abundance. Serum Let-7i, alone, was differentially abundant 7 days after PBBI., CONCLUSION: Brain tissue-derived miRNAs linked to increased cytokine levels demonstrates a plausible therapeutic target of TBI-induced inflammation. Suppression of serum derived Let-7i may have utility as a biomarker of subacute injury progression or therapeutic responses.

2539. Johnson, D., et al. (2013). "Altered microrna expression at acute time points following penetrating ballistic-like brain injury (PBBI) in rats." Journal of neurotrauma **30**(15): A67.

Introduction Biomarkers of traumatic brain injury (TBI) are being evaluated to aid in diagnosis, track prognosis and demonstrate a therapeutic response to treatment. Recently, microRNAs (miRNAs) have emerged as possible stable TBI biomarkers. Therefore we examined changes in specific miRNAs in our rodent model of penetrating ballistic-like brain injury (PBBI). Methods As a proof-of-concept study, we used the penetrating ballistic-like brain injury (PBBI) model to examine the expression of six specific miRNAs demonstrated previously to change in response to severe brain injury. PBBI injury was caused by the rapid inflation/deflation (i.e. < 40 msec) of an elastic balloon attached to the end of the custom probe, injuring 10% of total brain volume. Sham (control) animals received only a craniotomy. Ipsilateral coronal brain tissue sections 6mm from bregma, were collected 4h, 24h and 72h post injury. Total RNA was isolated from brain tissue sections and cDNA was created via reverse transcription. Real-time PCR was performed using Taqman assays specific to each miRNA of interest. The relative quantities of the miRNAs were normalized to U6 endogenous control. Results Of the six miRNAs studied the relative quantities of miR-21and Let-7i were significantly upregulated in brain tissue at 4 hours post injury compared to sham controls (80% and 60% respectively, $p < 0.05$). Three miRNAs, miR-107, miR-146a and miR-124a, were unchanged 4 hours post injury compared to sham controls. Additionally, miR- 292-5p was undetectable in both injured and sham (control) animals. Investigation of these six miRNAs at 24 and 72 hours post injury are in progress. Conclusions Previous studies in other TBI rodent models have demonstrated an increase in brain miR-21 (FPI) and serum Let-7i (Blast) from 3 hours to at least 24 hours post injury. Here we demonstrate similar increases in brain tissue following PBBI as early as 4 hr post injury. These two specific miRNAs are postulated to be involved in the regulation of apoptotic and neuroinflammatory processes, respectively, both of which are prominent following PBBI. Thus, this study provides proofof- concept that miRNA dysregulation indicative of specific types of secondary injury can be measured in brain following PBBI. Future studies will 1) examine the associated change in these markers in serum and 2) the full genomic arrays to determine if changes occur in other novel miRNAs over the course of PBBI, and 3) establish study the potential utility of miRNAs as biomarkers to aid in the diagnosis, prognosis and tracking of TBI treatments.

2540. Johnson, D., et al. (2014). "Microrna dysregulation occurs at acute time points after penetrating ballistic-like brain injury." Journal of neurotrauma **31**(12): A91.

ecent studies have shown that microRNAs (miRNAs), small RNAs that regulate cellular processes, may serve as novel markers of brain injury. Therefore five miRNAs, previously reported to change in the first 24 hours in other brain injury models, were examined as a proofof-concept study in our severe TBI model. MicroRNAs were measured following penetrating ballistic-like brain injury (PBBI) where a temporary cavity was generated in rats disrupting 10% of brain volume. Sham animals received a craniotomy. Ipsilateral brain tissue was collected 4 h, 24 h, 72 h and 7 d post injury.

Total RNA was isolated, reverse transcribed into cDNA and examined using real-time PCR with Taqman assays. The relative quantities of miRNAs were normalized to U6 endogenous reference gene. Similar to changes described in other TBI models, all miRNAs tested (miR-21, Let-7i, miR-124a, miR-146a, miR-107) were altered at 24 hours post PBBI. Let-7i demonstrated the most acute profile with a 1.6-fold increase at 4 h and a 2.7-fold increase at 24 h after injury. However, changes in Let-7i returned to normal by 72 h. MiR-146a demonstrated both an initial and delayed response to injury with a 2.4-fold increase 24 h after injury which resolved by 72 h but rebounded with a 3.9-fold increase at 7 days after injury. Most notably, miR-21 demonstrated an acute response with a 1.8-fold increase at 4 h that continued to increase over time where a 6.9-fold increase was measured by 7 days post injury. Initial pathway analysis indicated that these specific miRNAs are involved in regulating inflammation, cell migration and cell differentiation at 24 h, sterol metabolism at 72 h and matrix polymerization at 7 days. This study demonstrated that, similar to other TBI models, miRNAs are also altered by PBBI and exhibit temporal signatures of injury. Of interest, miR-21 showed sustained elevation for 7 days suggesting potential value as a therapy biomarker, and potentially aiding in our understanding of the chronic pathology following severe TBI.

2541. Johnson, D. J., et al. (2014). "A molecular method to correlate bloodstains with wound site for crime scene reconstruction." Journal of forensic sciences **59**(3): 735-742.

Bloodstain pattern analysis to determine the wound-of-origin of bloodstains is problematic with nonspecific patterns. In this proof-of-concept study, the authors examined a molecular approach to correlate bloodstains with injuries using the rat as a model. Specifically, investigations were conducted on the rat brain marker, rno-miR-124-3p, with the QIAGEN miScript System and real-time PCR analysis. Rno-miR-124-3p was detected in brain homogenates diluted 100,000 times; in 3-week-old, room temperature stored, simulated brain-blood stains; and in bloodstains from head gunshot wounds collected with swabs and subsequently frozen for 9-18 months; however, rno-miR-124-3p was not detected in whole blood. Proof-of-principle was demonstrated by the ability to distinguish bloodstains from a gunshot wound to the head versus bloodstains from a gunshot wound to the chest, by the testing of otherwise identical bloodstains from the two patterns for the presence of the marker. The results suggest a viable approach to a longstanding problem in casework. Copyright © 2014 American Academy of Forensic Sciences.

2542. Johnson, I. (1984). "Intra-operative ultrasound." Journal of neurosurgical nursing **16**(4): 208-210.

Real time intraoperative ultrasound can provide instant evaluation of the operative field. One can expect high quality images of intracranial anatomy. With such information, the neurosurgeon can make determinations of direction and position as well as depth of the lesion. The procedure is safe and easy to perform. There are no radiation hazards present. It may be advantageous to keep the ultrasound available as one operates to visualize the progress of tumor removal; it can also be utilized after closure of the dura for bleeding or other complications. Biopsy procedures and localization of lesions in the brain can be extremely problematic. The neurosurgeon does not have the luxury of exploring a brain during a craniotomy as a general surgeon does in exploring an abdomen during laparotomy. Despite the fact that modern day technology with angiography and CT scanning may provide excellent preoperative localization information, the neurosurgeon must translate the information into his own perspective when operating and lesions may be missed by a millimeter. Once the transducer visualizes the brain substance, the neurosurgeon can actually observe the progress of the craniotomy.

2543. Johnson, J., et al. (2012). "Gun orientation in self-inflicted craniomaxillofacial gunshot wounds: risk factors associated with fatality." International journal of oral and maxillofacial surgery **41**(8): 895-901.

The purpose of this study was to evaluate whether orientation of a firearm predicts survival, and to identify risk factors associated with fatality in subjects with self-inflicted craniomaxillofacial gunshot wounds. A retrospective cohort study design was used. The primary predictor variable was orientation of the weapon, defined as in the coronal (lateral) or sagittal (anterior-posterior) trajectory pattern. The primary outcome variable was death for subjects on arrival or during their hospital stay. Other covariates measured include demographic, firearm-related, and psychosocial variables. Risk factors for fatality were identified using multivariate logistic regression. Of the 92 subjects that met study inclusion criteria, 47 (67.2) held the firearm in the coronal position. In the full multivariate model, coronal gun orientation (OR=7.7, 95% CI: 2.0, 30.1, p=0.003) and the absence of a psychiatric diagnosis were associated with an increased risk of fatality (OR=0.1, 95% CI: 0.04, 0.5, p=0.002). Coronal firearm orientation was associated with an increased risk of fatality

following self-inflicted craniomaxillofacial gunshot injuries. A patient with a documented psychiatric disorder was not found to be more likely to succumb to this type of injury.

2544. Johnson, L. W. (1986). "A case for organ donation." Journal of emergency nursing **12**(4): 196-198.

2545. Johnson, M., et al. (2018). "A level I trauma center's five-year experience with aggressive management of civilian cranial gunshot wounds." Journal of neurotrauma **35**(16): A142-A143.

Introduction: Civilian cranial gunshot wounds (cGSW) require resource intensive management. Limited data exist to determine which clinical factors should be assessed to direct patient management. At our institution it has been practice to provide aggressive management to all traumatic brain injury patients in accordance with the Brain Trauma Foundation guidelines and the Surgical Management of Traumatic Brain Injury recommendations. Here we present 5-year outcomes from our Level I trauma center with a Tri-State catchment area. Methods: We compiled prospective data from our trauma registry at the University of Cincinnati Medical Center over a five-year period (2012-2017). All patients over 16 years of age with cGSW were included. Records were analyzed for demographic and injury factors that could affect the primary endpoint of mortality during admission. Multivariable regression analysis using age, race, sex, injury motive, transfer status, initial hospital GCS, and Injury Severity score (ISS) was conducted. Results: Of the 251 patients identified, 85.7% were male and the mean age was 33.2 years old (SD 15.2). There were 203 (80.9%) Ohio, 39 (15.5%) Kentucky, and 7 (2.8%) Indiana residents. Thirtyone patients (12.4%) were transferred from an outside hospital. One hundred and thirty-eight (55.0%) patients were alive at discharge, while 113 (45.0%) patients died during admission. Among nonsurvivors, injury motive was more often self-inflicted (53.1% versus 17.4%), and 83.2% had hospital length of stay of one day or less. For survivors, the average total ICU length of stay was 3.77 days (SD 6.0). Multivariable regression analysis showed that age, race, sex, transfer status, and injury motive did not contribute to mortality during admission, while initial hospital GCS (OR 0.67; CI 0.59-0.76) and ISS (OR 1.12; CI 1.05 -1.20) were significantly associated with hospital death. Conclusions: In a large single-center cohort of cGSW, a lower presenting GCS and significant extracranial injury were associated with hospital mortality; the majority of deaths occurred within the first 24 hours. We thus support aggressive management of cGSW patients, with continued treatment for those that survive the critical first day. Ongoing analysis will help identify additional variables important for cGSW survival.

2546. Johnson, M., et al. (2011). "Imaging assessment of traumatic ocular injury in the emergency room." Emergency radiology **18**(6): 465.

Purpose/Aim: 1-To assess the clinical indications for imaging assessment of ocular injuries 2- To review the use of ultrasound, CTandMRI in the setting of traumatic globe injury 3- To demonstrate common and uncommon findings of globe injury 4- To recognize post surgical changes that make mimic foreign body or other globe injury. Background: In the United States, it is estimated that 3% of all emergency room visits are secondary to eye injury, with many seen in combination with other orbital injuries. These often result from motor vehicle accidents and sports-related injuries. Clinical ophthalmologic examination is the key to rapid and accurate diagnosis of most ocular injuries. Imaging, in combination with the ophthalmologic examination, can be a powerful tool in the evaluation of traumatic injury to the globe. Content Organization: Systematic imaging assessment should include the position and density of the lens, the contour and volume of the globe, the density within the globe, the contours of the retina and sclera, the volume within the anterior chamber, and the presence of foreign bodies. It is also important to identify the imaging findings of globe or orbital surgery or remote traumatic injury. We present a representative retrospective series of cases to illustrate a variety of traumatic globe injurues including blunt and penetrating trauma, retinal and choroidal detachment and hyphema among others. We review the roles of CT ultrasound and MR in the assessment of these patients. The post surgical globe may manifest findings that mimic acute pathology. common post surgical appearances are demonstrated. Summary/Conclusion: Traumatic globe injury is an important cause of vision loss. Although clinical ophthalmologic examination is the mainstay of diagnosis, many types of globe injuries have characteristic imaging findings that are useful in treatment planning. Imaging evaluation of the globe should include the density and position of the lens, evaluation of the vitreous and aqueous humor, the shape and contour of the globe, the volume of the globe and the anterior chamber, assessment for retinaland/or choroidal detachments, and the presence of potential foreign bodies. By taking a logical, systematic approach to interpretation of globe imaging, most of these injuries can be elucidated.

2547. Johnson, M. D., et al. (2021). "Single-center experience with antibiotic prophylaxis and infectious complications in civilian cranial gunshot wounds." Neurosurgery Open **2**(1).

BACKGROUND: Despite the widespread adoption of systemic antibiotic prophylaxis in civilian cranial gunshot wounds (cGSWs), there remains a lack of consensus on microbial coverage and duration of therapy. OBJECTIVE: To analyze a 6-yr experience with prophylactic antibiotics in civilian cGSWs with a focus on infectious complications. METHODS: Records were reviewed for demographic and injury characteristics that could influence the risk of intracranial infection. Patients over 16 yr of age with cGSWs who survived more than 48 h were included. Antimicrobial prophylaxis was initiated at the discretion of the treating neurosurgeon, with eligible patients divided into 3 groups: no prophylaxis, single agent, and multiagent. Univariate analysis and multivariable logistic regression were performed to determine variables contributing to the development of intracranial infection. RESULTS: Of 75 eligible patients, prophylactic antibiotics were utilized in 61 (81.3%) with a 5 d median duration. Injury Severity Score (ISS) was significantly higher and Glasgow Coma Scale (GCS) was significantly lower in those who received prophylaxis. Eight intracranial infections were documented (10.7%) over a range of 1 wk to 3 yr from injury. Antibiotic prophylaxis did not contribute to infection, but the presence of cerebrospinal fluid (CSF) leak was associated with intracranial infection risk in multivariable regression (odds ratio [OR] = 11.8, P = .013). CONCLUSION: In a cohort of cGSW patients, those with a more severe injury profile were more likely to receive multiagent antimicrobial prophylaxis. However, we found that multiagent antimicrobial prophylaxis did not confer an advantage, and that the presence of CSF leak may be a more important contributing variable to the development of intracranial infection.

2548. Johnson, M. D., et al. (2020). "An external validation of the surviving penetrating injury to the brain (SPIN) score." Journal of neurosurgery **132**(4): 82.

Introduction: The Surviving Penetrating Injury to the Brain (SPIN) score utilizes clinical variables to estimate in-hospital and six-month mortality following civilian cranial gunshot wounds (cGSW). The initial SPIN score had excellent discrimination (area under the ROC curve (AUC) = 0.968), with good discrimination (AUC = 0.880) in a validation study. The goal of our study was to provide an independent, external validation of the SPIN score for in-hospital mortality. Methods: We retrospectively reviewed six years of data from our institutional trauma registry. SPIN score variables were collected including; gender, transfer status, injury motive, pupillary reactivity, motor Glasgow Coma Score (mGCS) subscore, Injury Severity Score (ISS), and admission international normalized ratio (INR). Multivariable logistic regression identified variables associated with in-hospital mortality. We compared the AUC between models using a non-parametric test for equality. Results: Of the 282 patients identified, 101 had all SPIN score components available. Our SPIN model had an AUC of 0.962. Continuous mGCS alone had an AUC of 0.932 and the addition of all SPIN score components, did not result in a significant increase in AUC (0.957, p=0.26). Using only mGCS resulted in fewer exclusions due to missing data. The AUC for continuous mGCS (0.932) was significantly higher compared to categorical mGCS (0.891, p=0.005). No additional variable included in the predictive model with continuous mGCS was both a significant predictor of inpatient mortality and increased model discrimination. Conclusion: The excellent discrimination of the SPIN score, when applied to our cohort, was due to a single variable. The continuous 6-point mGCS may be sufficient as a generalizable predictor of inpatient mortality in patients with cGSW with excellent discrimination and reduced bias due to missing data. Future prospective studies are needed to assess whether our cohort supports use of SPIN score variables for prediction of 6-month mortality.

2549. Johnson, M. D., et al. (2022). "An independent, external validation and component analysis of the Surviving Penetrating Injury to the Brain score for civilian cranial gunshot injuries." Journal of neurosurgery: 1-8.

OBJECTIVE: The Surviving Penetrating Injury to the Brain (SPIN) score utilizes clinical variables to estimate in-hospital and 6-month mortality for patients with civilian cranial gunshot wounds (cGSWs) and demonstrated good discrimination (area under the receiver operating characteristic curve [AUC] 0.880) in an initial validation study. The goal of this study was to provide an external, independent validation of the SPIN score for in-hospital and 6-month mortality., METHODS: To accomplish this, the authors retrospectively reviewed 6 years of data from their institutional trauma registry. Variables used to determine SPIN score were collected, including sex, transfer status, injury motive, pupillary reactivity, motor component of the Glasgow Coma Scale (mGCS), Injury Severity Score (ISS), and international normalized ratio (INR) at admission. Multivariable logistic regression analysis identified variables associated with

mortality. The authors compared AUC between models by using a nonparametric test for equality., RESULTS: Of the 108 patients who met the inclusion criteria, 101 had all SPIN score components available. The SPIN model had an AUC of 0.962. The AUC for continuous mGCS score alone (0.932) did not differ significantly from the AUC for the full SPIN model (p = 0.26). The AUC for continuous mGCS score (0.932) was significantly higher compared to categorical mGCS score (0.891, p = 0.005). Use of only mGCS score resulted in fewer exclusions due to missing data. No additional variable included in the predictive model alongside continuous mGCS score was a significant predictor of inpatient mortality, 6-month mortality, or increased model discrimination., CONCLUSIONS: Given these findings, continuous 6-point mGCS score may be sufficient as a generalizable predictor of inpatient and 6-month mortality in patients with cGSW, demonstrating excellent discrimination and reduced bias due to missing data.

2550. Johnson, N. A. (1997). "Penetrating BB shot head wound in an asymptomatic 9-year-old girl: the ultimate teaching moment." The Journal of the American Board of Family Practice **10**(2): 125-130.

BACKGROUND: Air rifle BB injuries represent a common type of childhood accident. The purpose of this case report is to encourage all providers of pediatric care to include nonpowder firearm safety education with standard well-child anticipatory guidance., METHODS: A case report is described and experience with similar injuries is discussed from cases found in a literature review using the key words "air rifle," "patient education," "pediatric," "ballistics," and "trauma.", RESULTS: A 9-year-old girl came to the emergency department after having been accidentally shot in the head by her 7-year-old brother with a toy air rifle. The BB shot entered through the left cheek and traversed up into the soft tissue above the mandible, just medial to the internal carotid artery, and posterior to the facial nerve. Other than local pain, she was entirely asymptomatic. The cheek was repaired without complication. Conservative therapy was recommended. She and her family were given anticipatory guidance, and her course thereafter was uneventful., CONCLUSION: Firearm education is not a standard part of every well-child encounter. Injuries by all types of firearms are increasing at epidemic rates. Questioning about the accessibility of both powder- and non-powder-based weapons (ie, air rifle) and providing routine safety education should become the standard of care at all well-child encounters.

2551. Johnson, T. E. (2000). "Intraorbital branch." Archives of ophthalmology (Chicago, Ill. : 1960) **118**(4): 590-591.

2552. Johnson, W. B., et al. (1995). "Indicator expression directed by regulatory sequences of the glial fibrillary acidic protein (GFAP) gene: in vivo comparison of distinct GFAP-lacZ transgenes." Glia **13**(3): 174-184.

An increase in the expression of the glial fibrillary acidic protein (GFAP) gene by astrocytes appears to constitute a crucial component of the brain's response to injury because it is seen in many different species and features prominently in diverse neurological diseases. Previously, we have used a modified GFAP gene (C-339) to target the expression of beta-galactosidase (beta-gal) to astrocytes in transgenic mice (Mucke et al.; New Biol 3:465-474 1991). To determine to what extent the in vivo expression of GFAP-driven fusion genes is influenced by intragenic GFAP sequences, the E. coli lacZ reporter gene was either placed downstream of approximately 2 kb of murine GFAP 5' flanking region (C-259) or ligated into exon 1 of the entire murine GFAP gene (C-445). Transgenic mice expressing C-259 versus C-445 showed similar levels and distributions of beta-gal activity in their brains. Exclusion of intragenic GFAP sequences from the GFAP-lacZ fusion gene did not diminish injury-induced upmodulation of astroglial beta-gal expression or increase beta-gal expression in non-astrocytic brain cells. These results demonstrate that 2 kb of murine GFAP 5' flanking region is sufficient to restrict transgene expression primarily to astrocytes and to mediate injury-responsiveness in vivo. This sequence therefore constitutes a critical target for mediators of reactive astrocytosis. While acute penetrating brain injuries induced focal increases in beta-gal expression around the lesion sites in C-259, C-445, and C-339 transgenic mice, infection of C-339 transgenic mice with scrapie led to a widespread upmodulation of astroglial beta-gal expression. Hence, GFAP-lacZ transgenic mice can be used to monitor differential patterns of astroglial activation in vivo. These and related models should facilitate the assessment of strategies aimed at the in vivo manipulation of GFAP expression and astroglial activation.

2553. Johnstone, D. J., et al. (1993). "The Victoria bomb: a report from the Westminster Hospital." Injury **24**(1): 5-9.

On 18 February 1991 a bomb exploded on Victoria station, London. A total of 51 people were injured including one fatally. Of the most seriously wounded, 30 were treated at The Westminster Hospital. The majority of injuries were

to the lower limbs, but serious wounds were also sustained to the chest, abdomen, forearm, orbit and cranium. Almost all injuries were caused by shrapnel. The low incidence of infection was attributed to thorough early surgical debridement. The administration of antibiotics was varied and uncoordinated, reflecting a lack of a common policy. The exhaustion of common external fixators necessitated the use of equipment unfamiliar to the surgeons and underlined the need for the rapid transfer of equipment between hospitals at the time of major incidents.

2554. Jonas, J. B., et al. (2000). "Prognostic factors in ocular injuries caused by intraocular or retrobulbar foreign bodies." Ophthalmology **107**(5): 823-828.

OBJECTIVE: To evaluate prognostic factors associated with final visual outcome, development of posttraumatic infectious endophthalmitis, and occurrence of proliferative vitreoretinopathy in patients with penetrating ocular injuries caused by intraocular or retrobulbar foreign bodies (FBs)., DESIGN: Clinic-based cross-sectional study., PARTICIPANTS: One hundred thirty patients presenting with penetrating ocular injuries caused by lacerations from FBs were operated on by one of two surgeons between 1989 and 1997. Follow-up time was an average of 20.84 +/- 20.76 months (median: 17.0 months). All FBs were located posterior to the lens., INTERVENTIONS: Pars plana vitrectomy; foreign body removal; additional surgical procedures according to the clinical situation., MAIN OUTCOME MEASURES: Postoperative visual acuity; posttraumatic infectious endophthalmitis; proliferative vitreoretinopathy., RESULTS: Occurrence of posttraumatic infectious endophthalmitis developing in seven patients (7/130 = 5.4%) was significantly (P = 0.026) associated with removal of the FB later than 24 hours after the accident and with the type of the FB (P < 0.01). Size (P = 0.37) of the FB, preoperative visual acuity (P = 0.62), presence of traumatic cataract (P = 0.75) or a retinal lesion by the FB (P = 0.16), age (P = 0.39), and gender (P = 0.46) did not show a statistically significant influence on the occurrence of endophthalmitis. Statistically significant risk factors for the development of proliferative vitreoretinopathy occurring in 27 patients (27 of 99 [27.6%] patients with a minimal follow-up of 3 months) were size of the FB (P < 0.001), preoperative visual acuity (P = 0.02), presence of a retinal lesion (P = 0.002), and traumatic cataract (P = 0.03). The time between FB removal and the accident was statistically marginally associated with the development of proliferative vitreoretinopathy (P = 0.07). Postoperative visual acuity depended significantly on size of the FB (P = 0.002), preoperative visual acuity (P < 0.001), presence of a retinal lesion (P = 0.049), and location of the retinal lesion (P < 0.001). Three eyes had to be enucleated because of endophthalmitis or phthisis bulbi., CONCLUSIONS: Prognosis in open-globe injuries with intraocular or retrobulbar foreign bodies depends on the size and type of the foreign body, presence and location of retinal lacerations, additional involvement of other intraocular structures, preoperative visual acuity, and timing of surgery. These factors may be important in preoperative counseling of the patient and for planning surgery.

2555. Jones, A. M., et al. (1987). "Suicidal contact gunshot wounds to the head with .38 Special Glaser Safety Slug ammunition." Journal of forensic sciences **32**(6): 1604-1621.

Glaser Safety Slug TM ammunition is a uniquely designed, essentially prefragmented ammunition. Tests performed by the U.S. Justice Department demonstrated that the ammunition possesses high kinetic energy, high relative incapacitation index (RII) and poses a very low risk to bystanders because of its total loss of kinetic energy in the target. Despite having been manufactured since 1974, no deaths from this ammunition have been previously reported. The authors herein describe the first three reported human deaths.

2556. Jones, B. L., et al. (1992). "Isolation of Bacillus licheniformis from a brain abscess following a penetrating orbital injury." The Journal of infection **24**(1): 103-104.

2557. Jones, J. N., et al. (1976). "Computed tomography of the brain." Current problems in diagnostic radiology **6**(4): 1-60.

2558. Jong, C. N., et al. (1999). "The effect of cocaine on traumatic brain injury outcome: a preliminary evaluation." Brain injury **13**(12): 1017-1023.

The effect of acute cocaine use on the functional and neuropsychological outcome of persons with traumatic brain injury, (TBI) was examined by comparing persons with TBI who tested positive for cocaine at the time of admission with persons with negative drug and alcohol screens. Subjects were matched for age, admission GCS score, level of education, and aetiology of injury (closed vs penetrating head injury). Dependent measures were: the Disability Rating Scale, the Functional Independence Measure, and selected neuropsychological tests. No group differences were found in DRS, FIM, FIM subsets, or FIM change. However, the cocaine group scored significantly lower than the no-drug group on the Rey Auditory Verbal Learning Test, but did not differ on any of the other neuropsychological tests.

2559. Jooma, R., et al. (1984). "Computed tomography in penetrating cranial injury by a wooden foreign body." Surgical neurology **21**(3): 236-238.

We present a case in which the skull and brain were pierced by a piece of wood, the low attenuation value of which, in a CT scan, simulated an intracerebral pneumatocoele. The risk of misinterpreting the CT appearance of intracranial wood is discussed, and the importance of thorough exploration of a penetrating cranial injury is stressed.

2560. Joos, Z. P., et al. (2016). "Orbital foreign body masquerading as orbital air." Clinical & experimental ophthalmology **44**(7): 637-639.

2561. Jopp-van Well, E., et al. (2016). "[Reconstructive investigations and identification measures in unknown soldiers of the Second World War]." Rekonstruktive Untersuchungen und Identifikationsmassnahmen bei unbekannten Soldaten aus dem Zweiten Weltkrieg. **237**(5-6): 153-171.

The article reports on the exhumation and identification of unknown soldiers from the Second World War. With the help of medicolegal investigation and reconstruction methods an American pilot presumably murdered by a shot to the head (lynch law) and an interned Italian soldier could be identified after about 70 years and brought back home.

2562. Jordana, F., et al. (2013). "Diagnosis of skull fractures according to postmortem interval: an experimental approach in a porcine model." Journal of forensic sciences **58 Suppl 1**: S156-162.

Most studies on fracture morphology of fresh or dry bones, specifically skull bones, have a limited focus, and they are often based on observations rather than experimental tests. This study characterized pig cranial fractures sustained under known impact conditions. An impact machine (mobile carriage guided by columns) was used to perform a fracture on each skull. Impacts were performed at the same energy level on fresh and dry bones, with two types of impactor: a sharp striker (n = 50) and a blunt striker (n = 50). We found distinct features under different conditions, including osseous flakes on fresh bones, 90degree fracture angles on dry bones, and more fractures with greater fragmentation on dry bones. These features highlighted the effects of time on perimortem fracture characteristics and the importance of bone storage conditions in the study of fracture genesis.

2563. Jorgensen, J. J., et al. (2016). "Injuries caused by fragmenting rifle ammunition." Injury **47**(9): 1951-1954.

INTRODUCTION: Although penetrating injuries are encountered on a regular basis in high volume trauma centres, most civilian trauma teams will be unfamiliar with the treatment of patients with injuries caused by fragmenting ammunition. The terrorist attacks in Norway on July 22, 2011 included a shooting spree causing 69 deaths and 60 injured. One of the weapons used was a semi-automatic rifle, calibre 5.56mm, with soft tip, short stop ammunition. The aim of the present study was to describe the characteristic injury patterns and lessons learned from the treatment of multiple patients admitted at the regional trauma centre with injuries from this type of ammunition., METHODS: We undertook an observational study of patients admitted at Oslo University Hospital, Ulleval after the shooting spree at Utoya on July 22, 2011. Data on demographics, injuries, injury severity, surgical procedures and outcome were collected prospectively., RESULTS: Of the 21 patients admitted after the shooting incident, 18 were identified with injuries caused by fragmenting ammunition and included in the study. Median age was 17 years (IQR 16, 19), median ISS 21 (IQR 12, 30) and 12 patients were female. They had been hit by a total of 38 projectiles, of which 32 were fragmenting bullets. Of the seven patients who sustained injuries to the head, neck and face, one patient required a craniotomy and one patient

had a non-survivable head injury. Of the 11 patients with torso injuries, six of the eight patients with chest injuries had intra-thoracic injuries that could be treated with chest tubes only. One patient had cardiac tamponade, requiring thoracotomy. Six patients underwent laparotomy, four of them more than one. Of the 10 patients with extremity injuries, two had nerve injuries and six patients had fractures. Five amputations were performed within the first nine days. A total of 101 operations were required within the first four weeks. The majority of these were repeated soft tissue debridements due to progressive necrosis., CONCLUSION: Knowledge about the specific challenges created by the progressive soft tissue necrosis caused by fragmenting ammunition should lead to planned, repeated debridements to reduce total tissue loss and complications.

2564. Jorgensen, O. S., et al. (1997). "Synaptic remodeling and free radical formation after brain contusion injury in the rat." Experimental neurology **144**(2): 326-338.

The purpose of this study was to explore whether bilateral frontal cortex contusion in rats would demonstrate changes relevant for understanding the pathology of frontal lobe injury in humans. Rats were allowed to survive for 3, 7, or 18 days postinjury (dpi). In the contused rats, albumin was trapped in frontal cortices, as well as in other brain areas, showing that neurons were exposed to plasma components. In the sham-operated rats, which had only craniotomy but no penetration of dura, the level of trapped albumin was also increased compared to intact controls, suggesting a partial lesion-like condition. Choline acetyltransferase activity was severely decreased in the frontal cortices of contused rats, compared to the sham-operated controls. The decrease was most pronounced at 3 dpi and less pronounced 18 dpi, suggesting that after the initial damage, regeneration of the cholinergic terminals occurred. The concentration of the mature presynaptic membrane protein D3(SNAP-25) was also decreased in the frontal cortices of contused rats at 3 and 7 dpi, whereas it was normalized at 18 dpi. Previously, we have evaluated changes in the rate of synaptic remodeling in brain injury by calculating the ratio of the neural cell adhesion molecule (NCAM) to D3(SNAP-25). The NCAM/D3(SNAP-25) ratio at 3 dpi was elevated by more than 60% in the frontal cortices of contused rats, suggesting a high initial rate of synaptic remodeling. The ratios were smaller at 7 and 18 dpi, suggesting that after the initial burst, the rate of remodeling leveled off. In contrast, astrocyte activation was less pronounced at 3 dpi than at 7 and 18 dpi, as measured by the levels of glial fibrillary acidic protein and glutamine synthetase immunoactivities. The immunoreactivity of glutamine synthetase more than doubled in the contused brains but its enzymatic activity increased less than 50%, suggesting that many enzymatic centers had been inactivated by free radicals. Calculated as the difference between the relative immunoreactivity and the relative enzymatic activity the "lost glutamine synthetase activity" increased continuously in frontal cortex and striatum from 3 to 18 dpi, indicating the production of free radicals long after the initial contusion event. In conclusion, following frontal cortical contusions the early synaptic damage was partly compensated by synaptic remodeling. We suggest that the continuous production of free radicals may have contributed to the declining remodeling rate and impair functional recovery.

2565. Jose, A., et al. (2019). "Management of Life-Threatening Hemorrhage from Maxillofacial Firearm Injuries Using Foley Catheter Balloon Tamponade." Craniomaxillofacial Trauma and Reconstruction **12**(4): 301-304.

The aim of this study is to evaluate the efficacy of Foley catheter in the management of hemorrhage from penetrating maxillofacial injuries in austere environment. This retrospective cohort study evaluated all penetrating head and neck trauma caused by firearm injuries reported to a military hospital at a forward aid location during 2015-2017. Foley catheter was used in the emergency management of bleeding in 11 cases. The effectiveness of this technique in controlling hemorrhage, its indication, contraindications, and complications has been explained. Out of 26 penetrating injuries received during the time period, 11 patients underwent Foley catheter balloon tamponade for the control of hemorrhage. Ten out of 11 patients responded adequately to balloon tamponade. One patient with a bullet lodged inside the neck underwent immediate surgical exploration for its removal and repair of internal jugular vein. No neurological deficits or complications were noted in any of the patients. Foley catheter balloon tamponade is very effective in managing hemorrhage from head and neck penetrating injuries. It significantly reduces the mortality by controlling bleeding from the major vessels especially in a combat environment.

2566. Joseph, A. P., et al. (2021). "An unusual case of a penetrating neck injury (PNI) illustrating the use of a “no zone” approach for the management of this injury and a review of the literature." Trauma case reports **32**.

We present an unusual case of a young male with a penetrating neck injury (PNI) due to a work-related injury. A metallic foreign body traversed from entry at surgical Zone 2 to Zone 1 in the neck and resulted in a transection of the left thyrocervical trunk at the origin with the left subclavian artery. Computed Tomographic Angiography (CTA) of the aortic arch and major branch vessels demonstrated haemorrhage anterior to the left subclavian artery and left thyrocervical trunk. We describe some of the diagnostic and operative challenges which may occur in these rare and life-threatening injuries. We have also reviewed some of the recent key literature on this topic and have collated the recommendations of the review. In recent years, there has been a movement away from selective “zone-based” mandatory surgical exploration for Zone 2 injuries, as well as invasive and time-consuming investigations (such as digital subtraction angiography, contrast oesophageal swallow and bronchoscopy) for Zone 1 and 3 injuries due to the high number of negative surgical procedures and investigations. We demonstrate there is now an evidence-based algorithm which demonstrates that a “no zone” approach to the management of these patients is safe and effective. This requires an initial physical examination looking for the presence or absence of “hard”, “soft” or “no” physical signs in these patients, and then deciding on subsequent management which would include immediate surgery, CTA of the aortic arch and branches (and subsequent surgical or other management) or observation only. Our aim in describing this case it to highlight that there is now good evidence-based guidance for the safe and effective management of patients with this infrequent but potentially fatal injury.

2567. Joseph, B., et al. (2014). "Improving survival rates after civilian gunshot wounds to the brain." Journal of the American College of Surgeons **218**(1): 58-65.

BACKGROUND: Gunshot wounds to the brain are the most lethal of all firearm injuries, with reported survival rates of 10% to 15%. The aim of this study was to determine outcomes in patients with gunshot wounds to the brain, presenting to our institution over time. We hypothesized that aggressive management can increase survival and the rate of organ donation in patients with gunshot wounds to the brain., STUDY DESIGN: We analyzed all patients with gunshot wounds to the brain presenting to our level 1 trauma center over a 5-year period. Aggressive management was defined as resuscitation with blood products, hyperosmolar therapy, and/or prothrombin complex concentrate (PCC). The primary outcome was survival and the secondary outcome was organ donation., RESULTS: There were 132 patients with gunshot wounds to the brain, and the survival rates increased incrementally every year, from 10% in 2008 to 46% in 2011, with the adoption of aggressive management. Among survivors, 40% (16 of 40) of the patients had bi-hemispheric injuries. Aggressive management with blood products ($p = 0.02$) and hyperosmolar therapy ($p = 0.01$) was independently associated with survival. Of the survivors, 20% had a Glasgow Coma Scale score >= 13 at hospital discharge. In patients who died (n = 92), 56% patients were eligible for organ donation, and they donated 60 organs., CONCLUSIONS: Aggressive management is associated with significant improvement in survival and organ procurement in patients with gunshot wounds to the brain. The bias of resource use can no longer be used to preclude trauma surgeons from abandoning aggressive attempts to save patients with gunshot wound to the brain. Copyright Published by Elsevier Inc.

2568. Joseph, B., et al. (2015). "Mild traumatic brain injury defined by Glasgow Coma Scale: Is it really mild?" Brain injury **29**(1): 11-16.

INTRODUCTION: Conventionally, a Glasgow Coma Scale (GCS) score of 13-15 defines mild traumatic brain injury (mTBI). The aim of this study was to identify the factors that predict progression on repeat head computed tomography (RHCT) and neurosurgical intervention (NSI) in patients categorized as mild TBI with intracranial injury (intracranial haemorrhage and/or skull fracture)., METHODS: This study performed a retrospective chart review of all patients with traumatic brain injury who presented to a level 1 trauma centre. Patients with blunt TBI, an intracranial injury and admission GCS of 13-15 without anti-platelet and anti-coagulation therapy were included. The outcome measures were: progression on RHCT and need for neurosurgical intervention (craniotomy and/or craniectomy)., RESULTS: A total of 1800 patients were reviewed, of which 876 patients were included. One hundred and fifteen (13.1%) patients had progression on RHCT scan. Progression on RHCT was 8-times more likely in patients with subdural haemorrhage >=10 mm, 5-times more likely with epidural haemorrhage >=10 mm and 3-times more likely with base deficit >=4. Forty-seven patients underwent a neurosurgical intervention. Patients with displaced skull fracture were 10-times more likely and patients with base deficit >4 were 21-times more likely to have a neurosurgical intervention., CONCLUSION: In patients with intracranial injury, a mild GCS score (GCS 13-15) in patients with an intracranial injury does not preclude progression on repeat head CT and the need for a neurosurgical intervention. Base deficit greater than four and

displaced skull fracture are the greatest predictors for neurosurgical intervention in patients with mild TBI and an intracranial injury.

2569. Joseph, C. (2017). "Characteristics and outcomes of gunshot-acquired spinal cord injury in South Africa." South African Medical Journal **107**(6): 518-522.

Background. Spinal cord injuries (SCIs) caused by assault present a unique challenge facing the healthcare system, in that very little is known about how these injuries manifest compared with other causes of injury. Understanding the nuances of gunshot SCIs could contribute towards better care provision. Objective. To determine the characteristics of gunshot SCI and compare both injury characteristics and outcomes between gunshot SCI and all other traumatic causes taken together. Methods. The gunshot SCI sub-cohort was derived from a 1-year prospective, population-based study, including both tertiary-level hospitals providing SCI care in the Cape Metropolitan area of South Africa (SA). All consenting 145 survivors, after a window period of 7 days, were included, and their demographic and injury characteristics were captured according to the International SCI Core Basic Data Set. Further, selected secondary medical complications (outcomes) were prospectively and routinely assessed throughout acute care. Both descriptive and inferential statistics were used to describe and compare characteristics and outcomes, respectively. Results. Of the 145 survivors of traumatic SCIs, 45 (31%) injuries were caused by gunshots. The gunshot SCI group consisted mainly of males (n=43; 96%), and the average age of injury onset was 26 years. Most survivors of the gunshot SCI group were paraplegic (69%), had complete lesions (69%) and vertebral injuries (96%), and presented with significant associated injuries (84%). When comparing gunshot SCI with all other traumatic causes, significant differences were found in relation to demographic and injury characteristics and adverse outcomes, indicating that those survivors with gunshot SCI were typically younger males with complete paraplegia, had more frequent secondary medical complications, and a longer hospital stay. Conclusion. This study contributes to the knowledge base of survivors with gunshot SCIs in a region of SA. Efforts should be made to reduce the occurrence of all gunshot SCIs, since those injuries impact survivors negatively in terms of injury characteristics and adverse outcomes.

2570. Joseph, G., et al. (2005). "Delayed hydrocephalus as an unusual complication of a stab injury to the spine." Spinal cord **43**(1): 56-58.

STUDY DESIGN: Case report., OBJECTIVE: To report a rare complication following a stab injury to the upper cervical spine and cord., SETTING: National spinal injury unit in a Scottish university teaching hospital., CASE REPORT: A 19-year-old male sustained a stab injury to his upper cervical spine, with a partial cord transection. After 5 months of rehabilitation, his condition deteriorated. CT scans showed hydrocephalus, which was treated by shunting. After shunting, the patient's condition improved but he remained tetraplegic requiring ventilatory support at night., CONCLUSION: Hydrocephalus as a late complication of a cervical spine injury is rare but should be considered if the condition of the patient with an upper cervical spine injury deteriorates. The likely mechanism of the hydrocephalus development is also discussed.

2571. Joubert, C., et al. (2019). "Vacuum-assisted closure (VAC) for craniocerebral wounds in severely injured patients: technical note of a damage control procedure." Journal of the Royal Army Medical Corps **165**(6): e1.

The management of a craniocerebral wound (CCW) remains challenging, particularly in a severely injured patient. Considering the complexity of the multilayer insult and damage control care in an unstable patient, every procedure performed should promptly benefit the patient. We report an illustrative case of a patient with a gunshot wound to the head that resulted in a CCW for which we applied vacuum-assisted closure (VAC) therapy according to damage control principles. We describe the technical approach and discuss the indications, results and technique by considering the literature available. VAC can be used for CCWs, particularly for large defects in selected patients according to clinical and CT evaluations following immediate resuscitation. In severely injured and unstable patients, VAC aims to delay definitive reconstructive and time-consuming treatment. Interestingly, it appears to be a safe treatment based on the previously described-but not exclusively trauma-cases with no secondary cerebrospinal fluid leakage encountered.

2572. Joud, A., et al. (2015). "Foreign body of the brainstem by penetrating injury: Conservative treatment." Neuro-Chirurgie **61**(6): 401-403.

Traumatic brainstem injuries usually lead to severe lesions and unfavourable outcome. In the literature, the few cases with favourable outcome all benefited from surgical removal of the foreign body. We report a very unusual case of a penetrating brainstem injury with a crossbow arrow with conservative treatment and favourable clinical course despite an infectious complication (brainstem abscess). This case illustrates an important gap between a good clinical status and the severity of the lesion highlighted by CT scan. In addition, a collegial decision was made not to treat the lesion surgically, but only the complication, the abscess, by stereotactic puncture. The treatment must thus be tailored in this type of lesion.

2573. Jourdan, C., et al. (1993). "[Cranio-cerebral gunshot wounds in civilian practice in children]." Plaies cranio-cerebrales par balle en pratique civile chez l'enfant. **48**(5): 389-396.

The circumstances and the prognosis of six gunshot craniocerebral wounds in civilian children are presented. The cause is a suicide in two cases and an accident in four cases. In three out of these four cases, another person is responsible for this accident, an adult two times, a child in one case. When the accident is due to a child, it is always by play and one time the accident is the autofact of a 2-year-old boy. In all cases, the fire arm was loaded and an adult's imprudence is present. The mortality is important (4/6). More than the initial clinical state, the seriousness of which is not a pejorative indice, the prognosis is subordinated to the CT scan aspect about the missile tract, and to the initial value of the intracranial pressure.

2574. Jousset, N., et al. (2010). "Suicide by skull stab wounds: a case of drug-induced psychosis." The American journal of forensic medicine and pathology **31**(4): 378-381.

Suicide by stabbing to the head and/or driving sharp objects into the skull is of extreme rarity. This article reports the case of a 27-year-old man, who committed suicide by multiple knife stabs and cuts to the head, the torso, one shoulder and the forearms. Autopsy showed a perforating wound of the skull and the 10-cm long broken blade of the knife being still embedded in the right temporal lobe of the brain. The deceased had no history of psychiatric illness but was currently treated by mefloquine, a quinine derivative associated with a high rate of psychiatric adverse effects. Toxicological examination confirmed a recent intake of mefloquine together with chloroquine, another antimalarial drug. To our knowledge, this is the first report of a completed suicide with very strong evidence of mefloquine implication. Discussion focuses upon mefloquine-induced psychiatric disorders and highlights the importance of performing toxicological investigations in cases of unusual suicides.

2575. Jovanovic, M., et al. (2002). "[Problems in diagnosis and extraction of foreign bodies from the orbit associated with pain]." Problem dijagnostike i ekstrakcije stranog tela u orbiti pracenog bolovima. **130**(11-12): 412-415.

The aim of this study was to present the troubles and significance of a proper diagnosis of a foreign body which caused a double perforation of the eyeball and was retained in the orbit. Another reason for this case report was the intensive pain associated with the existing foreign body in the orbit. A male, 54 years old, had a perforating wound of the eyeball caused by a metal foreign body, which stayed in the orbit close to the scleral wall. X-ray and echographic examinations of the orbit were not conclusive regarding the question whether this foreign body was situated within or outside the eyeball. Only CT imaging showed that foreign body produced a double perforation of the eyeball and was externally close to the sclera. Foreign body was extracted by transconjunctival anterior orbitotomy through the inferior fornix, using the electromagnetic probe. Since the first day of injury and up to the eighth day, the patient had intensive deep orbital pain, which was alleviated only partially by analgetics. It could not be explained by secondary glaucoma because IOP was normal or by an inflammatory process, or in any other way. Only the extraction of foreign body from the orbit led to the complete relief of pain. We believe that the pain was caused by compression of foreign body to some of scleral sensory nerves. X-ray and echographic examinations of the orbit are not always a reliable proof in the proper evaluation whether foreign body is within or outside the eyeball in the orbit. Precise diagnosis can be made only by CT imaging. The pain in the orbit may be caused by compression of foreign body to sensory nerves.

2576. Judd, O. and J. P. Wyatt (2007). "Circular saw suicide." Journal of forensic and legal medicine **14**(4): 235-237.

A case of an individual who died as a result of a self-inflicted circular saw injury to the head is presented. Death appeared to result from massive haemorrhage from injury to the superior sagittal sinus. The described mechanism of injury appears to be very unusual and may have reflected underlying issues. In particular, potential background factors resulting in the self-infliction of an injury to the head are discussed.

2577. Jung, B.-Y., et al. (2010). "Penetration injury to periorbital area by dental laboratory bur." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **68**(7): 1681-1683.

2578. Jurda, M., et al. (2019). "Digital restoration of fragmentary human skeletal remains: Testing the feasibility of virtual reality." Journal of forensic and legal medicine **66**: 50-57.

Experts in forensic anthropology and medicine have become gradually accustomed to examining components of the human body in the virtual workspace. While the computer-assisted approach offers numerous benefits, the interactions with digital three-dimensional biological objects are often problematic, particularly if conducted with mouse, keyboard and flat-panel screen. The study focusses on feasibility of a virtual reality (VR) system for virtual restoration of fragmentary skeletal remains. The VR system was confronted with three cases of fragmentary remains. The cases were reassembled manually by twenty participants using a HTC Vive headset combined with an in-house application A.R.T. The same task was performed using a CloudCompare software in conjunction with a desktop peripheral. The two systems were compared in terms of time efficiency, the geometric properties of the resulting restorations, and convenience of use. Restoration using the VR system took approximately half the time the desktop set-up did. The VR system also yielded a lower error rate when a severely fragmented skull was reassembled. Ultimately, although the efficiency of the reassembling was shown to be strongly dependent on the operator's experience, the use of the VR system balanced out the uneven levels of proficiency in computer graphics. The current generation of virtual reality headsets has a strong potential to facilitate and improve tasks relating to the virtual restoration of fragmented skeletal remains. A VR system offers an intuitive digital working environment which is less affected by an operator's computer skills and practical understanding of the technology than the desktop systems are.

2579. Jurgens, C., et al. (2008). "[Use of high-frequency ultrasound for foreign body imaging in chronic conjunctivitis due to microtrauma]." Fremdkorpernachweis mittels Hochfrequenzsonografie bei chronischer Konjunktivitis durch Mikrotrauma. **225**(7): 660-662.

Conjunctivitis is a frequent disease mostly caused by infections. In the case of a single-sided manifestation and additional resistance to anti-infective therapy a widespread differential diagnosis has to be considered. The case report of a 41-year-old patient suffering from unilateral persistent conjunctivitis is presented. Initially, there was no biomicroscopic evidence for a penetrated ocular foreign body. The unilateral, chronic and sectoral conjunctivitis was resistant to topical application of antibiotics and steroids. After repeated in-depth anamnesis the patient recalled an inconsiderable trauma while he was working on a building site. High-frequency ultrasound was used to locate an intrascleral foreign body 3 mm behind the limbus corneae while slit lamp biomicroscopy and ophthalmoscopy failed to detect the foreign material. The precise localisation provided by the 20-MHz sector scanner optimised the management of operative intervention and consequently led to an uncomplicated extraction of the bulbar foreign body.

2580. Juricek, L., et al. (2011). "[The real firing wound of type of skull perforation and head penetration compared with the mathematical model of behaviour of FMJ pistol projectile of calibre of 6.35 mm Browning (25 Auto)]." Realne strelne poraneni typu prustrel lebky a zastrel hlavy ve srovnani s matematickym modelem chovani FMJ strely pistoloveho naboje raze 6,35 mm Browning (25 Auto). **56**(4): 50-52.

Searching for the answer whether the bullet cal. 6.35 mm Browning (25 Auto) could entrance the human skull and stay inside without resting the head against the solid barrier inside the vehicle, forensic experts in the field of ammunition and wound ballistics used mathematical model of the monoogival pistol bullet's velocity decrease through the penetration of the several type of human tissue due to physical and mechanical properties. The result of the expert's terminal ballistics task was the mathematical prediction of wound track length at the moment of bullet's stop in the

tissue. The results has been compared with the cases where the similar weapon system with the resembling energetic output has been used.

2581. Just, T., et al. (2000). "[Danger from exploding fireworks and blank firearms]." Gefahrdung durch explodierende Feuerwerkskorper oder Schreckschusswaffen. **48**(12): 943-948.

Explosive amusement and deterrent articles such as New Year's Eve cannons and rockets, toy pistols, and blank guns are not at all harmless items. Their potential dangerousness is often extremely underestimated. Two damaging mechanisms are important: during explosions, high pressures and temperatures develop and a considerable sound pressure level can be measured. If the explosion happens near the human body (intentionally or inadvertently), not only superficial lesions can occur, but also (mainly due to contact shots) serious, deep-seated tissue damage, especially in the head and neck region with its endangered sense organs such as eye and ear, the vessels and nerves supplying the brain, the speech- and voice-forming apparatus, and in particular the face, can be the consequence. Their mutilation can lead to serious and extensive interpersonalchanges. Accidents are published in the relevant otological and forensic medical papers, but nevertheless it seems important to us to point out the dangerousness of these readily available items.

2582. Justice, J. S. (1994). "Personhood and death -- the proper treatment of anencephalic organ donors under the law: In re T.A.C.P., 609 So. 2d 588 (Fla. 1992)." University of Cincinnati law review. University of Cincinnati. College of Law **62**(3): 1227-1279.

2583. Jusue-Torres, I., et al. (2016). "Wooden Foreign Body in the Skull Base: How Did We Miss It?" World neurosurgery **92**: 580.e585-580.e589.

BACKGROUND: Timely detection of intraorbital and skull base wooden foreign bodies is crucial. Wooden foreign bodies are difficult to detect on imaging. The radiologist may fail to identify wooden foreign bodies on two thirds of initial scans and can miss them in almost one third of total cases., CASE DESCRIPTION: A 66-year-old woman sustained a penetrating injury through the left upper eyelid with a small tree branch. The branch was immediately removed in the field, and she was provided with prompt medical care at a local hospital. Initial computed tomography (CT) scan diagnosis was "posttraumatic sinusitis," and this was treated empirically with vancomycin and piperacillin/tazobactam. On the eighth day after injury, she developed progressive swelling and pain of her eyelid with left trigeminal/supraorbital numbness and complete left ophthalmoplegia. A new CT scan showed an open "track" from the region of the left upper orbit/superior rectus to the contralateral sphenoid sinus, which raised suspicion for a retained foreign body. Further imaging confirmed the suspicion. Endoscopic sinus surgery was performed with extraction of the wooden object and evacuation of the left orbital infection., CONCLUSIONS: This case indicates that intraorbital and skull base wooden foreign bodies are elusive, demanding a high index of suspicion from both clinicians and radiologists to identify retained material in the setting of ocular or sinus trauma. For better identification of wooden foreign bodies, bone windows on CT should have a width of -1000 Hounsfield units with a soft tissue window level of -500 Hounsfield units. Copyright Published by Elsevier Inc.

2584. Kabugi, J. G. and S. Okelo (2011). "Awake nasotracheal fiber-optic intubation in a patient with severe gunshot injury to the face: Case Report." Annals of African Surgery **7**: 66-67.

Facial trauma significantly increases the difficulty in airway management in the emergency department or during the provision of anesthesia for surgery. We present airway management in a patient with severe facial trauma that necessitated awake nasotracheal fiber-optic intubation for safe induction of anesthesia.

2585. Kacheris, B. N., et al. (2019). "Penetrating intracranial trauma of two minors treated with endovascular technique with the use of temporary balloon occlusion for proximal arterial control." BMJ case reports **12**(4).

We present two children treated with endovascular techniques to gain proximal arterial control of the internal carotid and vertebral artery prior to removal of penetrating objects from the skull base. Both siblings (8-month-old and 22-month-old boys) were injured by different sharp objects (knife and scissor) by a guardian. They were transported to the emergency room where vascular control, including coil embolisation and internal carotid balloon occlusion, was

performed in the neuroendovascular suite for safe removal of penetrating objects. Both minors recovered and were discharged home without any focal neurological deficits. In two children with scissor and knife stab with intracranial penetration, endovascular technique allowed safe removal of objects and ensured proximal arterial control was maintained to control for possible extravasation of blood on removal from the skull base.

2586. Kadhim, A. H. K., et al. (2020). "Cranial falling bullet injuries, a series of 30 cases in Iraq." British journal of neurosurgery **34**(2): 135-141.

Purpose: The purpose of this study is to highlight the importance of cranial falling bullet injuries and raise awareness about them. We studied the clinical and radiological findings, and their relation to the treatment and outcome. There are limited studies in this field. Materials and methods: Thirty patients, (aged 8-55 years) with cranial falling bullet injury were included in this study. They were followed during their hospitalization and up to 6 months thereafter. Post-resuscitation clinical findings, unenhanced brain CT scan findings, treatment and outcome (Glasgow Outcome Scale) were studied. Results: Male to female ratio was (1.73:1). Median age of all patients was: 17.5 years. 20(66.7%) patients had a GCS of 13-15, 3(10%) had 9-12, 2(6.7%) had 6-8, and 5(16.6%) had 3-5 at presentation. 23(76.7%) patients had normal pupillary reaction and symmetry whereas 7(23.3%) had poor reaction and/or asymmetry. On CT scan, 13 had a unilobar injury, six had multilobar or bihemispheric injuries, 10 had a bullet through the deep midline structures of the brain, seven had transventricular with IVH, four had SAH, none had large intracranial hematomas. All patients received medical treatment. Local wound care and/or extraction of extracranial subgaleal bullets were performed in 24 patients (80%). More extensive surgery was performed in six patients (20%). There was significant correlation (using Correlation Coefficient) between GCS, pupillary reaction/symmetry and CT imaging findings with the patient outcome. Low GCS, poor pupillary reaction and/or asymmetry, CT findings of central area injury, transventricular, IVH, or multilobar injury were associated with poor outcome. Conclusions: Cranial falling bullet injuries are uncommon, but they can cause significant morbidity and mortality. More studies are needed to document the impact of these injuries and to raise awareness among the society to support the efforts aiming at controlling the irrational use of guns in different countries of the world.

2587. Kadota, K., et al. (1988). "[Transorbital intracranial penetration by chopstick. Case report]." Neurologia medico-chirurgica **28**(11): 1128-1132.

2588. Kadri, H. (2013). "Ballistic trauma in Pediatrics Population." Child's Nervous System **29**(9): 1780.

Independent sources reported that more than 4000 kids were killed while 13000 were injured between 2011 and early 2013 in Syria. 42 patients aged between 2 months and 16 years were seen in critical conditions suffering frombrain injuries by gunshot. 11 cases the bullet was present in the skull space (no exit site) while in 31 the bullet left the head. All those patients were managed in primary battlefield hospital set up in secrets by some doctors. The aim was: stopping the bleeding by local homeostasis, decompression the brain and in few cases removing the projectile. Glasgow scale score was evaluated for all patients it varied between 4 and 13. 18 patients who arrived alive to medical unit, had an initial GS at 4 they died shortly after admission while 6 kids had GSS <11 needed artificial ventilation died later on because of lake or maladapted artificial ventilation. 18 kids underwent a surgical repair for their lesions. In those 18 patients who were evaluated as (in good condition), 10 of them had an outlet hole no XR was performed for them. While 8 out of the have no outlet hole, they had either an XR or CT scan in peripheral hospital. Transportation was itself an issue. The surgical repair varies between skin repair to prevent CSF leak, decompression by removal of bone fragments which were compressing the brain and local homeostasis. 8 patients died later from other complications a 10 stayed alive 3 of them have severe handicaps. Conclusion: Unfortunately the penetrating head injury by a gunshot have a bad prognosisi when it is managed in poorly equipped medical unit.

2589. Kaech, D. L. and D. Wyler (2016). "Delayed death one week following a gunshot injury due to air embolism." Swiss Medical Weekly **146**: 154S.

Introduction Gunshot injuries can be fatal or may be survived with neurological and neuropsychological deficits. At KSGR they are rare with one patient every 4-7 years. We report an exceptional case with a survival during one week

followed by death due to air embolism. Case report This 39 years old man was admitted following a right frontal to left parietal parasagittal gunshot injury after having being found comatose with CGS 4, but still breathing and coughing, with reacting and symmetrical pupils. He was intubated and brought to our hospital. (see Figs. 1-4). After stabilization of the hemodynamic situation, he underwent a neurosurgical wound revision with hemostasis, removal of some epidural blood, some bony fragments and protruding necrotic brain tissue, leaving some epidural blood layer “padding” the injured parieral midline. The wounds were adapted without achieving a watertight closure. He remained stable and was transferred on day 7 to the medical ward for further care. On day 8 he suddenly died after an attempt to mobilize him, i.e., to put him in an upright position. Result of the medico-legal examination Gas accumulation in the right sided heart chambers. Gunshot induced bi-parietal hemorrhagic lesions with 1 cm epidural hematoma extending to the frontal region, torn superior sagittal sinus (see Fig.5) with elevated about 4 cm large fragments of the parietal bone. Discussion This patient didn't die during the first days, but after one week, following what is routinely done in head injured patients: a progressive mobilization with verticalization. Autopsy revealed air embolism as cause of death. Some air has probabely entered through a not watertight closure of the skin, and the blood left on the dura didn't occlude enough the way to the torn superior sagittal sinus. Conclusion The risk of air embolism is well known, but the awareness of this risk is not present in daily routine especially in the very rare case of a gunshot injury to the brain. The upright position is known to be a trigger for air aspiration in patients with open head injuries or operations performed in sitting position because of negative pressure in the superior vena cava and the right atrium. The risk is comparable to the one during removal a central venous catheter, which should be performed in horizontal to Trendelburg position. This knowledge should be implemented into the checklists and guidelines, as recommendations to doctors, physiotherapists and nursing staff.

2590. Kafih, M., et al. (2009). "[Intra-uterine fetal death by knife: case report]." Mort foetale intra-uterine par arme blanche (a propos d'un cas). **38**(2): 182-185.

INTRODUCTION: Opened injuries by knife are rare in pregnant women and are responsible of foetal death in most cases., OBSERVATION AND COMMENTARY: We report a case of a 27-years woman, in her 8th months of pregnancy, victim of three knife punchs in her right iliac fossa. An emmergent laparotomy revealed deep wounds in the uterus and its right vascular pedicles, and a right external iliac artery lesion. Hysterectomy was performed and the extracted fetus was dead. He had two wounds in skull and back. Foetal death is common in opened knife injuries especially at the end of pregnancy. On one hand, the fetus has an abdominal situation that expose him to penetrating lesions. On the other hand, the uterus is richly vascularized during this period of pregnancy, thus any uterine or pedicular wound could result in a maternal hemorrhagic shock and hence a poor foetal and maternal prognosis., CONCLUSION: Knife injuries in pregnant women could compromise the foetal prognosis. Managmanent should be early and requires a close collaboration between resuscitators, obstetricians and vascular surgeons.

2591. Kahler, R. J., et al. (1998). "Orbitocranial penetration by a fern: case report." Neurosurgery **42**(6): 1370-1373.

OBJECTIVE AND IMPORTANCE: Cranial and orbitocranial penetration by organic foreign material is not infrequent. It is important to identify whether penetration has occurred and to localize and remove the organic foreign material., CLINICAL PRESENTATION: We report a 15-month-old patient who suffered orbitocranial penetration with the stem of a fern. The stem passed through the orbit, exiting via the superior orbital fissure. It continued through the middle cranial fossa to end in the posterior cranial fossa., INTERVENTION: The patient underwent surgery, and a modified Dolenc procedure was performed. The foreign body was identified in the prepontine cistern and was removed. An extradural approach was performed to the cavernous sinus and superior orbital fissure, and the remaining foreign body was removed., CONCLUSION: Retained intracranial wood should be removed. The radiological diagnosis can be difficult, and magnetic resonance imaging is the investigation of choice. Magnetic resonance imaging may not detect some cases of organic foreign material penetration.

2592. Kahugu, E. (2013). "Management of severe orbital trauma: A local experience." International journal of oral and maxillofacial surgery **42**(10): 1323.

Trauma from road traffic accidents and interpersonal violence provide for at least 50% of any maxillofacial Surgeons in Kenya. High speed motor vehicle accidents are common due to the recently developed 'super highways' and gunshot injuries are also common due to conflict in neighbouring nations. The management of these injuries in a

developing nation is presented with an emphasis on the application of new techniques and older techniques in a challenging environment to achieve desirable outcomes. The use of and adaptation of modern technology in this developing environment is presented.

2593. Kairinos, N., et al. (2009). "Pneumocephalus following gunshot injury to the thoracic vertebral column: a case report." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES **15**(6): 614-616.

Subarachnoid pleural fistula (SPF) following injury to the vertebral column is an extremely rare complication and is usually described after blunt trauma. We report the first case of SPF with pneumocephalus due to a gunshot wound to the spine.

2594. Kaiser, G. M., et al. (2010). "[Process of organ donation at a maximum care hospital]." Organspendeprozess an einem Krankenhaus mit Maximalversorgung. **135**(42): 2065-2070.

BACKGROUND: A chronic shortage of organs for transplantation has developed due to the disparity between the demand for solid organs and the current supply. Improved processes for identifying potential donors could expand the pool of available organs., PATIENTS AND METHODS: All patients who died between January 1, 2006 and December 31, 2008 in the University hospital of Essen suffering from a primary or secondary cerebral injury were assessed retrospectively. Age, date of death, duration of stay in the intensive care unit, main and additional diagnoses and diagnostic test for assessing brain death as well as discussions with relatives were recorded anonymously., RESULTS: 424 deaths with primary or secondary cerebral injury (group A) were identified during the study period. 267 deaths (62.9 %) (group B) were further evaluated for organ donation after excluding absolute medical contraindications, e. g. malignancies, multiple organ failure. In 68 cases (16.0 %), diagnostic test of brain death had been completed (group C). Despite a high refusal rate, 36 (8.5 %) organ procurements were realized (group D) resulting in 140 transplanted organs (3.9 per organ donor)., CONCLUSION: The first crucial step to improve the rate of organ donation is to identify any potential donor. In 8.5 % of intensive care unit deaths with primary or secondary cerebral damage, organ procurement was realized. In addition, education regarding transplant medicine and a positive attitude to organ donation among the general public as well as medical personnel is necessary to minimize the high refusal rates.

2595. Kaiser, G. M., et al. (2014). "In-house coordination for organ donation--single-center experience in a pilot project in Germany (2006 to 2013)." Transplantation proceedings **46**(6): 2066-2069.

A challenge for solid organ transplantation in Germany is the shortage of organs. In an effort to increase donation rates, some federal states mandated hospitals to install transplantation officers to coordinate, evaluate, and enhance the donation and transplantation processes. In 2009 the German Foundation for Organ Transplantation (DSO) implemented the In-House Coordination Project, which includes retrospective, quarterly, information technology-based case analyses of all deceased patients with primary or secondary brain injury in regard to the organ donation process in maximum care hospitals. From 2006 to 2008 an analysis of potential organ donors was performed in our hospital using a time-consuming, complex method using questionnaires, hand-written patient files, and the hospital IT documentation system (standard method). Analyses in the In-House Coordination Project are instead carried out by a proprietary semiautomated IT tool called Transplant Check, which uses easily accessible standard data records of the hospital controlling and accounting unit. The aim of our study was to compare the results of the standard method and Transplant Check in detecting and evaluating potential donors. To do so, the same period of time (2006 to 2008) was re-evaluated using the IT tool. Transplant Check was able to record significantly more patients who fulfilled the criteria for inclusion than the standard method (641 vs 424). The methods displayed a wide overlap, apart from 22 patients who were only recorded by the standard method. In these cases, the accompanying brain injury diagnosis was not recorded in the controlling and accounting unit data records due to little relative clinical significance. None of the 22 patients fulfilled the criteria for brain death. In summary, Transplant Check is an easy-to-use, reliable, and valid tool for evaluating donor potential in a maximum care hospital. Therefore from 2010 on, analyses were performed exclusively with Transplant Check at our university hospital.

2596. Kaiser, M. C., et al. (1983). "CT in a case of intracranial penetration of a pencil. A case report." Neuroradiology **24**(4): 229-231.

A case is reported of an unusual foreign body, a pencil, penetrating the right temporal lobe through the squamous temporal bone in a fall. Wood has low attenuation coefficients, so that the appropriate CT examination includes multiple window settings to permit accurate assessment of bone fragment displacement as well as recognition of detached wood splinters. CT scanning and early surgery are important steps in the management of these injuries to reduce significantly the overall mortality as well as immediate and long term complications. The necessity for meticulous surgical technique when removing the foreign body is stressed as retained wood can not easily be visualized against the hypodense background due to postoperative changes.

2597. Kalani, M. Y. S., et al. (2013). "Cerebral herniation as a complication of chest tube drainage of cerebrospinal fluid after injury to the spine." World neurosurgery **79**(5-6): 798.E717-799.

BACKGROUND: Patients with concomitant injuries to the thorax and thecal sac requiring chest tube drainage are at risk for cerebral herniation caused by overdrainage of cerebrospinal fluid (CSF)., CASE DESCRIPTION: A 40-year-old man presented to the trauma service awake, alert, and oriented with an isolated gunshot wound to the midaxillary line through the tenth intercostal space and a complete spinal cord injury at T12. The patient was stabilized and intubated. A chest tube was placed, and he was transferred to the neurologic intensive care unit. The patient was found to be comatose with complete absence of brainstem reflexes 3 hours after admission., RESULTS: Magnetic resonance imaging (MRI) and autopsy revealed diffuse cerebral edema, occlusion of the bilateral posterior cerebral arteries, and tonsillar herniation extending several centimeters below the foramen magnum, with petechial hemorrhages and absence of gliosis., CONCLUSIONS: To the authors' knowledge, this case represents the first report of cerebral herniation secondary to chest tube drainage of a CSF leak caused by traumatic injury to the thecal sac.

2598. Kalavrezos, N., et al. (2005). "Reconstruction of through-and-through osteocutaneous defects of the mouth and face with subscapular system flaps." Annals of the Royal College of Surgeons of England **87**(1): 45-52.

BACKGROUND: Major ablative surgery in the head and neck region may create composite defects involving the oral mucosa, bone and the overlying facial skin. The large surface area and the three-dimensional nature of these defects pose a difficult reconstructive challenge requiring adequate bone and large, positionally versatile skin flaps., PATIENTS AND METHODS: From September 1993 to May 2000, 19 patients with through-and-through osteocutaneous defects of the mouth and face were reconstructed with composite subscapular artery system flaps. The evaluated parameters included: (i) site and dimensions of the tissue defect; (ii) specific flap properties; and (iii) review of the recipient and donor site morbidity., RESULTS: 10 variants of scapular osteocutaneous flaps, eight latissimus dorsi with serratus anterior and rib osteo-myocutaneous flaps, and one combination of an osteocutaneous scapular and myocutaneous latissimus dorsi flap were used to reconstruct composite facial defects with mean dimensions of: skin 54.4 cm(2), mucosa 56.2 cm(2) and bone of 8.2 cm. Ischaemic complications occurred in three patients including one total flap failure and one failure of the bony component in previously irradiated patients. The third flap was successfully salvaged. No significant long-term donor site morbidity was noted., CONCLUSION: Composite flaps based on the subscapular artery system are a versatile reconstructive modality for large through-and-through defects of the mouth and face.

2599. Kaliszan, M., et al. (2021). "Fake gunshot wounds in the skull-post-mortem artifact caused by steel probe during police search for a missing body." International journal of legal medicine **135**(3): 879-883.

The paper presents a case of a forensic autopsy of a young woman who was murdered and her dismembered body was hidden in soil and water. In the skull of the deceased, in the temporal and occipital regions, the autopsy revealed 3 round, almost identical holes, which looked like small caliber gunshot wounds. Doubts about the cause of these injuries were raised by the fact that despite the decomposition of the body, the continuity of the dura at the site of these holes remained undamaged and the absence of any trace of a bullet's wound track in the brain, the absence of a foreign body in the cranial cavity, as well as the absence of wounds on the opposite side of the skull that could be exit wounds. A thorough analysis of the investigation and the activities carried out during the search for the missing body allowed to adopt and finally confirm the hypothesis that the above mentioned skull damage occurred during the search

for the cut-off head of the deceased in shallow water by means of special tapered conical steel probes used by the rescue/search teams. Due to the structure of such a spike, i.e., a sharp end and then a wide cone, only a superficial puncture of the steel probe tip three times into the skull had taken place, which caused regular, rounded bone damage without damaging the dura and brain. The presented case indicates that sometimes post-mortem artifacts may suggest a completely different origin of wounds, which emphasizes the need for a comprehensive analysis of all possible causes of their occurrence, particularly data concerning the handling of the corpse before it is delivered to the morgue, so as not to make a diagnostic error during autopsy.

2600. Kalman, M., et al. (2000). "Characteristics of glial reaction in the perinatal rat cortex: effect of lesion size in the 'critical period'." Neural plasticity **7**(3): 147-165.

In this study we investigate the capability of lesions, performed between embryonic day E18 and postnatal day P6, to provoke glial reaction. Two different lesion types were applied: 'severe' lesion (tissue defect) and 'light' lesion (stab wound). The glial reaction was detected with immunostaining against glial fibrillary acidic protein. When performed as early as P0, severe lesions could result in reactive gliosis, which persisted even after a month. The glial reaction was detected at P6/P7 and became strong by P8, regardless of the age when the animals were lesioned between P0 and P5. Namely, a strict limit could be estimated for the age when reactive glia were already found rather than for the age when glial reaction-provoking lesions could occur. After prenatal lesions, no glial reaction developed, but the usual glia limitans covered the deformed brain surface. Light lesions provoked glial reactions when performed at P6. In conclusion, three scenarios were found, depending on the age of the animal at injury: (i) healing without glial reaction, regardless of the remaining deformation; (ii) depending on the size of the lesion, either healing without residuum or with remaining tissue defect plus reactive gliosis; and (iii) healing always with reactive gliosis. The age limits between them were at P0 and P5. The glial reactivity seemingly appears after the end of the neuronal migration and just precedes the massive transformation of the radial glia into astrocytes. Estimating the position of the appearance of glial reactivity among the events of cortical maturation can help to adapt the experimental results to humans.

2601. Kalousek, M., et al. (1993). "Computed Tomography Analysis of Head and Spinal Cord Injuries Inflicted by Missiles and Explosives." Journal of Neuroimaging **3**(3): 178-183.

Cerebral and spinal column computed tomography (CT) was performed in 53 patients wounded during war in the Republic of Croatia from June through December 1992. Of these, 36 (67%) suffered craniocerebral injuries; 10 (18%) sustained facial, neck, and paranasal sinus wounds; and 7 (13%) had vertebral andjor paravertebral lesions. Twenty-five (70%) of the patients with craniocerebral injuries had penetrating wounds with diffuse and multiple, predominantly hemorrhagic lesions of cortical and subcortical structures, with basal ganglia lesions in 15 (43%) and brainstem lesions in 6 (20%). Of the 7 vertebral studies. 4 showed paravertebral tissue damage to the spinal column and cord.

2602. Kamal, S. R., et al. (2022). "Spatial and temporal dynamics of HDACs class IIa following mild traumatic brain injury in adult rats." Molecular psychiatry **27**(3): 1683-1693.

The fundamental role of epigenetic regulatory mechanisms involved in neuroplasticity and adaptive responses to traumatic brain injury (TBI) is gaining increased recognition. TBI-induced neurodegeneration is associated with several changes in the expression-activity of various epigenetic regulatory enzymes, including histone deacetylases (HDACs). In this study, PET/CT with 6-([18F]trifluoroacetamido)-1- hexanoicanilide ([18F]TFAHA) to image spatial and temporal dynamics of HDACs class IIa expression-activity in brains of adult rats subjected to a weight drop model of diffuse, non-penetrating, mild traumatic brain injury (mTBI). The mTBI model was validated by histopathological and immunohistochemical analyses of brain tissue sections for localization and magnitude of expression of heat-shock protein-70 kDa (HSP70), amyloid precursor protein (APP), cannabinoid receptor-2 (CB2), ionized calcium-binding adapter protein-1 (IBA1), histone deacetylase-4 and -5 (HDAC4 and HDAC5). In comparison to baseline, the expression-activities of HDAC4 and HDAC5 were downregulated in the hippocampus, nucleus accumbens, peri-3rd ventricular part of the thalamus, and substantia nigra at 1-3 days post mTBI, and remained low at 7-8 days post mTBI. Reduced levels of HDAC4 and HDAC5 expression observed in neurons of these brain regions post mTBI were associated with the reduced nuclear and neuropil levels of HDAC4 and HDAC5 with the shift to perinuclear localization of these enzymes. These results support the rationale for the development of therapeutic strategies to upregulate expression-activity of HDACs class IIa post-TBI. PET/CT (MRI) with [18F]TFAHA can facilitate the development and clinical translation of unique therapeutic

approaches to upregulate the expression and activity of HDACs class IIa enzymes in the brain after TBI. Copyright © 2021. The Author(s), under exclusive licence to Springer Nature Limited.

2603. Kamat, A. A., et al. (2007). "Brain sag as a cause of postoperative neurological deterioration following anterior cranial fossa floor repair for post traumatic cerebrospinal fluid rhinorrhoea." British journal of neurosurgery **21**(3): 303-306.

A patient with posttraumatic CSF rhinorrhoea underwent a transcranial anterior skull base repair, with a lumbar drain being inserted at induction of anaesthesia. Postoperative neurological deterioration occurred due to brain sag. Following treatment, there was significant recovery albeit in a slow and steady fashion. Patients with brain sag as a result of lumbar drain insertion can make a good recovery, despite an initial presentation with signs of severe brainstem compression, which could easily be misinterpreted as having a poor prognosis. Absence of an initial dramatic response to treatment does not necessarily imply poor outcome in the long term.

2604. Kamel, H., et al. (2010). "Delayed adverse reactions to blood donation." Transfusion **50**(3): 556-565.

BACKGROUND: Blood donation is safe, but a small proportion of donors have delayed and/or off-site reactions that have the potential to lead to serious injury. This retrospective study sought to identify risk factors for delayed reactions (DRs)., STUDY DESIGN AND METHODS: The records of 793,293 allogeneic whole blood and apheresis donations in 2007 were assessed for vasovagal reactions. Donor demographic, biometric, and clinical measurements were captured. Incidents related to needle insertion and mild reactions were excluded. Based on the reaction onset time relative to the procedure end time, reactions were classified as delayed (>15 min) or immediate (<or=15 min). Reactions were analyzed by multivariable logistic regression comparing donors with immediate reactions (IRs) or DRs to donors without reactions and comparing donors with DRs to IRs. The clinical consequences of off-site and on-site reactions are reported., RESULTS: The prevalence of reactions classified as moderate or severe was 41 in 10,000 donations; 24% of these reactions were delayed and 12% occurred off-site. DRs were associated with female sex (odds ratio [OR], 2.96; 95% confidence interval [CI], 2.21-3.96) and with low estimated blood volume (EBV; OR, 3.91; 96% CI, 2.84-5.51). Off-site reactions, particularly in female donors, were more likely to be associated with a fall, with head trauma, with other injury, and with the use of outside medical care., CONCLUSION: Low EBV, youth, and first-time donor status are major risk factors for IRs and DRs. Women are more likely than men to report DRs. Delayed and off-site reactions lead to potentially preventable morbidity. Understanding the physiologic basis of DRs may lead to the development of appropriate interventions to reduce their likelihood.

2605. Kamenski, R. S., et al. (2008). "Short interval spontaneous migration of an intracranial bullet fragment." The Journal of trauma **65**(2): E13-15.

2606. Kamiyama, H., et al. (2008). "A case of penetrating craniofacial injury caused by chopstick performed surgical repair of the CSF fistula 48 years later." Japanese Journal of Neurosurgery **17**(2): 150-155.

We report a rare case of delayed cerebrospinal fluid rhinorrhea after penetrating craniofacial injury caused by chopstick. A 50-year-old male had a transmaxillar penetrating injury with a chopstick when the patient was 2 years old. The patient had suffered from recurrent meningitis 3 times after trauma. Forty-eight years after a penetrating craniofacial injury, the patient experienced rhinorrhea of cerebrospinal fluid (CSF), and surgical repair of the CSF fistula at the anterior skull base was performed. Previous penetrating craniofacial injury should be considered in patients with recurrent CSF rhinorrhea and meningitis.

2607. Kammal, M., et al. (2007). "[Suicidal gunshot to the head while driving a car]." Suizidaler Kopfschuss im fahrenden Pkw. **219**(3-4): 124-130.

A severe traffic accident occurred on the German autobahn. According to eye witnesses, the car had changed from the left to the right lane at 160 km/h before crashing into a thicket at full speed. In the car, a sports pistol was found in the footwell of the driver's side. The emergency doctor who performed the external examination of the victim's body found a gunshot wound in the region of the driver's right lower jaw. As the prosecutor released the body without

further examination, the family of the suicide asked for an autopsy, which demonstrated a lethal suicidal gunshot to the head; toxicological tests proved a previous consumption of cocaine.

2608. Kamphausen, T., et al. (2019). "Wounding potential of 4.4-mm (.173) caliber steel ball projectiles." International journal of legal medicine **133**(1): 143-150.

From time to time, severe or fatal injuries caused by small caliber air rifle projectiles are seen. In forensic sciences, the theoretical wounding potential of these weapons and projectiles is widely known. Usually, shots against the skull were reported and, in these cases, penetrating the eyes or thin bone layers of the temporal region. Amongst a huge number of different projectiles available for air guns, sub-caliber 4.4-mm (.173) caliber steel ball projectiles were used in an unusual suicide case. This case led to fundamental questions concerning wound ballistics. An 82-year-old man shot once against his right temporal region and twice into his mouth with a 4.5-mm (.177) caliber air rifle. Because of the exceptionally deep penetration of the base of the skull and the use of spherical-shaped sub-caliber air rifle projectiles, terminal ballistic features were analyzed and compared to results published in forensic literature. Test shots using the same weapon and similar projectiles were fired into ballistic gelatin to measure and calculate basic wound ballistic variables of cal. 4.4-mm (.173) steel balls. In comparison, further test shots with cal. 4.5-mm (.177) steel balls BB (ball bearing), flat-headed and pointed air rifle pellets ("diabolos") were carried out. The theoretical penetration depth in solid bone was calculated with 36.4 mm, and test shots in gelatin from hard contact produced an on-average wound track of 120 mm underlining the potential wounding effect. Furthermore, spherical projectiles could roll back and forth within the barrel, and an air cushion between projectile and breechblock can reduce muzzle velocity by more than half, explaining the retained missile in the temporal region.

2609. Kamphausen, T., et al. (2017). "Suicide by air rifle-a case report under consideration of ballistic particularities." Rechtsmedizin **27**(4): 315.

Background. Suicidal shooting injuries are very common in legal medicine. In those cases the distinction between self-inflicted injuries and third party fault is the main purpose of medicolegal examinations. Material and methods. The 82 year old male body was found in a forest with an air rifle lying at his feet. Medicolegal autopsy was performed and three gunshot entry wounds could be found: a 0.5 mm measuring skin defect on the right temporal region with a 4.5 mm measuring projectile lying in the M. temporalis and causing a superficial defect on the outer bone table without penetrating the scull. Two further 0.5 mm measuring gunshot entry wounds were found in the mouth, penetrating the mucosa of the palate. Here one projectile stuck in the ethmoid sinus after penetration of the palatial bone. The third projectile perforated the soft tissue of the palate and entered the scull cavity through the sphenoidal os in front of the hypophyseal fossa. It travelled through the left hemisphere penetrating the left putamen and caused bleeding into the arachnoidea as well as general cerebral edema and a blood-aspiration. Subsequently ballistic investigations and experiments were performed to evaluate the potential effectiveness by means of projectile's velocity and energy. Results. 2178 autopsies were performed in a three year period at the Institute of Legal Medicine Cologne from 2014 to 2016 including 46 gunshot injuries. In 28 cases out of 46 a suicide could be confirmed (60.9%). Usually firearm ammunition, at least .22 cal. were used. In Germany air rifles, not allowed to exceeding kinetic energy at the muzzle of 7.5 Joule, can be purchased by adults without further permit, because they seem to be most likely harmless. It is widely known, but rarely seen, that air rifles cause severe or deadly injuries. Usually deadly injuries occur in children penetrating the temporal bone by shots from point blank range or nearly close contact. Discussion and conclusions. The results of our ballistic tests and a review of the literature will be presented and discussed.

2610. Kan, S. and K. Hayakawa (2009). "Usefulness of scout view of head CT." Neuroradiology **51**: S125.

PURPOSE Scout view is usually used as an aid to locating the scan level. However, scout view can contribute to the reading of brain CT. The purpose of this exhibit is to illustrate the usefulness of scout view of head CT. MATERIALS & METHODS When reading the brain CT scans, scout view is also viewed and evaluated. RESULTS Following conditions are visualized on scout view and useful information are also obtained. 1. Post operative state Several types of operation such as burr hole, burr hole button, cranioplasty, aneurysm clipping, deep brain stimulation, VP shunt. craniectomy, craniotomy, coiling for aneurysm 2. Bone defect Metastasis, diploic vein, vascular groove 3. Bone sclerosis Metastasis, osteopetrosis, hyperostosis frontalis interna Fibrous dysplasia 4. Skull fracture 5. Calcification Cranipharyngioma, AVM, meningioma, petroclinoid ligament 6. Skull size change 7. Paranasal lesion Sinusitis, tumor, pneumosinus dilatance 8.

Sellar enlargement 9. Craniovertebral junction lesions Atlantoaxial vertical subluxation CONCLUSION We found that a careful study of CT scout view can contributes significantly to the diagnosis of brain CT. Scout view imaging must be displaced with axial head CT slice and carefully evaluated.

2611. Kanagarajan, A. and S. Sgouros (2007). "Unusual penetrating cranio-cerebral injuries in children from mains plugs." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **23**(10): 1181-1183.

INTRODUCTION: Domestic accidents resulting in head injury are not uncommon. They mostly involve falls from high beds, tables or window seals. Rarely, children suffer penetrating skull injuries, often from unlikely objects., MATERIALS: We present two children, 2.5- and 1.5-year-old boys, respectively, who suffered penetrating wounds and compound depressed skull fractures when they fell from moderate height and landed on nearby electric mains plugs, which were driven into their heads. None of them lost consciousness or developed epilepsy. The first patient was brought with one plug pin firmly driven into the skull in the right frontal region. Parents had disassembled and removed the rest of the plug. The second patient was brought in with the whole plug attached and one pin embedded in the left parietal region. On plain radiographs and computed tomography (CT) scan, there was complete skull perforation, a compound depressed skull fracture, and the plug pin was embedded in the brain parenchyma in both patients. In the second patient, the injury site was near the motor cortex. In both cases, the plug was surgically removed, and the skull fracture was repaired., DISCUSSION: This type of injury from the protruding ends of mains plugs is uncommon and has to be borne in mind by parents, carers and any person dealing with childhood trauma because the plug could be removed at home and the child brought to the Emergency Department with only a small wound in the scalp, hiding a potentially serious underlying brain injury.

2612. Kanamori, A., et al. (2012). "Longitudinal study of retinal nerve fiber layer thickness and ganglion cell complex in traumatic optic neuropathy." Archives of ophthalmology (Chicago, Ill. : 1960) **130**(8): 1067-1069.

2613. Kane, K. (1992). "Complications of FESS." Australian Journal of Otolaryngology **1**(2): 169-172.

FESS, like any surgery, has complications which are occasionally severe. This paper gives an account of the problems and difficulties that the author has had with this surgery since 1986 at the Royal Victorian Eye and Ear Hospital, Melbourne. Since that date, over 300 patients have undergone such surgery. Methods to avoid potential complications will also be presented.

2614. Kane, N., et al. (1991). "Penetrating orbitocranial injury." Injury **22**(4): 326-327.

2615. Kaneko-Ohtaki, A., et al. (2011). "Ophthalmoplegia associated with transorbital penetrating brainstem injury by broken fishing pole." Clinical ophthalmology (Auckland, N.Z.) **5**: 927-929.

We report our findings in a case of ophthalmoplegia caused by a transorbital penetrating brainstem injury. An 8-year-old boy was accidentally injured by a broken fishing fiberglass pole which penetrated through the right orbit and entered the brainstem. Magnetic resonance imaging showed a linear wound that entered and passed through the pons obliquely and reached the fourth cerebral ventricle and cerebellar vermis. He had a left-sided hemiplegia and left facial nerve palsy and was diagnosed with "one-and-a-half syndrome". His hemiplegia and left facial nerve palsy resolved in 2 weeks leaving only a left abducens nerve palsy. The eye position and eye movements fully recovered within 3 months. These findings suggest a good prognosis for this type of trauma unless life-threatening changes develop.

2616. Kanitakis, J. and O. Monneuse (2016). "Gunshot Entry Wound of the Skin." The American Journal of dermatopathology **38**(7): 566-567.

2617. Kanoff, R. B., et al. (1990). "Cranial gunshot wounds." The Journal of the American Osteopathic Association **90**(6): 515-518.

Cranial gunshot wounds frequently produce devastating injuries to central nervous system structures. This article reviews pertinent principles of ballistics to explain several mechanisms of injury to the brain. A series of 21 consecutive cases of cranial gunshot wounds is presented outlining a protocol for management and identifying factors of prognostic significance.

2618. Kantarci, M., et al. (2007). "Detection of a giant wooden foreign body with multidetector computed tomography and multiplanar reconstruction imaging." The American journal of emergency medicine **25**(2): 211-213.

We describe the case of an unusual (unbelievable) giant wooden foreign body traversing the neck via the glabella. The relationship between the giant wooden foreign body and the nasopharynx air column was demonstrated through multidetector computed tomography (CT). The wooden foreign body mimicking air on a standard CT window setting was distinguished from air with the use of a higher CT window setting. Cases of accidental penetration injury of the head and neck by foreign bodies are not rare, but the entry of giant wooden foreign bodies into the neck via the glabella has never been reported in the literature. In our case patient, such a giant wooden foreign body was detected neither in the emergency department nor during radiologic investigations (conventional radiograms and standard CT) until the patient underwent multidetector CT 8 days after the related accident.

2619. Kanu, L. N., et al. (2019). "Self-insertion of foreign bodies into the orbit and periocular tissue." Orbit (Amsterdam, Netherlands) **38**(6): 486-491.

We describe six patients with 12 separate episodes of self-inflicted periocular foreign body injuries, which presented to our institution recently. All patients were male, relatively young (mean 28.5 years old), incarcerated, and had significant underlying psychiatric conditions. The subjects had inserted staples (6), paperclips (2), or other small metallic wire segments (4) into the periocular region. Most cases (9/12) involved concurrent self-inflicted injury to other body parts. Ten cases involved foreign bodies inserted through the palpebral conjunctiva into the upper eyelid, while two cases involved insertion into the orbit. Identification and surgical retrieval of foreign bodies was successful in most cases (9/11) but was not attempted in one case. Self-inflicted periocular injuries, while rare, are challenging cases for which the ophthalmologist should be prepared. A multidisciplinary approach, including psychiatric assessment and treatment, is important for optimal care.

2620. Kao, P.-T., et al. (2003). "Brain abscess: clinical analysis of 53 cases." Journal of microbiology, immunology, and infection = Wei mian yu gan ran za zhi **36**(2): 129-136.

Fifty-three cases of brain abscess were treated at Mackay Memorial Hospital from January 1991 through December 2001. The ages ranged from 2 weeks to 84 years, with a peak at 40 to 50 years (11/53, 21%). The male to female ratio was 1.8:1 (34 males, 19 females). The most common presenting symptoms were fever (30/53, 57%), headache (29/53, 55%), and changed mental status (24/53, 45%). The duration of symptoms before hospitalization ranged from several hours to 2 months. A shorter duration of symptoms was associated with poor outcome. The common predisposing factors were otic infection (10/53, 19%), penetrating head trauma and neurosurgery (10/53, 19%), and bacterial endocarditis (5/53, 9%). The leading underlying diseases were diabetes mellitus (12/53, 23%) and/or liver cirrhosis (6/53, 11%), and both were independently associated with increased risk of mortality. Computed tomographic scanning and magnetic resonance imaging facilitated early diagnosis and proper management. Surgical intervention was used together with antibiotics in 33 (62%) of 53 patients in whom the average abscesses diameter was 3.75 cm (range, 2-6 cm). The remaining 20 (38%) patients whose average abscesses diameter was 2.3 cm (range, 1-3.5 cm) were treated with antibiotics only. Culture of material drained from abscesses isolated 27 microorganisms from 19 (58%) of the 33 patients, 81% (22/27) of which were aerobic and 19% (5/27) anaerobic bacteria. The most common pathogen was alpha-hemolytic Streptococcus spp. (6/27, 22%). Most of the patients with Klebsiella pneumoniae isolated from brain abscess, cerebrospinal fluid, and blood cultures were diabetic. A high mortality rate (9/20, 45%) was found in patients with medical treatment. A high index of suspicion is needed for the early diagnosis of brain abscess, particularly in patients with predisposing factors. In this series, early diagnosis using computed tomography and/or magnetic resonance scanning, optimal timing of surgery, and appropriate use of antibiotics were associated with improved outcome.

2621. Kapoor, A. G., et al. (2020). "Retained intraorbital wooden foreign body presenting with combined anterior and posterior scleritis." BMJ case reports **13**(2).

Penetrating injury of the orbit with a wooden stick is not an uncommon finding in ocular emergencies. A 36-year-old man presented with redness, pain in the left eye following fall from a motorcycle 3 days ago. Ocular examination showed features of combined anterior and posterior scleritis in the form of an anterior scleral nodule, retinal folds and T sign on ultrasonography. There was worsening of symptoms along with new onset diplopia following scleral deroofing which led to the suspicion of an intraorbital wooden foreign body (IOWFB). CT scan of orbit showed a well-defined hypodensity between the medial rectus and optic nerve resembling a pocket of air surrounded by a rim of hyperdensity. IOWFB was removed under direct visualisation via transconjunctival orbitotomy. This is the case of a missed retained IOWFB presenting with features of combined anterior and posterior scleritis.

2622. Kapoor, R. and B. Rastogi (2021). "Diagnostic and prognostic significance of CSFCPK in meningitis." Neurology **96**(15 SUPPL 1).

Objective: To measure the CSF and serum CPK values in pyogenic, tubercular and viral meningitis and ascertain its association with severity of disease. Background: Creatinine phosphokinase (CPK), an enzyme involved in the phosphorylation of the creatinine with ATP from ADP and creatinine phosphate is markedly elevated in meningitis of varied etiology. Out of CPK isoenzymes, CPK-BB (Brain type) was found to be more specifically raised in infections of central nervous system. The liberation of CPK-BB from the brain tissue and its penetration into the intercellular fluid and then into the CSF was related to the functional structural changes in the cellular membranes of the brain in meningitis. Design/Methods: A cross section study with a sample size of 40 patients was carried out, 20 of which were controls. For the study group, clinically evident cases were selected, lumbar puncture was done and CSF was sent for cytology/biochemical analysis including CPK. Serum CPK samples were sent simultaneously. Asymtomatic patients who were posted for surgery under spinal anaesthesia were taken as controls. Their CSF and serum CPK samples were sent in a similar fashion. Results: Serum CPK values in all the three groups of meningitis were not elevated corresponding to CSF-CPK. CSF-CPK values were elevated more in cases of pyogenic meningitis than tubercular and viral meningitis. The CSF-CPK had a direct relationship with the deteriorating level of consciousness and mortality. Conclusions: It can be concluded that the CSF-CPK is elevated in all cases of meningitis. It was not possible to differentiate the type of meningitis on the basis of enzymatic activity in any of them. However it was possible to assess the degree of brain damage and to predict prognosis because higher basal activity of the enzyme was associated with poor prognosis. It also had a direct relationship with the level of consciousness of the patient and mortality.

2623. Kapp, J. P. and I. Gielchinsky (1972). "Management of combat wounds of the dural venous sinuses." Surgery **71**(6): 913-917.

2624. Kaptigau, W. M., et al. (2007). "Open depressed and penetrating skull fractures in Port Moresby General Hospital from 2003 to 2005." Papua and New Guinea medical journal **50**(1-2): 58-63.

BACKGROUND: Open wounds to the head with skull bone depression pose the potential for serious injuries to the brain parenchyma and an increased risk of infection. The treatment of these injuries aims to repair the breached dura as well as remove any nidus for infection. Open wounds to the head due to bullets pose special problems and have a high fatality rate., AIM: To review the presentation, management and outcome of depressed and penetrating open fractures of the skull in Port Moresby., METHOD: All cases seen from 2003 to 2005 were included. All were managed without a CT (computed tomography) scan. Their Glasgow Outcome Scale (GOS) was documented on discharge., RESULTS: There were 340 traumatic brain injury (TBI) cases over a period of 3 years between 2003 and 2005 managed by the Neurosurgery Unit of Port Moresby General Hospital. The open depressed and penetrating skull fractures seen in these cases numbered 46 (14%), of which 42 were males and 4 females. The weapons most commonly used were blunt objects (16), knives (11), guns (6) and axes (4). Gunshots contributed to 4 of the 7 deaths. 4 out of the 7 deaths were due to primary brain injury and 3 were due to infection., CONCLUSION: Open depressed fractures and penetrating injuries form a small but significant group in the management of head injuries. The use of blunt objects, firearms and arrows coupled with increasing urban violence is responsible for most of these injuries. The outcome of patients admitted who are fully conscious is expected to be good. They can be managed by prompt debridement of the wound, elevation of the

fracture and removal of fragments as appropriate. However, the mortality rate is high in those with a Glasgow Coma Score of 8 or less on admission, a finding indicative of the severity of brain injury beneath the wound.

2625. Kara, H., et al. (2022). "Unusual Transorbital-Penetrating Intracranial Injury by A Metal Bar: A Case Report." Akademik Acil Tip Olgu Sunumlari Dergisi **13**(1): 4-7.

The orbit has a fine bony structure and represents the most vulnerable structure in the cranium. Therefore, penetrating orbital injuries are often associated with traumatic brain injury. Although transorbital-penetrating intracranial injury is not commonly encountered in emergency medicine practice, this occurrence has the potential to cause severe and fatal brain injury. In this study, we report the case of a 21-year-old male patient presented with an injury to his left orbit, caused by falling while holding a metal bar. A local examination revealed a perforating injury at the entry location of a metallic bar (S-shaped) that penetrated his left orbit. CT imaging showed the appearance of a metallic foreign body that entered anterior superior to the left orbit, passed into the left half of the frontal sinus, and extended into the intracranial area. The metallic bar was removed by craniotomy. The patient fully recovered and was discharged on postoperative 9th day. The penetration of foreign bodies through the orbitofrontal region is rare but potentially life-threatening. An emergent surgical initiative is necessary to save the life of the patient. When managed in a timely and efficient manner, the associated mortality and morbidity can be reduced.

2626. Karabagli, H. (2005). "Spontaneous movement of bullets in the interhemispheric region." Pediatric neurosurgery **41**(3): 148-150.

Gunshot wounds to the head are usually mortal injuries. Their frequency has been increasing in the last years because of increasing crime and war rates. Penetrating craniocerebral injury in children and adolescents at the age of 17 or under is an increasing cause of emergent neurosurgical admissions to major metropolitan medical centers. I report a patient in whom a bullet in the brain moved from the interhemispheric region to 1 cm to the left of the inner occipital protuberance and midline. The patient recovered from surgery uneventfully. He was followed up for 4 years without neurodeficits. Spontaneous movement of bullets within the brain has been reported sporadically. The removal of intracerebral bullets is obviously warranted in patients undergoing craniotomy or craniectomy for debridement or evacuation of intracerebral clots or bone fragments if the metallic fragment is in proximity to the operative site. Before surgical removal of any intracerebral bullet, it is recommended that an intraoperative plain skull X-ray be obtained after final positioning of the head.

2627. Karabatsou, K., et al. (2005). "Self-inflicted penetrating head injury in a patient with manic-depressive disorder." The American journal of forensic medicine and pathology **26**(2): 174-176.

A 32-year-old Caucasian male with a history of repeated self-injury drilled a hole in his skull using a power tool and subsequently introduced intracerebrally a binding wire from a sketch pad. An emergency craniotomy was performed around the site of cranial injury, and the foreign body was carefully extracted. The wire was located partially in the subdural space and partially in the right hemisphere of the brain. The patient made an excellent recovery and was referred to a psychiatrist for further treatment. This is a rare case of unusual and complex repetitive self-destructive behavior without apparent suicidal intent. The pertinent literature is reviewed and the surgical and psychiatric implications of such injuries are discussed.

2628. Karaca, M. A., et al. (2015). "Evaluation of gunshot wounds in the emergency department." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES **21**(4): 248-255.

BACKGROUND: This study aimed to evaluate injury patterns of patients admitted to the emergency department with gunshot wounds, results of imaging studies, treatment modalities, outcomes, mortality ratios, and complications., METHODS: A retrospective descriptive study was carried out including a total number of one hundred and forty-two patients admitted to Hacettepe University Emergency Department with gunshot injuries between January 1, 1999 and December 31, 2013. The Glasgow Coma Scale (GCS), Revised Trauma Score (RTS), Injury Severity Score (ISS), and the Trauma and Injury Severity Score (TRISS) probability of survival for penetrating trauma were calculated for all patients., RESULTS: Among the one hundred and forty-two patients in the study, one hundred and twenty-eight (90.1%) were male. Mean age was 36 years. On admission, the average GCS score was 13, mean RTS was 6.64, median ISS was 5 and

median TRISS probability for survival was 99.4% for penetrating trauma. Fluid was detected in three (13%) patients in FAST, whereas intra-abdominal solid organ injury and bowel injury were detected in 11 (58%) patients in abdominal CT. The pneumothorax, hemothorax and lung injuries were detected in 10 (40%) patients, whereas hemothorax was detected only in one patient with thoracic injury by chest X-ray. Twenty four (16.9%) patients died; eighteen patients (75%) had isolated severe intracranial injuries, two (8.3%) had thoracic injuries with head and neck injuries, and four (16.7%) patients had intra-abdominal organ injuries (one with concomitant head injury). Ten patients were brought to the ED in cardiopulmonary arrest. In dead patients, GCS, RTS and TRISS were significantly lower, and ISS were significantly higher than in surviving patients. Twenty three (95.8%) patients were in critical injury level (ISS 25-75, actually ISS >50) in the exitus group., CONCLUSION: Mortality rates in gunshot wound patients with cranial injuries are very high. Spontaneous return is not seen in patients brought to the ED in arrest state. Bullets can cause internal organ injuries which can be greater than expected. In thoracoabdominal gunshot wound injuries, conventional X-ray and bedside FAST can be ineffective in detecting the whole extent of intrathoracic and intra-abdominal injuries. Thus, thoracic and abdominal CT should be planned early for hemodynamically stable patients in order to eliminate causes of fatality and make a timely and correct diagnosis. ISS, RTS and GCS are useful in predicting prognosis and mortality. Especially in patients with ISS scores >50, the mortality rate can be as high as 96%.

2629. Karadas, S., et al. (2014). "Treatment of intracranial foreign body." JPMA. The Journal of the Pakistan Medical Association **64**(7): 828-829.

Craniospinal penetrating foreign body (FB) injuries are interesting, but rarely observed, cases. They are important in terms of the complications that they may cause. The etiologies of craniospinal penetrating injuries and intracranial FB are also different. Though a sewing needle is more rarely seen in an intracranial FB, it may occur as atttempted infanticide or as a result of an accident especially in early childhood before the closure of fontanels. We detected an intracranial sewing needle in the head radiograph of a case admitted to the emergency department for another reason. We present this case since this is a rare injury and the etiologies of craniospinal penetrating foreign body have different characteristics.

2630. Karaman, E., et al. (2009). "Carotid-cavernous fistula after functional endoscopic sinus surgery." The Journal of craniofacial surgery **20**(2): 556-558.

Carotid-cavernous fistulas (CCFs) are anomalous communications between the carotid arterial system and the venous cavernous sinus. They can arise because of spontaneous or trauma causes. Most caroticocavernous fistulas are of spontaneous origin and unknown etiology. Spontaneous CCF may also be associated with cavernous sinus pathology such as arteriosclerotic changes of the arterial wall, fibromuscular dysplasia, or Ehler-Danlos syndrome. Traumatic CCFs may occur after either blunt or penetrating head trauma. Their clinical presentation is related to their size and to the type of venous drainage, which can lead to a variety of symptoms, such as visual loss, proptosis, bruit, chemosis, cranial nerve impairment, intracranial hemorrhage (rare), and so on. Treatment by endovascular transarterial embolization with electrolytically detachable coils is a very effective method for CCF with good outcomes. Carotid-cavernous fistulas have been rarely reported after craniofacial surgery and are uncommon pathologies in otolaryngology practice. In this study, we report a 40-year-old woman with CCF secondary to blunt trauma of functional endoscopic sinus surgery.

2631. Karaman, E., et al. (2011). "Encephalomalacia in the frontal lobe: complication of the endoscopic sinus surgery." The Journal of craniofacial surgery **22**(6): 2374-2375.

Encephalomalacia is the softening or loss of brain tissue after cerebral infarction, cerebral ischemia, infection, craniocerebral trauma, or other injury. The term is usually used during gross pathologic inspection to describe blurred cortical margins and decreased consistency of brain tissue after infarction. Multicystic encephalomalacia refers to the formation of multiple cystic cavities of various sizes in the cerebral cortex of neonates and infants after injury, most notably perinatal hypoxic-ischemic events. Chronic sinusitis has become one of the most common diseases in otolaryngology practice. Many of these patients can be managed successfully with medical therapy. Those who fail intensive medical therapy may be candidates for functional endoscopic sinus surgery (ESS). This procedure has variable complication rates and can have some serious consequences. Serious complications of functional ESS are very rare, but cerebrospinal fluid leak, meningitis, hemorrhage, infection, or vision loss has been reported in a few cases. In this study, we present a 57-year-old man with encephalomalacia after a penetrating brain injury incurred during ESS.

2632. Karamarkovic, A.-R., et al. (2007). "Hepatic abscess secondary to a rosemary twig migrating from the stomach into the liver." World journal of gastroenterology **13**(41): 5530-5532.

The ingestion of a foreign body that penetrates the gastric wall and migrates to the liver, where it causes an abscess is uncommon. A case of an ingested rosemary twig perforating the gastric antrum, then migrating to the liver, complicated by hepatic abscess and Staphylococcus aureus sepsis is reported. A 59-year-old man without a history of foreign body ingestion was admitted to our hospital because of sepsis and epigastralgia, which had progressively worsened. No foreign body was identified at preoperative imaging, but a rosemary twig was discovered during laparotomy. The liver abscess and sepsis were controlled successfully with surgery and antibiotics. This unusual condition should be kept in mind when dealing with cases of hepatic abscess, or even sepsis of unknown origin. Despite the improvement of non-surgical techniques such as percutaneous drainage and interventional endoscopy, surgery still remains important in the treatment of hepatic abscess caused by an ingested foreign body.

2633. Karamlou, T., et al. (2005). "Decreased recipient survival following orthotopic heart transplantation with use of hearts from donors with projectile brain injury." The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation **24**(1): 29-33.

BACKGROUND: Fatal gunshot injury to the brain can cause significant alterations in the neuroendocrine state and myocardial dysfunction. Therefore heart allografts from these donors may result in graft failure following orthotopic heart transplantation (OHTx). We evaluated whether receiving a heart from a donor who died from fatal gunshot wound to the brain independently affected the outcome of transplantation., METHODS: A retrospective review of 113 consecutive patients undergoing OHTx at a university hospital from 1996 to 2002 was performed. Group 1 received hearts from donors with fatal gun shot brain injury (n = 17), and Group 2 received hearts from donors who died from other causes (n = 96)., RESULTS: Recipient age, gender, United Network for Organ Sharing (UNOS) status, indication for transplantation, and other co-morbid conditions were similar in both groups. Young male donors pre-dominated in Group 1, but other donor characteristics were not significantly different. The incidence of Grade 3A rejection was higher in Group 1 than Group 2 (35% vs 6.3%, p = 0.003), as was the incidence of post-operative infection (35% vs 7.2%, p = 0.004). Actuarial survival at 1 and 5 years was significantly lower in Group 1 than in Group 2 (81% and 74% vs 97% and 94%, respectively, p = 0.005). Multivariate logistic regression analysis also demonstrated that fatal gunshot brain injury, as cause of donor death, was a risk factor for recipient mortality (p = 0.01)., CONCLUSION: Receiving a heart from a donor with fatal gunshot brain injury is a significant risk factor for recipient mortality following OHTx. Cautious use of heart allograft from these donors, especially in low-risk recipients, may lead to improved outcome following heart transplantation.

2634. Karampatakis, V., et al. (1998). "The risk of optic nerve injury in retrobulbar anesthesia: a comparative study of 35 and 40 mm retrobulbar needles in 12 cadavers." European journal of ophthalmology **8**(3): 184-187.

PURPOSE: This study was designed to demonstrate the increased risk of optic nerve injury by the 40 mm needle when fully inserted into the orbit., METHODS: Retrobulbar anesthesia needles 35 and 40 mm long were inserted into the orbits of 12 well-embalmed cadavers, as for typical retrobulbar anesthesia. The needle was seen directly through a fenestration of the orbital roof and by dissection of the orbital structures overlying the optic nerve., RESULTS: In all orbits the 40 mm needle reached and in seven cases significantly pushed against the optic nerve and could obviously penetrate its sheaths. The 35 mm needle could just slightly touch the outer optic nerve sheath only in two cases., CONCLUSIONS: We conclude that the 40 mm retrobulbar needle should not be fully inserted into the orbit and the 35 mm retrobulbar needle must be used with caution.

2635. Karasu, A., et al. (2008). "[Craniocerebral civilian gunshot wounds: one hospital's experience]." Kranyoserebral atesli silah yaralanmalari: bir hastanenin deneyimi. **14**(1): 59-64.

BACKGROUND: In this study we have discussed the factors that affect our surgical results according to our experience on patients who were admitted to our hospital's Emergency Surgery Department for civilian craniocerebral gunshot wounds between 1997 and 2006., METHODS: The clinical and radiological findings of 82 patients (74 males, 8 females) who were treated for civilian craniocerebral gunshot wounds were retrospectively recorded. Neurological and

physical examination, cranial computerized tomography (CCT) findings, trauma types, treatment modalities, prognosis, complications, morbidity and mortality rates were analyzed., RESULTS: Seventy-four (90%) of the patients were male, the mean age was 29.2 year. The Glasgow Coma Scores (GCS) during admission were as following respectively: 3-5 in 35 patients, 6-8 in 9 patients, 9-12 in 19 patients and 13-15 in 19 patients. According to their radiological findings, most commonly subdural hematoma, intracerebral hematoma, multiple contusion, depressed fracture and subarachnoidal hematoma were encountered. Operation or debridement was performed in 51 patients totally. Forty-one patients died and the mortality rate of 82 patients was calculated as 50%., CONCLUSION: The mortality rate of craniocerebral gunshot wound is high. The patients with GCS higher than 8 and with unihemispheric lesions during admission have better prognosis. We concluded that all patients must undergo debridement and the patients that have mass effect must be operated as soon as possible.

2636. Karasu, A., et al. (2009). "[Epidemiological study in head injury patients]." Kafa travmali hastalarda epidemiyolojik calisma. **15**(2): 159-163.

BACKGROUND: The aim of this study was to determine the hospital-based epidemiological data of the head injury patients who admitted to our Emergency Surgery Department., METHODS: The records of the patients (284 males [66%], 146 females [34%]; mean age 30+/-19) with head injury who admitted to our Emergency Surgery Department between 01.01.2006 - 31.12.2006 were analyzed retrospectively., RESULTS: Among the age groups, most head injuries occurred in children (22%) and young adults (30%). The most common trauma types were due to falls (40%) and motor vehicle accidents (37%). The mortality rate in head injury patients was 11%, serious morbidity was 2%, and the rate of deaths from head injury among all deaths in 2006 was 30%., CONCLUSION: According to these data, the most common causes of death in head-injured patients are falls (0-16 years of age) and outside vehicle traffic accidents and cranial gunshot wounds (16-35 years of age), especially for males. Admission Glasgow Coma Score is an important prognostic factor in head-injured patients. Primary precautions for head injury must be taken according to each age group. Further development of the diagnosis and treatment options will help to lower the mortality and morbidity of patients with traumatic brain injury.

2637. Karatela, M., et al. (2022). "Vertebral artery transection with pseudoaneurysm and arteriovenous fistula requiring antegrade and retrograde embolization." Journal of Vascular Surgery Cases, Innovations and Techniques **8**(2): 183-186.

Traumatic vertebral artery injury is a rare, life-threatening injury that has been increasingly managed with endovascular intervention. However, an antegrade endovascular approach alone can fail to occlude traumatic pseudoaneurysms (PSAs) and arteriovenous fistulas (AVFs), requiring high-risk surgical reoperation. We have presented the case of a 27-year-old man with traumatic right vertebral artery PSA and AVF. Despite successful ipsilateral coil embolization, the PSA and AVF persisted via retrograde filling from the contralateral vertebral artery. Distal coil embolization was achieved through the contralateral vertebral artery in a novel “up and over” approach through the basilar artery. The findings from our case report have broadened the endovascular options for complicated traumatic injuries.

2638. Karatoprak, S., et al. (2021). "Percutaneous radiological biliary interventions after failed endoscopic treatment in living liver donors: experience of a high-volume transplantation center." Transplant international : official journal of the European Society for Organ Transplantation **34**(12): 2846-2855.

This study aimed to evaluate the role of percutaneous radiological treatments for biliary complications (BCs) in donors after living donor liver transplantation (LDLT). We retrospectively evaluated BCs in donors involved in 1839 LDLTs between May 2009 and January 2019 at our centre. BCs were classified according to the modified Clavien-Dindo classification (MCDC). Patients treated with percutaneous transhepatic biliary intervention (PTBI) were identified. Complications requiring endoscopic, interventional or surgical treatment (MCDC grades III-IV) involved 123 (6.6%) donors. Complications comprised leakage, n = 73 (60%); stricture, n = 36 (29%); and both leakage and stricture, n = 14 (11%). Percutaneous drainage of biloma formations under ultrasound guidance was performed in 57 donors, endoscopic treatment in 83 and PTBI in 14. Of 83 patients who received endoscopic treatment, 13 were referred for PTBI due to failure or uncannulation. Eight of 14 patients were successfully treated with PTBI. Six patients were treated with a rendezvous procedure combining percutaneous and surgical treatments. In 13 patients, no BCs were developed after catheter or stent removal. In donors with BCs, the treatment should progress from the least invasive method to surgery.

In some patients, percutaneous radiological treatments eliminate the need for surgery or can guide surgical treatment.

2639. Karavaev, V. M. (2014). "[A case of suicide committed with a crossbow]." Sudebno-meditsinskaia ekspertiza **57**(1): 45-46.

The paper reports the results of forensic medical expertise of the corpse of a young man who committed suicide by two arrow shots to the head with a MK-80-A4AL crossbow. Both wounds are penetrating brain injuries.

2640. Karcioglu, Z. A. and A. M. Nasr (1998). "Diagnosis and management of orbital inflammation and infections secondary to foreign bodies: A clinical review." Orbit **17**(4): 247-269.

Orbital inflammation and secondary infections may be caused by many types of foreign bodies, including organic and inorganic matter, non- autogenous surgical implants and allografts, and surgical hardware and materials utilized in reconstructive surgery. In penetrating injury patients, the nature of the foreign body determines the clinical behavior; inert objects such as steel and glass may not cause significant inflammation to warrant their removal. Removal of organic foreign bodies, however, is mandatory since these objects usually lead to secondary infection with abscess and fistula formation. This paper reviews salient points related to history-taking and physical examination, diagnostic workup, and medical and surgical treatment in foreign body-induced orbital inflammation and infections. It is emphasized that practically every case of orbital trauma should be approached with a high index of suspicion for penetrating injury with possible intraorbital foreign body. The investigational tools to detect orbital foreign bodies, including ultrasonography, computed tomography and magnetic resonance imaging, are reviewed. The principles of the management, including antimicrobial therapy, surgical indications and techniques, are also discussed.

2641. Karger, B., et al. (1997). "[Retained capacity for action in brain gunshot injury. Case report and systematic examination]." Erhaltene Handlungsfahigkeit bei Gehirnschussverletzung. Kasuistik und systematische Untersuchung. **199**(5-6): 159-166.

A case of physical activity following a suicidal gunshot to the head including perforation of the left frontal lobe from a .22 rimfire rifle is reported. Subsequently, the man was able to walk a distance of more than 100 m and to reload manually. The special wound ballistic features of the head leading to increased intracranial projectile effects are discussed and the morphological changes such as cortical contusion zones, intracerebral hemorrhages or indirect skull fractures are explained. The analysis of 38 cases of head shots followed by physical activity reveals that injury to certain CNS-areas or the use of centre fire rifles and large handguns usually excludes a potential for subsequent physical activity. But physical activity is possible if the trajectory is restricted to the frontal brain or one temporal lobe only and if a projectile of low wounding potential has been used for this gunshot.

2642. Karger, B. and B. Brinkmann (1997). "Multiple gunshot suicides: potential for physical activity and medico-legal aspects." International journal of legal medicine **110**(4): 188-192.

Out of 138 clearly defined gunshot suicides which were autopsied, 11 persons (8%) fired two or more gunshots to the body. From these 11, 5 cases involved 2 gunshots to the head where the bullets fired first had missed the brain. The trajectories were restricted to the chest in three cases and a combination of gunshots to the head and chest including two perforating heart wounds without immediate incapacitation occurred in three more cases. Reliable incapacitation is based on physiological effects (tissue disruption) and can only be achieved by decreasing the functioning capability of the CNS. This can be accomplished by direct disruption of brain tissue or indirectly by cerebral hypoxemia from massive bleeding. Targets of immediate incapacitation are restricted to certain CNS areas and targets of rapid incapacitation include the heart, the (thoracic) aorta and the pulmonary artery. Other major blood vessels and major organs (lungs, kidneys, liver, spleen) constitute targets of delayed incapacitation. This general classification can be derived from the literature and is illustrated by the cases presented. A thorough post mortem can exclude or quantify the potential for physical activity. Typical features of single gunshot suicides such as contact shots, classical entrance wound sites and soot/backspatter on a hand also occur in multiple gunshot suicides.

2643. Karger, B., et al. (2001). "Proof of a gunshot wound and its delayed effects 54 years post injury." International journal of legal medicine **115**(3): 173-175.

In 1945 a 6-year-old girl received a tangential gunshot injury to the left posterior inferior skull. After hospitalisation because of septicemia she was unable to walk for several months. Since 1967 she had been repeatedly applying for compensation because of pseudoneurasthenia and residual ataxia and many medical examinations were performed including X-ray, CT and MRI. Although certain objective findings (e. g. cerebellar atrophy) could be verified, a causal connection between the gunshot injury and the clinical findings could not be established. Therefore previous investigators concluded on a vascular origin of the disease. During the present re-examination of the patient, the authors found patch-like scars at the left posterior inferior skull base and behind the left ear, a cord-like scar formation in the subcutaneous tissue, connecting both skin scars, a gutter-like defect in the left occipital base of the skull and an indention of the left mastoid process, both again in line between the skin scars and a large defect of the left cerebellar hemisphere. It could be concluded with certainty that the anatomical findings and the clicinal symptoms were the direct result of a gunshot injury. Previous investigations had failed because of deficient investigations and techniques. In addition to an anatomical reconstruction, three dimensional reconstructions from CT scans proved most helpful.

2644. Karger, B., et al. (2002). "Backspatter on the firearm and hand in experimental close-range gunshots to the head." The American journal of forensic medicine and pathology **23**(3): 211-213.

The deposition of backspatter on the firearm or person shooting can greatly assist the reconstruction of shooting incidents. Backspatter was investigated in experimental transverse gunshots (9-mm Luger) to the heads of calves (n = 9) from shooting distances of 0 to 10 cm. The firearms were examined with a magnifying glass; the surgical gloves and the right sleeve worn by the person shooting were examined with a stereomicroscope. On the firearms, backspatter of blood was found in five of the nine cases, and one or both gloves showed bloodspatter deposits in six and the right sleeves in four cases. Most droplets were 1 to 3 mm and circular or elongated. In addition, a fine spray of tiny blood deposits was present on the firearm and textiles in four cases. The distribution of the droplets on the firearms varied: the areas included regions shielded by prominent parts, and the droplets were predominantly located on the extensor side of the fingers and the radial aspect of the hands and sleeves. Backspatter of tiny bone fragments was recovered from the firearm and sleeve in only one case, but tissue (bone, fat, muscle, skin) was present on the ground in front of the entrance wound in seven cases. A careful investigation, including appropriate lightning and magnification, is necessary for reliable statements concerning the absence of backspatter or the extent of backspatter present.

2645. Karger, B., et al. (1998). "Morphological findings in the brain after experimental gunshots using radiology, pathology and histology." International journal of legal medicine **111**(6): 314-319.

The tissue disruption inside the brain after experimental gunshots to the head was investigated with special reference to secondary bone missiles and intracranial pressure effects such as cortical contusion and deep intracerebral haemorrhages. The evidential value of various examination methods is compared. 9 mm Parabellum ammunition was fired to the temporal region of calves (n = 10) from a distance of 0-10 cm. Plain film radiography, CT, MRI, visual inspection and histology were performed on every brain. The tissue disruption of the permanent tract is delineated best by artefact-free MRI. Cortical contusions and deep intracerebral haemorrhages were detected infrequently by visual inspection and imaging techniques although they were present in every brain as verified by histology. These injuries remote from the tract increase cerebral wounding compared to non-confined tissue. In particular, the brain stem and central areas were frequent sites of haemorrhages, which can be expected to have serious and immediate consequences. Ectopic bone fragments were found in all brains using CT scans. Bone fragments were located inside clearly enlarged permanent tracts or were driven into brain tissue. In the latter cases, secondary shot channels up to 4 cm in length could be verified by histology. Cortical contusions and intracerebral haemorrhages can only be detected reliably by histology. The localization of bone fragments requires CT scans. Therefore, a detailed examination is accomplished best by a combination of the methods applied in this study.

2646. Karimi, A., et al. (2016). "Dynamic finite element simulation of the gunshot injury to the human forehead protected by polyvinyl alcohol sponge." Journal of materials science. Materials in medicine **27**(4): 74.

Although there are some traditional models of the gunshot wounds, there is still a need for more modeling analyses due to the difficulties related to the gunshot wounds to the forehead region of the human skull. In this study,

the degree of damage as a consequence of penetrating head injuries due to gunshot wounds was determined using a preliminary finite element (FE) model of the human skull. In addition, the role of polyvinyl alcohol (PVA) sponge, which can be used as an alternative to reinforce the kinetic energy absorption capacity of bulletproof vest and helmet materials, to minimize the amount of skull injury due to penetrating processes was investigated through the FE model. Digital computed tomography along with magnetic resonance imaging data of the human head were employed to launch a three-dimensional (3D) FE model of the skull. Two geometrical shapes of projectiles (steel ball and bullet) were simulated for penetrating with an initial impact velocity of 734 m/s using nonlinear dynamic modeling code, namely LS-DYNA. The role of the damaged/distorted elements were removed during computation when the stress or strain reached their thresholds. The stress distributions in various parts of the forehead and sponge after injury were also computed. The results revealed the same amount of stress for both the steel ball and bullet after hitting the skull. The modeling results also indicated the time that steel ball takes to penetrate into the skull is lower than that of the bullet. In addition, more than 21% of the steel ball's kinetic energy was absorbed by the PVA sponge and, subsequently, injury sternness of the forehead was considerably minimized. The findings advise the application of the PVA sponge as a substitute strengthening material to be able to diminish the energy of impact as well as the load transmitted to the object.

2647. Karras, C. L., et al. (2022). "Outcomes Following Penetrating Brain Injuries in Military Settings: A Systematic Review and Meta-Analysis." World neurosurgery **166**: 39-48.

OBJECTIVE: While neurosurgeons are experienced in treating penetrating brain injuries (PBIs) in civilian settings, much less is known about management and outcomes of PBIs in military settings., METHODS: A systematic review was performed according to Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines. Data extracted included surgical management, age, gender, location/type of injury, initial Glasgow Coma Scale (GCS) score, and outcomes. The primary outcomes were last reported Glasgow Outcome Score (GOS) and mortality. The secondary outcomes included central nervous system infections, seizures, and cerebrospinal fluid leak/fistula. Odds ratios (ORs) with corresponding 95% confidence intervals (CIs) were used for outcome analysis., RESULTS: Twelve studies with 1738 patients treated for PBIs in military settings were included. The weighted mean age was 27.8 years, 86.7% were male, and 64.3% underwent neurosurgical intervention. Most patients (64.3%) presented with a GCS score >8, while 31.0% presented in a coma (GCS score <8). Over a median last follow-up time of 9 months, 68.6% achieved a favorable (GOS = 4-5) outcome and 34.2% achieved a poor (GCS score = 1-3) outcome. The overall mortality was 18.0%. A meta-analysis was performed using 5 of 12 studies to evaluate the effect of the presenting GCS score on primary outcomes. Patients with an initial GCS score <8 had statistically significant lower odds of a favorable (GOS = 4-5) outcome (OR: 0.03; 95% CI: 0.00-0.19; P: 0.000) and higher odds of mortality (OR: 28.46; 95% CI: 8.62-94; P: 0.000) than patients with an initial GCS score >8. The pooled rates of central nervous system infection, seizures, and cerebrospinal fluid leak/fistula were 13.8%, 13.2%, and 5.4%, respectively., CONCLUSIONS: In this first systematic review and meta-analysis of outcomes following combat-related PBIs, a GCS score >8 at presentation was found to be an important predictor of a favorable GOS and decreased mortality.

2648. Karvonen, K. L., et al. (2020). "Ed utilization varies by race/ethnicity in premature infants." Journal of Investigative Medicine **68**(1): A169.

Purpose of study While racial/ethnic disparities in preterm birth are well-documented, less is known about differences in postdischarge health outcomes. We sought to investigate emergency department (ED) use by race/ethnicity in very preterm infants (<32 weeks gestational age [GA]), late and moderate preterm infants ([LMPT] 32-36 weeks GA), and all preterm infants (<37 weeks GA). Methods used Cohorts were derived from a California database of infants born between 2007-2011 maintained by the California Office of Statewide Health Planning and Development. A Kaplan-Meier table illustrating time to ED visit by race/ethnicity was constructed. Logistic regressions were used to predict outcomes by race/ethnicity among cohorts compared to white infants controlling for: Model 1-none; Model 2-GA, birthweight, and sex; Model 3-additionally adjusting for maternal BMI, smoking, drug/alcohol use, hypertension, diabetes, mental health disorders, and prenatal care; and Model 4-addi-tionally adjusting for maternal education, insurance status, and WIC use. Summary of results Racial/ethnic differences in time to ED visit are shown in figure 1. Hispanic and Black very preterm infants were more likely to visit the ED (model 4 OR 1.4 95% confidence interval [CI] 1.3-1.5, model 4 OR 1.4 CI 1.3-1.6). Hispanic and Black LMPT infants and all premature infants were more likely to visit the ED (model 4 OR 1.3 CI 1.3-1.4, model 4 OR 1.4 CI 1.3-1.5). Very premature and LMPT Asian infants were less likely to

visit the ED (model 4 OR 0.8 CI 0.7-1.0, model 4 OR 0.8 CI 0.7-0.8). Conclusions There are racial/ethnic disparities in ED utilization among preterm infants over the first year of life, with Black and Hispanic infants more likely to visit the emergency room compared to White non-Hispanic infants.

2649. Kasamo, S., et al. (1992). "[Transorbital penetrating brain injury]." No shinkei geka. Neurological surgery **20**(4): 433-438.

Transorbital penetrating brain injury is rare during this time of peace. In our paper, we reported seven cases of these injuries and discussed the mechanism and treatment of intracranial complications. Transorbital penetrating brain injuries were caused by thin, long and relative hard objects such as chop-stick (case 3), pencil (case 6), bamboo stick (case 1, 2, 7) and a piece of metal (case 4, 5). CT scan, MRI and angiography demonstrated a large variety of intracranial complications. For instance, intracerebral hematoma, cerebral contusion, intraventricular hemorrhage, pneumocephalus, brain stem injury and carotid cavernous sinus fistula. We had no case of infectious complications such as meningitis and brain abscess. If the direction of the injuring object runs parallel to the orbital roof, it penetrates the cranial cavity commonly via the superior orbital fissure or the optic canal, which routes provide direct access without bone fracture. This direction will cause critical intracranial complications such as CCF or brain stem injury. If the injuring object runs upward and across the orbital roof which has thin bone and therefore offers little resistance, the frontal lobe will be easily damaged, and it will cause intracerebral hematoma. But the prognosis for this type of injury is not so poor because we can easily remove the hematoma and the foreign body. With our treatment policy of "pull and see", all our cases but one recovered well. The one exception was a case in which a large intracerebral hematoma was over-looked in an ophthalmological clinic. This patient died. Nowadays, CT scan and MRI give clear information about the anatomical location of injuring objects and intracranial complications.(ABSTRACT TRUNCATED AT 250 WORDS)

2650. Kasmann-Kellner, B., et al. (2022). "[Optical rehabilitation and pediatric ophthalmological care following keratoplasty for childhood corneal opacities]." Optische Rehabilitation und kinderophthalmologische Betreuung nach Keratoplastik bei kindlichen Hornhauttrubungen. **119**(5): 462-470.

BACKGROUND: The younger the children are at the time of corneal transplantation, the worse the survival prognosis of the graft., PREOPERATIVE CONSIDERATIONS: Preoperative considerations are significant in terms of accurate parental education, ensuring adherence to treatment and choosing the appropriate surgical time frame (amblyopia versus graft failure, compliance of the patient). Parental education must include the reduced visual prognosis in young children, exceptions being later acquired corneal pathologies such as inflammatory corneal scars (herpes) and keratoconus., POSTOPERATIVE CARE: A distinction must be made between morphological care after transplantation and refractive correction as well as treatment of amblyopia. The younger the children, the less favorable the prognosis for the transplant and the more often multiple examinations with anesthesia are necessary in order to detect complications, such as infiltrates or suture loosening at an early stage. Especially unilateral congenital pathologies often do not lead to a sufficient improvement of amblyopia (refractory amblyopia, poor compliance)., CONCLUSION: The prognosis after keratoplasty in childhood is already partly decided by the careful evaluation of indications (no surgery of a sclerocornea) and the detailed and realistic clarification for the parents (cooperation with long-term ocular and systemic treatment even if the child has poor compliance, frequent check-ups, reduced chances of amblyopia treatment). The younger the child is at the time of transplantation, the more frequent are graft failure and the development of complications. Later manifesting diseases in older children (herpetic corneal scars, keratoconus) have a better prognosis.

2651. Kasparov, A. A. and I. V. Aladinskaia (2002). "[Possibilities of immunosuppressive therapy in reconstructive keratoplasty (experience gained in the use of cyclosporin)]." O vozmozhnostiakh immunosupressivnoi terapii pri rekonstruktivnoi keratoplastike (opyt primeneniia preparata tsiklosporin). **118**(4): 16-18.

Cyclosporin was used for preventing the graft rejection reaction after reconstructive operations on the anterior segment of the eye. Analysis of the results of surgical treatment of patients with vascularized corneal leukomas of different etiology in 23 patients (25 eyes) who received postoperative oral cyclosporin therapy and in 25 patients to whom this drug was instilled showed that cyclosporin promoted transparent healing of the keratotransplant and its use was not associated with serious side effects.

2652. Kasper, E. M., et al. (2010). "Retained transorbital foreign body with intracranial extension after pipe bomb explosion." Surgical neurology international **1**: 94.

BACKGROUND: Penetrating brain injuries caused by explosions are survived in extremely rare cases only. However, potential casualties of such cases may be encountered by regular physicians even outside a war zone, e.g., due to an assault or terror blast. There is very limited literature to this end; therefore, we report the successful neurosurgical management of a penetrating head injury due to a pipe bomb explosion., CASE DESCRIPTION: A 19-year-old man was brought to the ER with a swollen, bleeding right orbit, and a severely injured left hand after having sustained an unwitnessed explosion from a self-made pipe bomb. He presented with a GCS (Glasgow Coma Scale) of 15 at time of admission, work-up revealed an intracranial retained metal fragment measuring 5 x 1 x 0.2 cm lodged retro-orbitally and in the skull base. The patient underwent emergent right temporal craniotomy and temporal lobectomy and simultaneous right enucleation before the petrous bone and sphenoid wing lodged metal fragment was successfully removed., CONCLUSION: This case underscores the importance of having a high suspicion for the presence of an intracranial injury and a retained foreign body in the setting of a penetrating head injury. Aggressive and timely workup as well as expeditious surgical management are crucial in these settings and can generate exceptionally good outcomes despite a major trauma.

2653. Kassan, A. H., et al. (2000). "A retrospective analysis of gunshot injuries to the maxillo-facial region." SADJ : journal of the South African Dental Association = tydskrif van die Suid-Afrikaanse Tandheelkundige Vereniging **55**(7): 359-363.

This study analysed the prevalence, demography, soft- and hard-tissue injury patterns, management and complications of gunshot injuries to the maxillo-facial region in 301 patients treated at Groote Schuur Hospital, Cape Town. The number of patients presenting with maxillo-facial injuries caused by gunshot increased over the 15-year study period. The majority were caused by civilian type low-velocity hand-guns and were purposefully and intentionally inflicted by others. Males in their third decade of life and of low socioeconomic status were most often the victims. The wounding effects of these low-velocity injuries were characteristic--small rounded entrance wounds, causing fragmentation of teeth and comminution of the underlying bone, usually without any exit wounds. A comminuted displaced type of fracture pattern was most frequently observed. Special investigations included plain film radiographs with more sophisticated investigations being requested where indicated. Definitive surgical management was initiated by early soft-tissue debridement. Both the mandibular and maxillary fractures had more open than closed reductions. Bone continuity defects as a result of the initial injury were usually reconstructed secondarily using free autogenous bone grafts. All the patients received anti-tetanus toxoid on admission and the majority received antibiotic treatment. The most common complications were sepsis, ocular and neurological complications and limitation of mouth opening. The postoperative sepsis rate was high (19%). The wounding effects of these low-velocity missile injuries are devastating and pose a treatment challenge to the maxillo-facial surgeon.

2654. Kassel, E. E. and P. W. Cooper (1983). "Radiologic studies of facial trauma associated with a regional trauma centre." Journal of the Canadian Association of Radiologists **34**(3): 178-188.

The study of severe facial trauma has been altered by the development of computed tomography (CT). As a regional trauma unit we have gained increasing experience with complex fractures of the face. In those patients most severely injured, high resolution CT has become the imaging modality relied upon to offer the safest and most accurate information. Conventional films still have a role, especially in the less severely traumatized patient. We describe our methods and observations, based upon experience at a trauma unit, in the radiologic investigation of facial injuries.

2655. Kassi, A. A. Y., et al. (2018). "Enduring Neuroprotective Effect of Subacute Neural Stem Cell Transplantation After Penetrating TBI." Frontiers in neurology **9**: 1097.

Traumatic brain injury (TBI) is the largest cause of death and disability of persons under 45 years old, worldwide. Independent of the distribution, outcomes such as disability are associated with huge societal costs. The heterogeneity of TBI and its complicated biological response have helped clarify the limitations of current pharmacological approaches to TBI management. Five decades of effort have made some strides in reducing TBI mortality but little progress has been made to mitigate TBI-induced disability. Lessons learned from the failure of numerous randomized clinical trials and the

inability to scale up results from single center clinical trials with neuroprotective agents led to the formation of organizations such as the Neurological Emergencies Treatment Trials (NETT) Network, and international collaborative comparative effectiveness research (CER) to re-orient TBI clinical research. With initiatives such as TRACK-TBI, generating rich and comprehensive human datasets with demographic, clinical, genomic, proteomic, imaging, and detailed outcome data across multiple time points has become the focus of the field in the United States (US). In addition, government institutions such as the US Department of Defense are investing in groups such as Operation Brain Trauma Therapy (OBTT), a multicenter, pre-clinical drug-screening consortium to address the barriers in translation. The consensus from such efforts including "The Lancet Neurology Commission" and current literature is that unmitigated cell death processes, incomplete debris clearance, aberrant neurotoxic immune, and glia cell response induce progressive tissue loss and spatiotemporal magnification of primary TBI. Our analysis suggests that the focus of neuroprotection research needs to shift from protecting dying and injured neurons at acute time points to modulating the aberrant glial response in sub-acute and chronic time points. One unexpected agent with neuroprotective properties that shows promise is transplantation of neural stem cells. In this review we present (i) a short survey of TBI epidemiology and summary of current care, (ii) findings of past neuroprotective clinical trials and possible reasons for failure based upon insights from human and preclinical TBI pathophysiology studies, including our group's inflammation-centered approach, (iii) the unmet need of TBI and unproven treatments and lastly, (iv) present evidence to support the rationale for sub-acute neural stem cell therapy to mediate enduring neuroprotection.

2656. Kastanaki, A. E., et al. (2009). "An unusual suicide inside a grave with two gunshot wounds to the head--the psychological approach." Journal of forensic sciences **54**(2): 404-407.

In this report, the authors present a case of suicide committed by a 66-year-old man, inside a grave at the local cemetery, with two gunshot wounds to the head. A multiple-paged, handwritten suicide note was found in an army type bag inside the victim's car, while a second one was found in his house. Medicolegal examination of the body revealed two typical contact gunshot entrance wounds and one exit wound to the head. Toxicological analysis of the femoral blood was negative for alcohol and drugs. The history, scene and autopsy findings, along with further police investigation, indicated an obvious case of suicide. The literature is reviewed and discussed. We report this case as the place of suicide is extremely uncommon and as there is no mention of a gunshot suicide inside a grave in the current literature.

2657. Kataria, R., et al. (2011). "Low velocity penetrating head injury with impacted foreign bodies in situ." Asian journal of neurosurgery **6**(1): 39-44.

Penetrating head injury is a potentially life-threatening condition. Penetrating head injuries with impacted object (weapon) are rare. The mechanism of low velocity injury is different from high velocity missile injury. Impacted object (weapon) in situ poses some technical difficulties in the investigation and management of the victims, and if the anticipated problems are not managed properly, they may give rise to serious consequences. The management practice of eight patients with impacted object in situ in context of earlier reported similar cases in literature is presented.

2658. Katayama, K., et al. (2013). "Translucent three-dimensional CT is useful in considering the treatment strategy for the penetrating skull base injury with a metal rod: case report." Neurologia medico-chirurgica **53**(9): 613-615.

An 18-year-old male suffered a penetrating skull base injury caused by a metal rod. We made translucent three-dimensional (3D) computed tomography (CT) for clearing the injury site. This method has revealed that right carotid artery was compressed directly by the foreign body, and internal carotid artery trapping was carried out based on hemodynamics as revealed by angiography. This patient achieved modified Rankin scale score of 1 at discharge. Cases of trauma involve a variety of circumstances and therefore require a case-by-case evaluation that depends on the patient's condition. Translucent 3D CT was useful in considering the treatment strategy of the penetrating skull base injury.

2659. Kato, H., et al. (2018). "A case of transnasal intracranial penetrating injury with skull base fracture caused by a broken golf club shaft." Legal medicine (Tokyo, Japan) **32**: 57-60.

2660. Kaufman, E. J., et al. (2017). "Patient Characteristics and Temporal Trends in Police Transport of Blunt Trauma Patients: A Multicenter Retrospective Cohort Study." Prehospital emergency care : official journal of the National Association of EMS Physicians and the National Association of State EMS Directors **21**(6): 715-721.

BACKGROUND: Police transport (PT) of penetrating trauma patients has the potential to decrease prehospital times for patients with life-threatening hemorrhage and is part of official policy in Philadelphia, Pennsylvania. We hypothesized that rates of PT of bluntly injured patients have increased over the past decade., METHODS: We used Pennsylvania Trauma Outcomes Study registry data from 2006-15 to identify bluntly injured adult patients transported to all 8 trauma centers in Philadelphia. PT was compared to ambulance transport, excluding transfers, burn patients, and private transport. We compared demographics, mechanism, and injury outcomes between PT and ambulance transport patients and used multivariable logistic regression to identify independent predictors of PT. We also identified physiological indicators and injury patterns that might have benefitted from prehospital intervention by EMS., RESULTS: Of 28 897 bluntly injured patients, 339 (1.2%) were transported by police and 28 558 (98.8%) by ambulance. Blunt trauma accounted for 11% of PT and penetrating trauma for 89%. PT patients were younger, more likely to be male, and more likely to be African American or Asian and were more often injured by assault or motor vehicle crash. There were no significant differences presenting physiology between PT and EMS patients. In multivariable logistic regression analysis, male sex (OR 1.89, 95%CI 1.40-2.55), African American race (OR 1.71 95%CI 1.34-2.18), and Asian race (OR 2.25, 95%CI 1.22-4.14) were independently associated with PT. Controlling for injury severity and physiology, there was no significant difference in mortality between PT and EMS. Overall, 64% of PT patients had a condition that might have benefited from prehospital intervention such as supplemental oxygen for brain injury or spine stabilization for vertebral fractures., CONCLUSIONS: PT affects a small minority of blunt trauma patients, and did not appear associated with higher mortality. However, PT patients included many who might have benefited from proven, prehospital intervention. Clinicians, EMS providers, and law enforcement should collaborate to optimize use of PT within the trauma system.

2661. Kaufman, H. H., et al. (1985). "Neurobehavioral outcome after gunshot wounds to the head in adult civilians and children." Neurosurgery **16**(6): 754-758.

To assess the quality of long term outcome of civilian gunshot wounds to the head after intensive neurosurgical management, particularly with regard to the possibility of subtle problems due to diffuse injury, we administered neuropsychological tests to six survivors (four adults and two children) at about 1 year after injury. Five patients were moderately disabled, and one patient achieved a good recovery. Residual neurobehavioral sequelae were present in all cases. Defects in long term memory for new information were the most common sequelae, whereas the persistence of linguistic and visuospatial deficits was related to the hemispheric lateralization of injury. In comparison with the outcome reported for patients with closed head injuries who had similar Glasgow coma scale scores, our patients exhibited more severe impairment due to significant focal brain injuries and less evidence of diffuse damage.

2662. Kaufman, H. H., et al. (1995). "Patients with Glasgow Coma Scale scores 3, 4, 5 after gunshot wounds to the brain." Neurosurgery clinics of North America **6**(4): 701-714.

Even this information is only partial. To study fully the effects of treatment would require optimal care at all points from time of injury, including rapid prehospital resuscitation, rapid transport to an optimally equipped and staffed hospital, immediate evaluation and treatment of the initial injury and all complications, rapid and comprehensive rehabilitation, and supportive and flexible home and work settings for the patient on discharge. Patients would need to be stratified for premorbid characteristics, including intelligence, personal traits, and training. Prolonged follow-up, possibly for several years, would be required to determine true outcome. No current study contains sufficient numbers of patients treated optimally and studied for prolonged periods, but this should be done. One way of looking at such patients is to decide that many should be treated to salvage a few. The other way of looking at them is that so many must receive care, at great emotional and economic cost to themselves and others, that such treatment is inappropriate for any of them. Treating all such patients would be a major undertaking. If most of these patients were treated vigorously, a great proportion of them would still die but probably not for a number of days. During this period, their families would be under extreme stress. Once stabilized and receiving ongoing care, some patients would enter a permanent vegetative state and survive for prolonged periods until their prognosis was clear and care was withdrawn, again causing family stress as well as high cost. Some would likely survive although impaired. The charges and real costs of care for all these patients would be tremendous. The question therefore arises as to how to decide what to do about caring for a large group of patients whose maximal care would be costly in emotional and financial terms, particularly at

a time when it is recognized that resources for medical care are going to be limited. When discussing such patients as a group with a view toward developing practice guidelines, many considerations must be brought to bear. One consideration is the certainty of the prognosis in both a quantitative and a qualitative sense in an individual case. It is not clear that one can be certain in patients except when there are overwhelmingly unfavorable features. As has been noted, even patients who have been shot through the geographic center of the brain and are posturing can make excellent recoveries. This would push toward aggressive treatment for many patients. Decision making must therefore be considered in terms of bioethics. The major principle-based systems of bioethics are deontologic, arising from accepted principles, and utilitarian, arising from effect on outcome. A virtue-based ethic for physicians arising from "the caring bond and the public trust" is being revived as a balance to analytical ethics. A similar orientation from the point of view of patients is communitarian ethics, that is asking for only what is reasonable and not so much as might harm others. Some of the issues to be considered include the sanctity of life while taking into account the criteria for life--vegetative function versus some level of mental function. One must also review each decision from the viewpoints of all the parties involved--patients, family and friends, physicians, and society--in the context of a heterogeneous society in which individual rights and tolerance enforced by law are primary features. In the patients' terms, there is a desire and right to medical care to maintain a healthy productive life. Even if impaired to some extent, patients may still have an interest in living. Balancing benefits and burdens of life is a complex problem. There is also the right, based on patients' values, to refuse care if there is the wish not to take a chance of having a significantly compromised existence. Such declaration before injury should be honored...

2663. Kaufman, H. H., et al. (1983). "Civilian gunshot wounds: the limits of salvageability." Acta neurochirurgica **67**(1-2): 115-125.

Patients who have suffered gunshot wounds in civilian settings, who present with posturing and in whom the bullet has passed through the geographical centre of the brain have generally not been felt to be salvageable. However, surprisingly favourable outcomes in two such patients have led us to believe that some such patients may deserve aggressive treatment.

2664. Kaufman, H. H., et al. (1986). "Gunshot wounds to the head: a perspective." Neurosurgery **18**(6): 689-695.

Craniocerebral gunshot wounds are a significant cause of injury and death in the United States. However, despite reports of occasional unexpectedly favorable outcome in surgically treated patients, these injuries have been viewed pessimistically and indeed have generally been excluded from modern studies of head injuries, which have concentrated on closed head injuries. A review of 143 victims of craniocerebral gunshot wounds admitted to Hermann Hospital, Houston, Texas, during a recent 30-month period confirmed that a few apparently neurologically devastated patients can be saved. A detailed analysis of these patients, including demographic details, general and neurological condition, anatomic injuries, laboratory findings, surgical care, neurological course, and neurological and functional outcome follows. The helpfulness of early resuscitation and appropriate criteria for surgery need to be studied using historic or randomized controls.

2665. Kaufman, H. H., et al. (1980). "Delayed intracerebral hematoma due to traumatic aneurysm caused by a shotgun wound: a problem in prophylaxis." Neurosurgery **6**(2): 181-184.

A delayed traumatic intracerebral hematoma was seen in a patient after a shotgun wound to the brain. The cause of the hemorrhage seemed to be a traumatic aneurysm. Both complications are reviewed, and it is suggested that clinical and intracranial pressure monitoring should lead to early diagnosis and may minimize the effects of this problem and that angiography may be appropriate early in the course of patients who have had fragments pass near intracranial vessels.

2666. Kaufman, H. H., et al. (1991). "A national survey of neurosurgical care for penetrating head injury." Surgical neurology **36**(5): 370-377.

We report results of a survey on the management patterns of penetrating head injury (PHI). American neurosurgeons (N = 2969) were asked to participate in a mail survey. One thousand one hundred twenty-eight responded, providing detailed information about their practices, their opinions concerning diagnostic testing,

nonoperative therapy, and surgical debridement for PHI. Although there was agreement on some areas of management and care, including the use of computed tomography scanning, antibiotics, anticonvulsants, and a few surgical indications/contraindications, there was wide variation on a significant number of points. These included testing for coagulopathy; use of corticosteroids, intracranial pressure monitoring, and barbiturate coma; and surgical indications including debridement of contusions, removal of fragments, location of injury, and Glasgow Coma Score 5-8. Many nonoperative decisions were influenced by the presence of neurosurgical residents, whereas the decision to operate was based primarily on judgment of patient salvageability. This survey uncovered disagreement on several crucial issues in the care of patients with penetrating head injury and the need for continued research in this area of patient care.

2667. Kaufman, K., et al. (2010). "Hypersexuality following traumatic brain injury (TBI) and neurosurgery: Case analysis with literature review." European Psychiatry **25**.

Introduction: Hypersexuality is an uncommon behavioral complication associated with traumatic brain injury (TBI) involving lesions to frontal basal, temporal, or diencephalic structures. Experimental brain injury in animals has produced hypersexual behaviors; however, there is comparative paucity of knowledge in humans. TBI with hypersexuality offers insights into neurological basis of aberrant sexual behaviors as well as potential treatments. This case report describes social/sexual disinhibition in a patient following neurosurgery for self-inflicted TBI. Method: Case analysis with literature review. Results: 32-year-old male was admitted with TBI following an unsuccessful suicide attempt, self-inflicted nail gun injury to the occiput. CT scan revealed 6.5cm nail that had entered the skull in right occiput, right parasagittal location with nail head right of vein of Galen, coursing through splenium of corpus callosum, right thalamus-hypothalamus-midbrain, with its tip at the suprasellar cistern. Occipital craniotomy with retrieval of foreign body was performed eleven days after admission. From post-operative day eight through twenty-seven, patient made inappropriate sexual comments to female medical student: asking her out repetitively, describing her physical appearance, enquiring about her suitors, and requesting her to call him upon his discharge. Prior psychiatric history was pertinent for major depression and social anxiety (especially women) with psychotropic noncompliance. During admission, patient was diagnosed with recurrent major depression, social anxiety by history, and impulse control disorder nos. On sertraline titrated to 100mg qhs, depression resolved with increased control over newly acquired sexual/social disinhibition noted. Conclusion: TBI can lead to social disinhibition and hypersexuality. Sertraline may be a beneficial treatment.

2668. Kaufman, K. R., et al. (2014). "Hypersexuality after self-inflicted nail gun penetrating traumatic brain injury and neurosurgery: case analysis with literature review." Annals of clinical psychiatry : official journal of the American Academy of Clinical Psychiatrists **26**(4): e1-4.

2669. Kaufman, K. R., et al. (2015). "Hypersexuality after self-inflicted nail gun penetrating traumatic brain injury and neurosurgery: Case analysis with literature review." Annals of Clinical Psychiatry **27**(1): 65-68.

2670. Kaufman, Y., et al. (2008). "Contemporary issues in facial gunshot wound management." The Journal of craniofacial surgery **19**(2): 421-427.

Facial gunshot wounds pose a significant challenge for reconstructive surgeons, particularly when composed of significant soft and bone tissue defects. Often the result of assault, accident, or suicide attempt, facial defects must be thoroughly evaluated to devise an appropriate tissue repair and replacement with the likely prospect of secondary revision. In the acute setting after injury, the primary concern is patient stabilization centered on advanced trauma life support. Thorough examination along with appropriate imaging is critical for identifying any existing defects. As opposed to past surgical management that advocated delayed definitive treatment using serial debridement, today's management favors the use of more immediate reconstruction. Recent improvements in microsurgical technique have shifted favor from local tissue advancement to distant free-flap transfers, which improve cosmesis and function. This has reduced the number of surgeries necessary to achieve reconstruction. Given the diversity and complexity of facial gunshot injuries, a systematic algorithm is essential to help manage the different stages of healing and to ensure that the best outcome is ultimately achieved.

2671. Kaukinen, S., et al. (1995). "Significance of electrical brain activity in brain-stem death." Intensive care medicine **21**(1): 76-78.

A 46-year-old man was diagnosed clinically brain dead after sustaining head trauma. The patient was in deep coma, brain nerves were unresponsive and spontaneous breathing was absent. However, EEG showed well preserved activity, but no reactivity to external stimuli. EEG activity disappeared within 40 h. BAEP were highly abnormal, flash-VEP as recorded 3 h after the diagnosis of brain stem death was of high amplitude but of simplified form. The neurophysiological findings revealed that the main reason for deep coma was brain stem damage while cortical activity was still present. This condition raises ethical questions when brain death is diagnosed clinically prior to removal of organs for transplantation.

2672. Kaups, K. L. (2011). "Editorial comment." Journal of Trauma - Injury, Infection and Critical Care **71**(3): 769-770.

2673. Kawamura, S., et al. (1997). "Penetrating head injury caused by chopstick--case report." Neurologia medico-chirurgica **37**(4): 332-335.

A 4-year-old boy suffered a transorbital penetrating head injury caused by falling on a wooden chopstick while walking. The chopstick was removed completely, but full diagnosis was delayed for 3 years because the entry wound had not appeared to be serious. The patient later experienced rhinorrhea of cerebrospinal fluid (CSF), and recurrent bacterial meningitis. Surgical repair of the CSF fistula at the anterior skull base was performed when the patient was 7 years old. Previous penetrating head injury should be considered in patients with recurrent CSF fistula and meningitis.

2674. Kawanishi, M., et al. (2000). "Penetrating brain injury at the occipital midline region by a nail-gun: A case report." Japanese Journal of Neurosurgery **9**(2): 81-85.

A case of penetrating brain injury by a nail-gun at the site of the occipital midline region is reported. A 57-year-old male was urgently transported to our hospital due to a penetrating head injury due to a nail- gun accident. On admission the nail-head was seen at the occipital midline region. The patient was conscious and alert and he showed no focal neurological signs. Plain craniography, CT and 3 dimensional-CT revealed that the nail penetrated the skull at the sagittal suture in the occipital midline. Cerebral angiography did not show any particular findings strongly suggesting an injured superior sagittal sinus. As the possibility of injuries to this sinus could not be ruled out the nail was carefully extracted by craniotomy. The prognosis of penetrating brain injury by nail is mainly dependent on major vascular injury, infection and traumatic aneurysm, so meticulous preoperative examination and surgical exploration prior to the removal of the nail are mandatory.

2675. Kawashima, M., et al. (2009). "Characteristics of traumatic globe rupture after keratoplasty." Ophthalmology **116**(11): 2072-2076.

OBJECTIVE: To analyze risk factors of traumatic wound rupture after penetrating keratoplasty (PKP) or deep anterior lamellar keratoplasty (DALK)., DESIGN: Retrospective case series., PARTICIPANTS: A total of 1962 consecutive cases were included., METHODS: A review of consecutive patients undergoing either PKP (1776 eyes) or DALK (186 eyes) at 1 regional center between 1998 and 2006 was carried out to determine the incidence of traumatic globe rupture after keratoplasty. Ophthalmic and demographic factors were analyzed. A comparison with previous literature was performed., MAIN OUTCOME AND MEASURES: Incidence, causes, and final visual acuity., RESULTS: Of 43 eyes with globe rupture during this period, 36 received keratoplasty during this study period. The incidence of globe rupture after keratoplasty was 1.8% (36/1962). These 36 cases consisted of 35 of the 1776 eyes receiving PKP (2.0%) and 1 of the 186 eyes receiving DALK (0.5%). Globe rupture occurred 61.6+/-50.0 months (mean +/- standard deviation) after keratoplasty in 43 cases. The major cause of trauma was a fall in elderly patients (73.2+/-8.4 years, 17 eyes), with lens damage occurring in all such cases. Although 15 eyes (34.9%) had a visual acuity of 20/200 or better at final follow-up, eyes showing lens damage were associated with poorer visual acuity than eyes with no lens damage ($P<0.01$)., CONCLUSIONS: Wound weakness persisted for a long period after keratoplasty. A fall was observed frequently in elderly patients and resulted in poor visual outcome. Globe rupture associated with lens injury could be the predictor for future visual outcome.

2676. Kawasumi, Y., et al. (2012). "Postmortem computed tomography images of a broken piece of a weapon in the skull." Japanese journal of radiology **30**(2): 167-170.

The use of post-mortem radiological imaging is becoming increasing widespread in forensic medicine. These images can help improve the quality and safety of autopsy. We report two cases of homicide victims that had broken pieces of a weapon in their skull. Postmortem multislice computed tomography (MSCT) demonstrated metal artifacts in the skull of two homicide cases. Autopsy showed that both artifacts were pieces broken off of a sharp instrument. Some possible benefits of postmortem MSCT include the ability to reconstruct visual images of weapons and the possible prevention of injury to autopsy personnel.

2677. Kawecki, Z. and L. Konieczny (1972). "Cranio-cerebral injuries in adults." Polish medical journal **11**(2): 447-453.

2678. Kawu, A. A., et al. (2011). "Complications and causes of death in spinal cord injury patients in Nigeria." West African journal of medicine **30**(4): 301-304.

BACKGROUND: There have been many reports on the problems of spinal cord injury (SCI) in Nigeria but few have reported on the complications and causes of death in spinal cord injured patients. OBJECTIVE: The objective of this study was to determine the complications, causes of death and associated risk factors in patients with SCI within six months post injury. METHODS: Patients were retrospectively identified from the hospital trauma database from January 1997 to December 2007. Complications and cause of death within the first six months of SCI were determined along with associated risk factors. RESULTS: Five hundred and eighty-two patients were eligible for analyses and data were obtained for 422 (72.5%) patients with a mean age of 37.2 (±14.2) years at six months follow-up. Muscle spasms 417 (98.8%) and neurogenic pain 382 (94.5%) were the main complications noted. The mortality during the review period was 144 (34.1%). Respiratory failure (44.4%) was the commonest cause of death. The independent predictors of mortality were mainly age, GCS<9, Frankel Type A at presentation and cervical spine injury (CSI) and while CSI and Frankel Type A injury were the main predictors of complications. CONCLUSION: Most common complication and cause of death following SCI are muscle spasm and respiratory failure respectively. The risk factors associated with mortality are age, GCS<9, cervical spinal injury, and complete neurologic injury and those for complications were cervical spinal injury and Frankel Type A injury.

2679. Kayhanian, S. and R. J. Machado (2020). "Head Injuries in Homer's Iliad." World neurosurgery **143**: 33-37.

The Iliad is an epic poem chronicling the journey of Achilles in the Trojan War. The poem is one of the earliest sources of written literature in the Western canon. It is not a medical text, but the many and varied descriptions of injuries and their consequences mean that it is an important source for examining the earliest notions of anatomy and knowledge of the pathologies that result from trauma. Head injuries feature prominently in the text and represent written accounts of neurotrauma from nearly 3000 years ago. Previous work on the poem has suggested an awareness of neurological concepts such as nystagmus, syncope, and pupillary dilatation after trauma. In this paper, we identify and categorize all of the head injuries detailed in the text and examine these to identify concepts of functional neuroanatomy that are revealed by the descriptions. We identify and discuss 2 detailed descriptions of head injury, suggesting an awareness of decerebrate posturing after brainstem injury and cerebrospinal fluid leakage following a basal skull fracture.

2680. Kaylor, J. P., et al. (2012). "Electronic medical records and compliance with goal-directed therapy in traumatic brain injury." Annals of emergency medicine **60**(4): S50.

Study Objectives: Traumatic brain injury (TBI) is a devastating public health crisis. There are 1.5-2 million annual incident cases in the United States; the sequelae of which comprise 295,000 hospitalizations, 1/3 of all injury-related mortality, and severe disability. Goal-directed therapy (GDT) has been shown to mitigate secondary brain injury in TBI. GDT is dependent upon timely review of the patient's physiological profile, radiographs, and response to clinical intervention. Electronic medical record systems allow providers across specialties to access the essential components of a patient's treatment simultaneously. This study assesses emergency department (ED) compliance with physiological

monitoring and GDT (ex: early intubation, blood pressure management, neurosurgical intervention) in the treatment of TBI, before and after implementation of an electronic medical record system. Methods: An observational multi-phase before/after cohort study was conducted to assess TBI care at 2 points in time. The study was completed at an urban Level I Trauma Center (annual census >100,000). Patients with a diagnosis of blunt head trauma and initial GCS 3-12 were identified via retrospective review of the on-site trauma registry. Exclusion criteria included: penetrating trauma, GCS >12, and age <18y. 169 subjects met inclusion criteria at Time 1, prior to electronic medical record (1/1/2008-1/1/2010). 137 subjects met inclusion criteria at Time 2, after implementation of electronic medical record (1/3/11-12/31/11). Data on demographics, history, physical exam, clinical care, and disposition were collected. Univariate analyses were completed using SPSS v19, 2010. Results: Distribution of mechanism of injury did not differ significantly between groups. In the post- electronic medical record group, patients had higher initial GCS scores (5.93/6.68, p = 0.04). Despite this difference, time to neurosurgical intervention significantly improved at Time 2 (344/151 minutes, p = .002). At Time 2, patients were also more likely to receive ED placement of an external ventricular drain (p = .01). No statistically significant differences were noted in compliance with parameters for: blood pressure goals, endotracheal intubation, use of antiseizure medicine, or mortality Conclusion: After implementation of electronic medical record there was a significant decrease in time to neurosurgical interventions, such as surgical decompression of hemorrhage and/or placement of external ventricular drain. Future research is needed to assess the relationship between electronic medical record, critical care, and early identification of surgical emergencies, essential components of GDT in TBI.

2681. Kazan, S., et al. (1997). "Intracranial glass." Turkish neurosurgery **7**(3-4): 100-102.

A case of intracranial glass following an orbitocranial trauma is presented. During a car crash, glass fragments from shattered windshield passed through the orbital plate and penetrated into the ventral portion of the frontal lobe. No injury to the globe was observed and the patient did not show any demonstrable signs of neurological deficit. Intracranial glass was surgically removed.

2682. Kazanci, A., et al. (2012). "Intracranial sewing needles in an adult patient." Turkish neurosurgery **22**(6): 775-776.

A 37-year-old patient is reported with intracranial sewing needles, which were located in the right frontal lobe. Both clinical and radiological findings suggested that these needles must have been introduced in infancy before the closure of anterior fontanelle during an unsuccessful homicide. Usually intracranial foreign objects are placed due to penetrating trauma or surgical procedures. Child abuse has been known for centuries. Many types of physical traumas have been reported, especially in Western countries. In Iran, insertion of sewing needles into the brain aiming to kill the infant have been seen in a lot of cases. This situation takes part in a lot of Persian stories. We reported a 37-year-old man who had 2 intracranial sewing needles with unknown etiology.

2683. Kazanis, E., et al. (2001). "Molecular mechanisms involved in the response of brain tissue to trauma molecular mechanisms involved in the response of brain tissue to trauma." Archives of Hellenic Medicine **18**(4): 363-374.

OBJECTIVE: Brain trauma is a major medical problem. It is a primary cause of death, and in the event of survival it leads to long-term ill-health, as well as social and economic problems. The elucidation of the molecular mechanisms involved in the destruction of brain tissue after trauma and in the induction of permanent changes in brain function is necessary for the development of rational therapeutic approaches. METHOD: A model of focal, mechanical, penetrating injury was employed in adult rats. In this model the expression of certain proteins was studied in order to investigate the response of the brain tissue to trauma. The expression of Heat-shock protein-70 (Hsp-70), Brain-Derived Neurotrophic Factor (BDNF), Neurotrophin-3 (NT-3), the astrocytic marker Glial Fibrillary Acidic Protein (GFAP) and Insulin-like Growth Factor-I (IGF-I) were studied immunohistochemically. The occurrence of apoptotic cell death was investigated by the TUNEL reaction. In addition, IGF-I was administered to the injured rats and its neuroprotective properties were determined. RESULTS: 4 and 12 hours after the injury, an increase in Hsp-70 expression, limited induction of IGF-I and activation of astroglia around the core of the injury were observed. Neurotrophin expression was severely reduced in a restricted peritraumatic zone and scattered apoptotic cells were detected, mainly in the injured hemisphere but to a lesser degree in the contralateral hemisphere. One week later, an astroglial scar had been formed at the site of the injury and Hsp-70 expression was limited. BDNF levels remained low, while the reduction in NT-3 was no longer visible. IGF-I expression as well as the number of apoptotic cells were further increased. The local administration of IGF-I following the injury restored the normal tissue patterns to a significant degree, as evidenced by the maintenance of

normal neurotrophin expression and the reduction of the apoptosis in the injured hemisphere. CONCLUSIONS: Focal mechanical injury of the brain induces significant local changes in BDNF, NT-3 and IGF-I expression, which remain detectable at least one week after the injury. With time, degenerative cellular phenomena, as reflected by Hsp-70 expression and apoptotic cell death, spread beyond the site of tissue damage. Administration of IGF-I after the injury reverses some of these phenomena and is able to help maintain homeostasis of the brain tissue.

2684. Kazanis, I., et al. (2003). "Neuroprotective effects of insulin-like growth factor-I (IGF-I) following a penetrating brain injury in rats." Brain research **991**(1-2): 34-45.

The elucidation of the molecular mechanisms involved in the response of brain tissue to trauma and the recognition of substances with neuroprotective properties is a prerequisite for the development of rational therapeutic approaches. In this study, we used a model of, unilateral, penetrating stab-like brain injury and examined the possible beneficial effects of post-injury administration of insulin-like growth factor-I (IGF-I) both at the cellular level, 4 and 12 h post-injury, and on the physical condition of the animals up to 1 week following the trauma. The consequences of injury were assessed by immunohistochemically observing the expression of heat-shock protein 70 (Hsp70), which is thought to be a marker of cell stress and injury, and by staining the tissue with the TUNEL reaction, in order to detect apoptotic cell death. Injury resulted in an increase in the number of Hsp70 and TUNEL positive cells in the peritraumatic area. The physical condition of the rats was followed by measuring body weight changes, food and water intake and by estimating their "motor activity". IGF-I administration resulted in a significant decrease in the number of Hsp70 and TUNEL positive cells in the peritraumatic area. Additionally, it improved the total "motor activity" of injured rats, increased food intake and attenuated the post-injury body weight loss. IGF-I thus emerges as a factor acting both at the cellular level as a neuroprotectant and at the systemic level as an anabolic agent.

2685. Kazanis, I., et al. (2004). "Alterations in IGF-I, BDNF and NT-3 levels following experimental brain trauma and the effect of IGF-I administration." Experimental neurology **186**(2): 221-234.

The effects of a unilateral, penetrating brain trauma on IGF-I, BDNF and NT-3 were studied immunocytochemically in the rat. BDNF and NT-3 were decreased in the peritraumatic area, but increased in the adjacent region, 4 and 12 h post-injury. One week following the trauma, BDNF remained low in the peritraumatic area, but was restored to normal levels in the adjacent, while no effect of injury on NT-3 levels was detected in either area. Injury resulted in an increase in IGF-I levels in the peritraumatic area, which was most pronounced 1 week following the trauma, indicating that IGF-I could participate in endogenous repair processes. We thus administered IGF-I immediately following the trauma and investigated its effects on injury-induced changes in neurotrophin levels. Administration of IGF-I partially reversed the injury-induced decrease in BDNF and NT-3 in the peritraumatic area observed 4 and 12 h post-injury, while at the same time-points, it completely cancelled the effects of injury in the adjacent region. One week after the trauma, BDNF levels were dramatically increased in both the peritraumatic and adjacent area, reaching levels even higher than those of the sham-operated animals, following IGF-I administration. Our results showing that IGF-I not only counteracts injury-induced changes in neurotrophins, but can also further increase their levels, indicate that this growth factor could mediate repair and/or protective processes, following brain trauma.

2686. Kazemi, H., et al. (2012). "Intractable epilepsy and craniocerebral trauma: analysis of 163 patients with blunt and penetrating head injuries sustained in war." Injury **43**(12): 2132-2135.

Post-traumatic epileptic seizure is a common complication of brain trauma including military injuries. We present clinical characteristics and correlates of post-traumatic epilepsy in 163 head-injured veterans suffering from intractable epilepsy due to blunt or penetrating head injuries sustained during the Iraq-Iran war. The medical records of 163 war veterans who were admitted by the Epilepsy Department of the Shefa Neuroscience Center between 2005 and 2009 were retrospectively reviewed. The mean follow-up period after developing epilepsy was 17.2 years. The time interval between the trauma and the first seizure was shorter and the seizure frequency was higher in epileptic patients suffering from penetrating head trauma. There was no difference in seizure type between epileptic patients traumatised by blunt or penetrating injury. Patients with seizure frequency of more than 30 per month mostly had simple partial seizure. Frontal and parietal semiologies were observed more frequently in patients with penetrating trauma, whereas patients with blunt trauma showed a higher temporal semiology. The most common brain lesion observed by CT scan was encephalomalacia followed by porencephaly and focal atrophy. There was no association between intracerebral

retained fragments and different characteristic features of epilepsy. Patients with military brain injury carry a high risk of intractable post-traumatic epilepsy decades after their injury, and thus require a long-term medical follow-up.

2687. Kazemi, H., et al. (2014). "Intractable epilepsy and craniocerebral trauma: Analysis of 163 patients with blunt and penetrating head injuries sustained in war." Brain injury **28**(5-6): 620.

Objectives: Post-traumatic epileptic seizure is one of the common neurological disorders after military injuries. This study evaluated clinical characteristics of post-traumatic epilepsy in 163 patients injured during the Iraq-Iran war. Methods: The medical records of patients who were admitted by the Epilepsy Department of the Shefa Neuroscience Center between 2005-2009 were retrospectively reviewed. The mean follow-up period after developing epilepsy was 17.2 years. Results: The time interval between the trauma and the first seizure was shorter and the seizure frequency was higher in epileptic patients suffering from penetrating head trauma while there was no difference in seizure type between patients injured by blunt or penetrating trauma. Patients with seizure frequency of more than 30 per month mostly had simple partial seizure. Frontal and parietal semiologies were observed more frequently in patients with penetrating trauma, whereas patients with blunt trauma showed a higher temporal semiology. The most common brain lesion observed by CT scan was encephalomalacia followed by porencephaly and focal atrophy. There was no association between intracerebral retained fragments and different characteristic features of epilepsy. Conclusions: There is a high risk of intractable post-traumatic epilepsy in patients suffering from military brain injury. Consequently, these patients require a long-term medical follow-up.

2688. Kazim, S. F., et al. (2011). "Management of penetrating brain injury." Journal of emergencies, trauma, and shock **4**(3): 395-402.

Penetrating brain injury (PBI), though less prevalent than closed head trauma, carries a worse prognosis. The publication of Guidelines for the Management of Penetrating Brain Injury in 2001, attempted to standardize the management of PBI. This paper provides a precise and updated account of the medical and surgical management of these unique injuries which still present a significant challenge to practicing neurosurgeons worldwide. The management algorithms presented in this document are based on Guidelines for the Management of Penetrating Brain Injury and the recommendations are from literature published after 2001. Optimum management of PBI requires adequate comprehension of mechanism and pathophysiology of injury. Based on current evidence, we recommend computed tomography scanning as the neuroradiologic modality of choice for PBI patients. Cerebral angiography is recommended in patients with PBI, where there is a high suspicion of vascular injury. It is still debatable whether craniectomy or craniotomy is the best approach in PBI patients. The recent trend is toward a less aggressive debridement of deep-seated bone and missile fragments and a more aggressive antibiotic prophylaxis in an effort to improve outcomes. Cerebrospinal fluid (CSF) leaks are common in PBI patients and surgical correction is recommended for those which do not close spontaneously or are refractory to CSF diversion through a ventricular or lumbar drain. The risk of post-traumatic epilepsy after PBI is high, and therefore, the use of prophylactic anticonvulsants is recommended. Advanced age, suicide attempts, associated coagulopathy, Glasgow coma scale score of 3 with bilaterally fixed and dilated pupils, and high initial intracranial pressure have been correlated with worse outcomes in PBI patients.

2689. Kazmi, S. A. M., et al. (2001). "Missile injuries of the brain." Journal of the College of Physicians and Surgeons Pakistan **11**(1): 4-7.

Data was analyzed relating to a consecutive series of 16 patients of penetrating brain injuries received at forward defence lines. Characteristics studied were the cause of injury, level of consciousness and various neurological deficits presented on initial examination, CT scan findings, the surgical procedures performed and the final outcome after one year of follow-up. One, out of 16 patients, died due to severe associated injuries to abdominal viscera and major vessels. Meningitis occurred in one patient during the immediate postoperative period. All patients with motor weakness, speech deficits and incontinence showed significant improvement. Hearing loss of one ear persisted in one patient. Two patients developed delayed onset seizures. It is concluded that, patients with penetrating brain injuries should be evacuated to the tertiary care neurosurgical centres as soon as possible. In operation only obviously necrotic brain and easily accessible metal and bone pieces should be removed. There is no need to explore the normal brain as it

would only result in increased neurological deficits. The patients with such injuries should receive broad-spectrum antibiotics to prevent the infective complications.

2690. Kc, K. M., et al. (2022). "Frontal Bone Osteomyelitis in Adult." Journal of Nepal Health Research Council **20**(1): 257-259.

Frontal bone osteomyelitis is a rare clinical disease which occurs as a result of frontal sinusitis, penetrating injury on head, post-operative complication after sinus surgery and hematogenous spread from distant site. Early diagnosis, appropriate surgical debridement and antibiotic are keys to prevent from life threatening intracranial complications. We report a 63 years old male patient with osteomyelitis of outer cortex of frontal bone. The wound was thoroughly debrided after computer tomography scan showed an osteolytic lesion on outer table of fontal bone and antibiotic was continued for 2 months until inflammatory markers become normal. Keywords: Frontal bone; Intracranial complications; osteomyelitis; pott's puffy tumour.

2691. Keates, R. H., et al. (1974). "Tear gas keratopathy in a child: treatment by keratoplasty." Ophthalmic surgery **5**(2): 38-41.

2692. Kedous, M. A., et al. (2018). "Unusual circumstances to diagnose cervical Pott's disease." Skeletal radiology **47**(5): 723-727.

Tuberculous spondylodiscitis usually affects the dorso-lumbar spine, and its cervical location is a rare condition that can mimic other diseases and consequently cause treatment delays. We report a case of tuberculous spondylodiscitis of the lower cervical spine discovered under unusual circumstances in a patient with severe polytrauma involving a cranio-cerebral trauma, a non-displaced fracture of the two laminae and the spinous process of the C6 vertebrae as well as fibular and tibial shaft fractures. The patient underwent static tibial nailing, and a collar with occipital and chin supports was applied. At 2-month follow-up, the patient presented with severe neck pain without neurologic deficits. Plain and dynamic cervical radiographs showed a stable C6-C7 subluxation and C7 superior endplate collapse. The CT scan also outlined prevertebral soft tissue swelling. The MRI showed a C6-C7 spondylodiscitis associated with a prevertebral abscess with am 8-cm major axis. The diagnosis of C6-C7 Pott's disease was confirmed by a CT-guided biopsy. The patient received 12 months of antituberculous chemotherapy, after which the paravertebral abscess completely disappeared, and the patient has had no functional sequelae. The diagnosis of cervical spine tuberculosis is difficult and requires a high level of attention. Delays in establishing the diagnosis and starting the appropriate treatment result in severe complications such as spinal cord compression and spinal deformity, which are difficult to manage.

2693. Keel, M., et al. (2005). "The role of surgical hip dislocation in the treatment of acetabular and femoral head fractures." European Journal of Trauma **31**(2): 138-147.

Background and Purpose: Surgical hip dislocation by trochanteric flip osteotomy facilitates access to acetabular and femoral head fractures. Furthermore, it allows evaluation of cartilage damage and vascularity of the femoral head. In this study the potential benefits of this procedure for improved fracture management and for prognostic assessment were investigated. Patients and Methods: From July 1997 to October 1999, 20 selected patients with displaced acetabular fractures (n = 12), femoral head fractures (n = 7), or combined injuries (n = 1) were included. Inclusion criteria for acetabular fractures were either displaced posterior wall fragments with cranial extension or complex acetabular fractures involving a displaced transverse fracture line. Open reduction and fixation of either complex acetabular fractures or femoral head fractures were carried out through Kocher-Langenbeck approach, trochanteric flip osteotomy, and complete surgical hip dislocation. Additionally, the extent of cartilage destruction and femoral head perfusion were assessed. Results: Anatomic reduction (≤ 1 mm displacement) of acetabular fractures was achieved in 69% of patients and good reduction (< 3 mm) in 31%. In patients with acetabular fractures, severe cartilage destruction of the acetabulum was found in 38% and of the femoral head in 15%, while patients with isolated femoral head fractures revealed severe cartilage damage of the femoral head in 57%. Arterial bleeding from the femoral head, tested by drilling, was observed in all patients. Secondary dislocation of the trochanteric osteotomy occurred in one patient and made refixation necessary. Patients were reexamined at least 2 years after intervention. 77% of patients with acetabular

fractures and all patients with femoral head fractures showed good or excellent results after 32.6 ± 6.1 months according to the functional score of D'Aubigné & Postel. Conclusion: Surgical hip dislocation allows adequate reconstruction of complex acetabular and femoral head fractures and intraoperative evaluation of local cartilage damage and femoral head perfusion. © Urban & Vogel.

2694. Keimowitz, R. M. and B. L. Annis (1973). "Disseminated intravascular coagulation associated with massive brain injury." Journal of neurosurgery **39**(2): 178-180.

2695. Kelishadi, S. S., et al. (2019). "Facial Fracture Patterns Associated with Traumatic Optic Neuropathy." Craniomaxillofacial Trauma and Reconstruction **12**(1): 39-44.

Traumatic optic neuropathy (TON) is rare. The heterogeneity of injury patterns and patient condition on presentation makes diagnosis difficult. Fracture patterns associated with TON have never been evaluated. Retrospective review of 42 patients diagnosed with TON at the R. Adams Cowley Shock Trauma Center from May 1998 to August 2010 was performed. Thirty-three patients met criteria for study inclusion of fracture patterns. Additional variables measured included patient demographics and mechanism. Cluster analysis was used to form homogenous groups of patients based on different fracture patterns. Fracture frequency was analyzed by group and study population. Visual depiction of fracture patterns was created for each group. Cluster analysis of fracture patterns yielded five common groups or fracture patterns among the study population. Group 1 (n = 3, 9%) revealed contralateral lateral orbital wall (100%), zygoma (67%), and nasal bone (67%) fractures. Group 2 (n = 7, 21%) demonstrated fractures of the frontal bone (86%), nasal bones (71%), and ipsilateral orbital roof (57%). Group 3 (n = 14, 43%) involved fractures of the ipsilateral zygoma (100%), lateral orbital wall (29%), as well as frontal and nasal bones (21% each). Group 4 (n = 5, 15%) consisted of mid- and upper-face fractures; 100% fractured the ipsilateral orbital floor, medial and lateral walls, maxilla, and zygoma; 80% fractured the orbital roof and bilateral zygoma. Group 5 (n = 4, 12%) was characterized by fractures of the ipsilateral orbital floor, medial and lateral orbital walls (75% each), and orbital roof (50%). A notably high 15 of 33 patients (45%) sustained penetrating trauma. Our study demonstrates five fracture pattern groups associated with TON. Zygomatic, frontal, nasal, and orbital fractures were the most common. Fractures with a combination of frontal, nasal, and orbital fractures are particularly concerning and warrant close attention to the eye.

2696. Kell, H. H. and H. Roding (1967). "[Gunshot injuries caused by air-pressure weapons]." Schussverletzungen durch Luftdruckwaffen. **92**(34): 2422-2428.

2697. Kell, H. M., et al. (1993). "Traumatic optic neuropathy complicated by thyroid eye disease." Journal of the American Optometric Association **64**(6): 432-439.

BACKGROUND: Thyroid eye disease is the most common orbital disorder found in adults. Ocular changes may occur with or without systemic hyperthyroidism. Blunt orbital trauma can affect the eye in many ways and can confound and alter the natural course of thyroid eye disease., METHODS: A 76-year-old patient with a number of ophthalmic findings and associated symptoms which could have been related to previous blunt ocular trauma. Careful optometric evaluation, systemic laboratory testing, and review of the ocular and medical findings demonstrated the onset of thyroid dysfunction., RESULTS: Thyroid disease was diagnosed on the basis of the presence of enlarged extraocular muscles by CT scan and elevated tensions on attempted upgaze. The patient demonstrated an elevated T3 uptake and low TSH levels for which he was treated with propylthiouracil. The occurrence of thyroid disease and damage from blunt trauma confounded the diagnosis because forced duction testing and optic atrophy could well have been the result of previous blunt trauma., CONCLUSIONS: This case elucidates the many differential diagnoses and complications that result from the combination of previous blunt trauma and the occurrence of new thyroid disease with ophthalmic findings.

2698. Keller, A., et al. (1996). "[Primary unrecognized gunshot wound in the frontal skull base]." Primar unerkannte Schussverletzung der Frontobasis. **75**(12): 772-774.

BACKGROUND: Craniocerebral gunshot wounds demand a high degree of skill in clinical treatment. In addition to painstaking history, modern imaging techniques for preoperative diagnosis and interdisciplinary surgical treatment are

important., CASE REPORT: Diagnosis and therapeutic principles are discussed on the basis of a case study of a 21-year-old soldier with an unusual craniocerebral gunshot wound.

2699. Kelley, P., et al. (2003). "Complex midface reconstruction: maximizing contour and bone graft survival utilizing periosteal free flaps." The Journal of craniofacial surgery **14**(3): 413-416.

2700. Kelly, J. F. (1973). "Maxillofacial missile wounds: evaluation of long-term results of rehabilitation and reconstruction." Journal of oral surgery (American Dental Association : 1965) **31**(6): 438-447.

2701. Kelly, P. and C. J. Drago (2009). "Surgical and prosthodontic treatment of a patient with significant trauma to the middle and lower face secondary to a gunshot wound: a clinical report." Journal of prosthodontics : official journal of the American College of Prosthodontists **18**(7): 626-637.

Large defects of dentofacial structures may result from trauma, disease (including neoplasms), and congenital anomalies. The location and size of the defects are related to difficulties that patients report relative to speech, mastication, swallowing, facial esthetics, and self-image. This article reports on the evaluation and treatment of a patient who suffered significant trauma to the lower and mid-face secondary to a gunshot injury. It describes the initial presentation, life-saving procedures, and subsequent bone grafts, implant placement, and prosthetic treatments required to rehabilitate the patient to a condition that closely approximated his preoperative condition. This clinical report confirms that no matter the degree of complexity involved in treating the results of significant facial trauma, successful treatment is dependent on thorough physical and radiographic examinations, development of the appropriate diagnoses, and treatment based on sound prosthodontic and surgical principles.

2702. Kelly, P. D., et al. (2021). "Incorporating conditional survival into prognostication for gunshot wounds to the head." Journal of neurosurgery: 1-10.

OBJECTIVE: Several scores estimate the prognosis for gunshot wounds to the head (GSWH) at the point of hospital admission. However, prognosis may change over the course of the hospital stay. This study measures the accuracy of the Baylor score among patients who have already survived the acute phase of hospitalization and generates conditional outcome curves for the duration of hospital stay for patients with GSWH., METHODS: Patients in whom GSWH with dural penetration occurred between January 2009 and June 2019 were identified from a trauma registry at a level I trauma center in the southeastern US. The Baylor score was calculated using component variables. Conditional overall survival and good functional outcome (Glasgow Outcome Scale score of 4 or 5) curves were generated. The accuracy of the Baylor score in predicting mortality and functional outcome among acute-phase survivors (survival > 48 hours) was assessed using receiver operating characteristic curves and the area under the curve (AUC)., RESULTS: A total of 297 patients were included (mean age 38.0 [SD 15.7] years, 73.4% White, 85.2% male), and 129 patients survived the initial 48 hours of admission. These acute-phase survivors had a decreased mortality rate of 32.6% (n = 42) compared to 68.4% (n = 203) for all patients, and an increased rate of good functional outcome (48.1%; n = 62) compared to the rate for all patients (23.2%; n = 69). Among acute-phase survivors, the Baylor score accurately predicted mortality (AUC = 0.807) and functional outcome (AUC = 0.837). However, the Baylor score generally overestimated true mortality rates and underestimated good functional outcome. Additionally, hospital day 18 represented an inflection point of decreasing probability of good functional outcome., CONCLUSIONS: During admission for GSWH, surviving beyond the acute phase of 48 hours doubles the rates of survival and good functional outcome. The Baylor score maintains reasonable accuracy in predicting these outcomes for acute-phase survivors, but generally overestimates mortality and underestimates good functional outcome. Future prognostic models should incorporate conditional survival to improve the accuracy of prognostication after the acute phase.

2703. Kendirli, M. T., et al. (2012). "A more realistic animal model of post-traumatic epilepsy." Epilepsy Currents **12**(1).

Rationale: Epilepsy is a common consequence following traumatic brain injury, with the highest incidence following penetrating injuries such as gun shot wounds. There are many models of traumatic brain injury, but they do not replicate all of the features of penetrating injuries, including retained foreign materials such as metal. To create a

model that was closer to the clinical situation, we examined if placing metal fragments into a penetrating injury increased the risk for subsequent epilepsy. Methods: Under isoflurane anesthesia adult male Sprague-Dawley (250-350 g) rats had penetrating injuries induced with a small bore (approximately 1mm tip diameter) , at one or two different frontal and/or limbic sites from the dorsal to ventral surface. In two thirds of the animals immediately after the penetrating lesion we put several lead or copper metal fragments into the lesion areas. At a minimum of 3 months following the lesion, recording electrodes were placed around the site of the lesion and over the frontal cortex, and the electrodes were secured with dental acrylic. Following the surgery the animals were recorded intermittently to determine the presence of spontaneous seizures for until 6 months following the injury. Results: Six rats died from complications of the lesion, and 4 rats lost headsets before recordings were completed. Of the rats that were tested until 6 months post lesion, 0/4 of the lesion only, 10/10 of the lesion plus copper and 3/4 of the lesion plus lead rats showed spontaneous seizures ($p<0.01$). The incidence of epilepsy increased over the 3 months of observation. The mean seizure number per day was 6.8±1.5 and the mean seizure duration was 73±9 second. Many of the seizures were convulsions, but there were also many nonconvulsive seizures. Frontal lesions were as likely to result in seizures as limbic lesions. Initial pathological examination suggested that the presence of copper and lead resulted in larger lesions. Conclusions: Retained metal fragments significantly increase the risk of epilepsy and may cause additional brain damage. The long term presence of these toxic metals may cause additional changes that lead to epilepsy. This model may more closely replicate the epilepsy that follows gun shot wounds and may also provide a useful model of neocortical epilepsy.

2704. Kendirli, M. T., et al. (2014). "A model of posttraumatic epilepsy after penetrating brain injuries: effect of lesion size and metal fragments." Epilepsia **55**(12): 1969-1977.

OBJECTIVE: Penetrating brain injury (PBI) has the highest risk for inducing posttraumatic epilepsy, and those PBIs with retained foreign materials such as bullet fragments carry the greatest risk. This study examines the potential contribution of copper, a major component of bullets, to the development of epilepsy following PBI., METHODS: Anesthetized adult male rats received a penetrating injury from the dorsal cortex to the ventral hippocampus from a high speed small bit drill. In one group of animals, copper wire was inserted into the lesion. Control animals had only the lesion or the lesion plus stainless steel wire (biologically inert foreign body). From 6 to up to 11 months following the injury the rats were monitored intermittently for the development of epilepsy with video-electroencephalography (EEG). A separate set of animals was examined for possible acute seizures in the week following the injury., RESULTS: Twenty-two of the 23 animals with copper wire developed chronic epilepsy, compared to three of the 20 control rats (lesion and lesion with stainless steel). Copper was associated with more extensive injury. The control rats with epilepsy had larger lesions. In the acute injury group, there was no difference in the incidence of seizures (83% lesion plus stainless steel, 70% lesion plus copper)., SIGNIFICANCE: Copper increases the risk for epilepsy and may increase damage over time, but there were no differences between the groups in the incidence of acute postinjury seizures. Lesion size may contribute to epilepsy development in lesion-only animals. Copper may be an independent risk factor for the development of epilepsy and possible secondary injury, but lesion size also contributes to the development of epilepsy. The consequences of prolonged exposure of the brain to copper observed in these animals may have clinical implications that require further evaluation.

2705. Kennedy, F., et al. (1993). "The Glasgow Coma Scale and prognosis in gunshot wounds to the brain." The Journal of trauma **35**(1): 75-77.

To determine which factors predict survival in patients with gunshot wounds to the brain, 192 patients who had intracranial injury demonstrated on computed tomographic (CT) scanning were retrospectively reviewed. Glasgow Coma Scale (GCS) scores on admission seemed to be the most important factor in predicting survival. Age, the presence of extruded brain, and use of a shotgun could not be shown to be factors independent of admission GCS score. Findings on CT scans (single lobe vs. multilobe involvement) helped to predict survival only in patients with GCS scores 5-13. The mortality rate was 35%. Among survivors 18% had brain-related long-term disability, and an additional 27% had long-term disability related to associated eye injury.

2706. Kennedy, F. R., et al. (1994). "Incidence of cervical spine injury in patients with gunshot wounds to the head." Southern medical journal **87**(6): 621-623.

Cervical spine immobilization is standard during the early stages of prehospital and hospital care of patients with blunt head injury. However, the need for cervical spine immobilization in patients with gunshot wounds to the head has not been addressed. To determine the incidence and types of cervical spine injury in this group, we retrospectively examined the records of 308 consecutive patients who had computed tomographic (CT) scans of the head to evaluate brain injury after gunshot wounds. Of the 266 patients with data adequate for review, 157 (59%) had a complete lateral x-ray film of the cervical spine. Of these 157, 105 had wounds limited to the calvaria, and none had cervical spine injury. Of 52 patients with complete lateral x-ray films and wounds not limited to the calvaria, 5 (10%) had cervical spine or spinal cord injury. Of the 192 patients who had CT-proven intracranial injury, 86 (45%) required immediate intubation before x-ray films were obtained, and 67 (35%) died. We conclude that cervical spine immobilization may not be required during endotracheal intubation of brain-injured gunshot victims with wounds limited to the calvaria.

2707. Kennedy, M. C., et al. (1996). "Drugs and brain death." The Medical journal of Australia **165**(7): 394-398.

IN THE EARLY HOURS of the morning, a fit young man leaves a party, where drugs are reported to have been consumed, to walk home. A short time later he is found unconscious by the roadside, with severe head injuries. En route to hospital by ambulance, he suffers a cardiac arrest and is successfully resuscitated. On arrival at the Emergency Department he has obvious head injuries and is deeply unconscious, but shows spontaneous ventilatory movements. Available history is that he is a 20-year-old student with well-controlled epilepsy for which he takes phenytoin. It is not known how he sustained his injuries. Pupils are equal, small and react sluggishly to light. There is generalised flaccidity and an extensor-plantar response to painful stimuli. Skull x-rays show no fractures and computed tomography shows early cerebral oedema and scattered cerebral contusions with evidence of subarachnoid haemorrhage. He is transferred to the intensive care unit and measures to inhibit cerebral oedema, including mannitol, are commenced. An N-methyl-D-aspartate (NMDA) inhibitor is administered for neuroprotection and ventilatory support is commenced. Over the next 24 hours haemodynamic support is needed with fluid loading and vasopressors. A urine drug screen by Toxilab (Toxilab Incorporated, Irvine, Calif.) shortly after arrival shows the presence of phenytoin and morphine. The report states that the presence of benzodiazepines is suspected. Plasma phenytoin concentration at the time of arrival was 78 mumol/L (optimal range, 40-80 mumol/L). Forty hours after admission his condition has deteriorated. His pupils are at midposition, no longer reactive to light and his lower limbs exhibit only spinal reflexes. His relatives begin to prepare themselves for the fact he may not survive and raise the issue that he would have been keen to donate organs under such circumstances. What is the opinion regarding withdrawal of life support at this time?

2708. Kennedy, M. S., et al. (2019). "Epidemiology of ocular trauma in the Indigenous vs non-Indigenous population in the Top End." Clinical & experimental ophthalmology **47**(8): 995-999.

IMPORTANCE: Epidemiological data on visually significant ocular trauma in the Top End of the Northern Territory., BACKGROUND: Our main objective is to determine whether Indigenous patients are disproportionately affected by visually significant ocular trauma as compared to non-Indigenous patients., DESIGN: This was a retrospective audit at the Royal Darwin Hospital in the Top End of the Northern Territory during January 2013 to June 2015., PARTICIPANTS: A total of 104 ocular trauma patients were included; 43 were Indigenous and 61 were non-Indigenous., METHODS: Medical records of patients with ocular trauma between January 2013 and June 2015 (except simple, non-penetrating corneal foreign bodies and abrasions) were reviewed. Vision loss was defined by visual acuity: mild >=6/18, moderate 6/18-6/60, severe <=6/60 following World Health Organization standards., MAIN OUTCOME MEASURES: The study included the incidence of ocular trauma patients by ethnicity (Indigenous vs non-Indigenous). Our secondary outcome included vision loss, mechanism of injury, open vs closed injury, age, remoteness and alcohol involvement., RESULTS: A total of 104 patient charts were reviewed; 43 (41%) were Indigenous and 61 (59%) were non-Indigenous. Alleged assault was the greatest contributor to ocular trauma in both groups (74% in Indigenous vs 39% non-Indigenous). Severe vision loss was more prevalent in the Indigenous vs non-Indigenous patients (30% vs 16%)., CONCLUSIONS AND RELEVANCE: Indigenous patients were disproportionately affected by visually significant ocular trauma compared to non-Indigenous patients. This research provides important data on ocular trauma in the Northern Territory. Further prevention strategies are needed to reduce vision loss in this population.

2709. Kennedy, U. M., et al. (2007). "Intracranial stab wound: a case report." European journal of emergency medicine : official journal of the European Society for Emergency Medicine **14**(2): 72-74.

OBJECTIVE: Intracranial stab wounds are relatively uncommon, as the adult skull usually provides an effective barrier to penetration. We present an interesting case of a penetrating intracranial stab wound with several important teaching points., CLINICAL PRESENTATION: A 44-year-old man presented to the emergency department with a 1.2-cm stab wound to the left temporal area. His initial Glasgow Coma Score was 14/15. Computerized tomography of his brain revealed a left temporal lobe haemorrhage and contusion. Magnetic resonance images of his brain revealed a linear haematoma extending from his left temporal lobe into the left middle cerebellar peduncle, consistent with a penetrating injury. He was managed conservatively with intravenous antibiotics and made an excellent recovery. Three weeks after injury, he had mild residual problems with recall and attention., CONCLUSION: Several leaning points exist in this case. Firstly, as stab wounds to the brain frequently present as apparently innocuous facial or scalp lacerations, a high index of suspicion is needed to prevent these injuries presenting with serious late infective complications. Secondly, reports of similar cases in the literature suggest that stab wounds to the temporal region are associated with a high morbidity and mortality. This case demonstrates that a patient with an injury such as this can occasionally make a good functional recovery. Finally, this case highlights the advantage of magnetic resonance imaging over computerized tomography in patients with these injuries once it has been established that there is no residual intracranial metal fragment prior to magnetic resonance imaging. In this case, the entire wound tract was only evident on magnetic resonance imaging and not on the initial computerized tomography scans.

2710. Keong, N. C. H., et al. (2006). "Neurosurgical history: Comparing the management of penetrating head injury in 1969 with 2005." British journal of neurosurgery **20**(4): 227-232.

Penetrating head trauma may present challenging problems in the acute phase (removal of foreign bodies, control of haemorrhage, prevention of infection) and in the management of long-term sequelae (neurological deficit, cognitive impairment, seizures). Two unusual cases demonstrate the progress made in emergency medicine, radiology neurointensive care, and neurosurgical head injury management over 36 years.

2711. Ker, K. and K. Blackhall "Bradykinin beta-2 receptor antagonists for acute traumatic brain injury." (7).

Background, Traumatic brain injury (TBI) is a leading cause of death and disability worldwide. Cerebral oedema, the accumulation of fluid within the brain, is believed to be an important contributor to the secondary brain damage that occurs following injury. The release of kinins is thought to be an important factor in the development of cerebral vasogenic oedema and the use of bradykinin beta-2 receptor antagonists, which prevent the release of these kinins, has been proposed as a potential therapeutic intervention., Objectives, The objective was to assess the safety and effectiveness of bradykinin beta-2 receptor antagonists for TBI., Search methods, We searched the Cochrane Injuries Group Specialised Register, Cochrane Central Register of Controlled Trials (The Cochrane Library 2010 Issue 2), MEDLINE (Ovid SP), EMBASE (Ovid SP), ISI Web of Science: Science Citation Index Expanded (SCI-EXPANDED), ISI Web of Science: Conference Proceedings Citation Index-Science (CPCI-S), Zetoc: British Library's table of contents of journal articles and conference proceedings, PubMed, and Current Controlled Trials covering all available years up to 20th May 2010. We also searched the Internet and checked the reference lists of relevant papers and other reviews to identify any further studies., Selection criteria, Randomised controlled trials of beta-2 receptor antagonists versus placebo for TBI., Data collection and analysis, Two authors independently screened search results and assessed the full texts of potentially relevant studies for inclusion. Data were extracted and the risks of bias assessed. Relative risks (RR) and 95% confidence intervals (CIs) were calculated and data were pooled using a fixed-effect model., Main results, Four studies involving 406 participants were included. All four studies reported the effects of beta-2 receptor antagonists on mortality. The pooled RR for mortality was 0.84 (95% CI 0.55 to 1.29). Two studies measured disability and the RR of death or severe disability with beta-2 receptor antagonists was 0.81 (95% CI 0.59 to 1.09). One trial reported data on adverse events, the RR of at least one serious adverse event was 1.37 (95% CI 0.76 to 2.46) and the RR of local skin reactions was 13.79 (95% CI 0.85 to 224.81). Two studies measured the effect on intracranial pressure (ICP), only in one study did this finding reach statistical significance. There was no evidence for the presence of heterogeneity., Authors' conclusions, There is no reliable evidence that bradykinin beta-2 receptor antagonists are safe or effective for use in TBI patients, and they should not be used outside the context of well conducted trials. Further adequately powered and well conducted randomised controlled trials are required.

2712. Kerbler, S., et al. (1990). "[Traumatic embolization of the middle cerebral artery]." Traumatische Embolisierung der Arteria cerebri media. **45**(5): 301-303.

A 3 mm metallic particle, which had blasted during grinding operation, shot into the neck of a nine year old boy, penetrated into the common carotid artery and embolized the right middle cerebral artery. There had been no neurological symptoms until four days after the injury. Suddenly, a mild left side hemiparesis occurred with accentuation of the arm. The case illustrates an unusual penetration and intravascular migration of a foreign body. After the injury, penetration and subsequent peripheric embolisation can happen immediately, or as in our case within a short time after. Hence, the small particle may not be detected by a local radiogram, or may not be found on surgical exploration. Therefore, in all cases of neck wounds caused by low velocity injection of foreign bodies, radiological evaluation with skull-x-rays and a neurological examination should be done. If further special scans are required, these should be accomplished by axial computer tomography, because the metallic nature of the foreign bodies would prohibit the examination by magnetic resonance.

2713. Kerr, M. L. and J. A. Prahlow (2014). "Seizure disorder secondary to remote gunshot wound of the head: a case of sudden unexpected death in epilepsy." Forensic science, medicine, and pathology **10**(4): 643-646.

2714. Kerr, N. A., et al. (2019). "Human lung cell pyroptosis following traumatic brain injury." Cells **8**(1).

Approximately 30% of traumatic brain injured patients suffer from acute lung injury or acute respiratory distress syndrome. Our previous work revealed that extracellular vesicle (EV)-mediated inflammasome signaling plays a crucial role in the pathophysiology of traumatic brain injury (TBI)-induced lung injury. Here, serum-derived EVs from severe TBI patients were analyzed for particle size, concentration, origin, and levels of the inflammasome component, an apoptosis-associated speck-like protein containing a caspase-recruiting domain (ASC). Serum ASC levels were analyzed from EV obtained from patients that presented lung injury after TBI and compared them to EV obtained from patients that did not show any signs of lung injury. EVs were co-cultured with lung human microvascular endothelial cells (HMVEC-L) to evaluate inflammasome activation and endothelial cell pyroptosis. TBI patients had a significant increase in the number of serum-derived EVs and levels of ASC. Severe TBI patients with lung injury had a significantly higher level of ASC in serum and serum-derived EVs compared to individuals without lung injury. Only EVs isolated from head trauma patients with gunshot wounds were of neural origin. Delivery of serum-derived EVs to HMVEC-L activated the inflammasome and resulted in endothelial cell pyroptosis. Thus, serum-derived EVs and inflammasome proteins play a critical role in the pathogenesis of TBI-induced lung injury, supporting activation of an EV-mediated neural-respiratory inflammasome axis in TBI-induced lung injury.

2715. Keskin, E., et al. (2021). "Rebar-induced transpalatal penetrating head trauma: a case report." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **37**(12): 3939-3943.

Penetrating head injuries caused by blunt or piercing objects are rare. In this paper, we present the case of a 9-year-old boy referred to our hospital with rebar-induced injury. The patient's neurological examination findings were normal. Computed tomography undertaken revealed that the rebar had entered through the oral cavity transorally-transpalatally, passing the frontal bone, and then exited the body by piercing the skin. The patient was taken to emergency surgery, and first, tracheostomy was performed. The rebar had been cut and shortened by the emergency rescue unit, which resulted in shortening the part of the foreign body that would pass through the brain parenchyma. During surgery, the rebar was carefully removed by following the route of the entry. All the defects caused by the foreign body were surgically repaired using a multidisciplinary approach, including neurosurgery and plastic and reconstructive surgery, by otolaryngology teams.

2716. Kesting, M. R., et al. (2017). "Classification of orbital exenteration and reconstruction." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **45**(4): 467-473.

Orbital exenteration (OE) is considered to be a mutilating surgical procedure reserved for relentlessly progressive neoplastic disorders or extensive facial trauma with unfavourable eye involvement. Malignant tumours,

accounting for the majority of ablative orbital surgeries, may be caused by primary orbital tumours or secondarily by neoplasias from the surrounding skin, the maxillary sinus or intracranial malignomas. Orbital exenteration following trauma is mostly caused by penetrating globe defects or extended infections with the danger of intracranial effects. Thoughtful resection planning, the exploitation of reconstructive possibilities as well as the consideration of adjuvant therapy are essential to provide the patient with the best available treatment. As a multitude of reconstructive procedures exist, it is of crucial importance to offer a disease-tailored treatment to achieve a successful patient outcome. After retrospective analysis of 45 orbital exenteration cases within the last decade, we developed a defect-driven classification for ablative orbital therapy followed by a guideline for reconstructive procedures. The classification as well as the reconstruction guideline will help the surgeon to restore anatomic boundaries and to promote physiological and psychological recovery for the patient.

2717. Ketharanathan, N., et al. (2019). "Combining Brain Microdialysis and Translational Pharmacokinetic Modeling to Predict Drug Concentrations in Pediatric Severe Traumatic Brain Injury: The Next Step Toward Evidence-Based Pharmacotherapy?" Journal of neurotrauma **36**(1): 111-117.

Evidence-based analgosedation in severe pediatric traumatic brain injury (pTBI) management is lacking, and improved pharmacological understanding is needed. This starts with increased knowledge of factors controlling the pharmacokinetics (PK) of unbound drug at the target site (brain) and related drug effect(s). This prospective, descriptive study tested a pediatric physiology-based pharmacokinetic software model by comparing actual plasma and brain extracellular fluid (brainECF) morphine concentrations with predicted concentration-time profiles in severe pTBI patients (Glasgow Coma Scale [GCS], <=8). Plasma and brainECF samples were obtained after legal guardian written consent and were collected from 8 pTBI patients (75% male; median age, 96 months [34.0-155.5]; median weight, 24 kg [14.5-55.0]) with a need for intracranial pressure monitoring (GCS, <=8) and receiving continuous morphine infusion (10-40 mug/kg/h). BrainECF samples were obtained by microdialysis. BrainECF samples were taken from "injured" and "uninjured" regions as determined by microdialysis catheter location on computed head tomography. A previously developed physiology-based software model to predict morphine concentrations in the brain was adapted to children using pediatric physiological properties. The model predicted plasma morphine concentrations well for individual patients (97% of data points within the 90% prediction interval). In addition, predicted brainECF concentration-time profiles fell within a 90% prediction interval of microdialysis brainECF drug concentrations when sampled from an uninjured area. Prediction was less accurate in injured areas. This approach of translational physiology-based PK modeling allows prediction of morphine concentration-time profiles in uninjured brain of individual patients and opens promising avenues towards evidence-based pharmacotherapies in pTBI.

2718. Kevin, L. G., et al. (2000). "An old injury with a modern twist." Anaesthesia **55**(2): 199.

2719. Khalid, M., et al. (2018). "Iatrogenic cavernous sinus air embolism during peripheral venous catheter insertion." Journal of Investigative Medicine **66**(2): 394-395.

Case report 86 year old male with advanced dementia admitted with worsening confusion for 2 weeks. Physical exam was significant for disoriented to place and time (baseline) but no neurological deficit. Labs and CXR were normal. Computed tomography (CT) of the head without contrast showed air in left cavernous sinus and right transverse foramen on C1 which tracked down into venous circulation of neck. He didn't have any central line placement, however it was later discovered that he had a peripheral catheter insertion with a poorly primed line for saline administration and was the most likely (TABEL PRESENTED) cause of air embolization. He was kept in Trendelenburg position and hyperbaric therapy was indicated, but deferred due to patient non-compliance in the setting of advanced dementia. Serial follow up neurological exam showed no deficits. Repeat CT head later showed resolution of air embolism. Echocardiography with bubble study showed normal left ventricular function. Cavernous sinus air embolism is associated with infection, penetrating trauma or complication of vascular interventions. The most common cause is peripheral or central venous catheter lines insertion. Air embolism should be consider one of the differentials if the patient has acute change in neurological function especially during venous cannulation. Diagnosis usually made by CT scan of the brain and treatment is 100% oxygen.

2720. Khalil, A. F. (1980). "Civilian gunshot injuries to the face and jaws." The British journal of oral surgery **18**(3): 205-211.

Eighteen patients with different types of civilian gunshot injuries to the face and jaw were studied clinically and radiographically and treated in our department. Ten patients had soft tissue injuries and eight had mandibular fractures with soft tissue injuries. The weapons responsible for the injuries were rifles in five cases, handguns in two cases, shotguns in four cases, air guns in five cases and shrapnel from landmine explosions in two cases. The injuries were due to intentional fights in three cases and were accidental in the other cases.

2721. Khalil, M., et al. (2021). "Pediatric mortality at pediatric versus adult trauma centers." Journal of Emergencies, Trauma and Shock **14**(3): 128-135.

Introduction: Pediatric trauma centers (PTCs) were created to address the unique needs of injured children with the expectation that outcomes would be improved. However, prior studies to evaluate the impact of PTCs have had conflicting results. Our study was conducted to further clarify this question. We hypothesize that severely injured children ≤ 14 years of age have better outcomes at PTCs and that better survival may be due to higher emergency department (ED) survival rates than at adult trauma centers (ATCs). Methods: A retrospective analysis of severely injured children (ISS>15) ≤18 years of age entered into the National Trauma Data Bank (NTDB) between 2011 and 2012 was performed. Subjects were stratified into 2 age cohorts; young children (0-14 years) and adolescents (15-18 years). Primary outcomes were emergency department (ED) and in-patient (IP) mortality. Secondary outcomes included in-hospital complications, hospital and ICU length of stay, and ventilator days. Outcome differences were assessed using multilevel logistic and negative binomial regression analyses. Results: A total of 10,028 children were included. Median ISS was 22 (Interquartile range 17-29). Adjusting for confounders on multivariate analysis, children ≤ 14 had lower odds of ED (0.42[CI 0.25-0.71], p=0.001) and IP mortality (0.73[CI 0.5-0.9], p=0.02) at PTCs. There were no differences in odds of ED mortality (0.81 [CI 0.5-1.3], p=0.4) or IP mortality (1.01 [CI 0.8-1.2], p=0.88) for adolescents between centers. There were no differences in complication rates between PTCs and ATCs (OR 0.86 [CI 0.69-1.06], p=1.7) but children were more likely to be discharged to home and have more ICU and ventilator free days if treated at a PTC. Conclusion: Young children but not adolescents have better ED survival at PTCs compared to ATCs.

2722. Khalil, N., et al. (1991). "Transcranial stab wounds: morbidity and medicolegal awareness." Surgical neurology **35**(4): 294-299.

In this series of eight patients with transcranial stab wounds, the importance of classifications of such wounds as a separate traumatic entity is stressed. The mechanisms of neuronal and vascular damage in these wounds are discussed and are found to be specific from other head injuries. Cerebral injury by stabbing is largely restricted to the wound tract. Frontal stabs (two cases) are accompanied by the least morbidity and mortality, while temporal stabs (four cases) are more commonly fatal. In transorbital stabs (two cases) carotid-cavernous fistulae resulted. Early recognition, administration of antitetanus serum and antibiotics, and debridement may minimize complications.

2723. Khalili, H., et al. (2021). "Risk factors for post-traumatic epilepsy." Seizure **89**: 81-84.

PURPOSE: The aim of the current study was to investigate the risk factors for post-traumatic epilepsy (PTE) in a large cohort of patients after severe non-penetrating civilian traumatic brain injury (TBI)., METHODS: This was a longitudinal study. All patients with a severe non-penetrating TBI, who were admitted at the neuro-intensive care unit of Shahid Rajaee Trauma Hospital, affiliated with Shiraz University of Medical Sciences, Shiraz, Iran, from 2015 until 2019, were studied. Severe TBI was defined as a Glasgow Coma Scale-Motor score below six. Post-traumatic epilepsy was defined as any seizures that occurred after being discharged from the hospital., RESULTS: In total, 803 patients with severe non-penetrating TBI were studied; 82 patients (10.2%) reported any late post-traumatic seizures (PTSs). A higher Glasgow outcome scale (extended) at discharge was significantly inversely associated with PTE [Odds Ratio (OR)= 0.76, 95% Confidence Interval (CI): 0.65-0.87; p = 0.0001]. Depressed skull fracture (OR= 1.88, 95% CI: 0.92-3.80; p = 0.081), epi-dural hematoma (OR= 1.67, 95% CI: 0.93-2.97; p = 0.083), and sub-dural hematoma (OR= 1.64, 95% CI: 0.96-2.78; p = 0.068) were associated with PTE as trends., CONCLUSION: Our study adds to the literature on the risk of PTE after severe non-penetrating civilian TBI. Our large sample size and also the application of a logistic regression analysis model may suggest that other variables (e.g., depressed skull fracture and intracranial hematoma) are indeed associated with the

Glasgow outcome scale (extended) at discharge and that is why they lost their significance in the model.

2724. Khan, A. A., et al. (1994). "Penetrating craniocerebral trauma. Report of 20 cases." Bangladesh Journal of Neuroscience **10**(1): 1-8.

20 cases of penetrating craniocerebral trauma managed surgically are reported. The commonest cause of injury was assault with crude weapons like teta, Dao, Spade and Axe. Other causes were RTA, bomb blast, fall on Bati and being gored by buffalo. The youngest patient was 8 months of age and the oldest 65 yrs. with an average of 26 years. Sixteen cases were male and 4 female. More than 50% of cases were admitted in the hospital within a short time after the trauma. But some cases were admitted as late as 7 days with grossly infected wounds. Fifteen cases had injury of the vault majority being parietal with involvement of the dominant hemisphere. Five cases were frontal basal injuries. Twelve cases were managed by debridement, 5 by craniectomy and 3 by craniotomy. In 16 cases the dura was repaired. Eleven cases had different degrees of brian laceration/swelling. Seven cases had intracranial haematoma, seven wound infection, one meningitis and one infected bone had minor neurological deficit, 4 cases were left with different degrees of disabilities. One case died.

2725. Khan, K. A., et al. (2019). "Penetrating head injury due to angle grinder: an occupational hazard." British journal of neurosurgery **33**(2): 202-206.

Penetrating head injury is a life threatening condition. In the workplace, these are mostly non missile type, low velocity civilian injuries caused by sharp objects. Angle grinders are used to cut stones, metal etc, and cause penetrating head injuries due to shattered rotating discs from the grinder at home and workplaces. We report a series of three cases of penetrating head injuries due to unsafe use of angle grinders. The relevant literature is reviewed and management of such cases is discussed.

2726. Khan, M. B., et al. (2014). "Civilian craniocerebral gunshot injuries in a developing country: presentation, injury characteristics, prognostic indicators, and complications." World neurosurgery **82**(1-2): 14-19.

BACKGROUND: Civilian craniocerebral gunshot injuries (CGIs) are rare but increasing in incidence in the developing world and there is scare literature on presentation, injury characteristics, prognostic indicators, and complications of brain trauma due to projectiles., METHODS: A retrospective review of 51 civilian patients with CGI who presented to the Aga Khan University Hospital between 1998 and 2011 was carried out. Presentation, injury characteristics, and complications were analyzed with emphasis on outcomes and prognostic indicators., RESULTS: There were 43 male and 8 female patients with an average age of 28.92 (+/-12.33) years. Twenty-three patients had a Glasgow Coma Scale (GCS) score of 13-15, 6 patients had a GCS score of 9-12, and 22 patients had a GCS score of 3-8 on admission. The overall mortality rate was 22% (n = 11). The most common postoperative neurologic deficits were motor deficits (19 patients) followed by aphasias (11 patients). On univariate analysis, admission GCS score and bi- or multilobar injuries were found to be highly predictive of neurologic outcome. There was no difference in outcomes between penetrating and perforating injuries. We also failed to find a statistically significant correlation between ventricular injury and outcomes in our patients., CONCLUSION: Admission GCS and number of lobes involved are highly prognostic of outcome. Patients with a GCS score >=9 and unilobar injury on computed tomographic scans may benefit the most from surgical management.

2727. Khan, M. R., et al. (1985). "Spent-bullet injuries in the head and neck region (report of seven cases)." The Journal of laryngology and otology **99**(12): 1319-1323.

2728. Khanam, S., et al. (2021). "Clinical Presentation and Management Strategies in Intraorbital Foreign Bodies." Case reports in ophthalmological medicine **2021**: 6645952.

The authors present a retrospective, observational case study of seven patients, who presented with retained Intra-Orbital Foreign Bodies (IOrbFBs) following penetrating orbital injury at a tertiary eye hospital over a period of one year. Cases were reviewed for epidemiological features, mechanism of injury, nature of foreign body, clinical features,

imaging modality, associated complications, management outcomes, and the final prognosis. The mean age of presentation was 27.43 years. Amongst the seven patients, two were children (aged <10 years). The male : female ratio was 4 : 3. Of the seven retained IOrbFBs, two were plastic, two wooden, and three metallic in nature (one gunshot injury, one ball projectile (commonly referred to as BB) injury, and one with knife). Two out of seven had no light perception at presentation. The periocular location of the foreign bodies was inferior in 4 cases and medial in 3 cases. Computed Tomography scan confirmed the diagnosis in five cases and Magnetic Resonance Imaging (MRI) was diagnostic in one. Surgical intervention was done in five cases, and two cases were managed conservatively. The authors conclude that favourable outcome can be achieved even without surgical removal in cases of inert metallic/inorganic IOrbFBs. The properties of plastic FBs can frequently render them invisible on imaging, or they may mimic chronic inflammatory conditions like tuberculosis. Long-standing wooden IOrbFBs evade identification radiologically due to prolonged hydration. The ultimate choice of intervention must be individualised, weighing the risks of retention against the risk of iatrogenic damage.

2729. Khanduja, S., et al. (2013). "Tractor nail as impacted foreign body: rare case scenario." International ophthalmology **33**(3): 291-293.

A patient presented with a metallic nail impacted in the right orbital floor after being hit by a projectile. The nail was disimpacted and removed as guided by the radiograph image. Radiography proved helpful in forming a coherent scheme for case management.

2730. Khanna, J. N. and R. Ramaswami (2019). "Protocol for the management of ankylosis of the temporomandibular joint." The British journal of oral & maxillofacial surgery **57**(10): 1113-1118.

Ankylosis of the temporomandibular joint (TMJ) is a severely deforming, disabling condition as a result of craniomandibular fusion caused mainly by condylar fractures with displacement of the meniscus. Ankylosis may be fibrous, fibro-osseous, or bony, and unilateral or bilateral. The severity of the deformity is based on the onset, duration, and type of ankylosis. Various surgical techniques have been described for treatment, but no single treatment is recommended because of inconsistent results and the high rate of failure. While our total experience extends to 300 cases, we have developed a protocol using the most recent 193 patients to address our earlier high failure rate. The onset was during childhood in 168 patients, and 25 were adults. We describe the protocol that we developed for these two groups. Our management included gap arthroplasty, costochondral grafting, temporalis flaps, ramus osteotomies, and transport distraction.

2731. Khara, M. and J. C. Herath (2019). "Suicide Decapitation by a Detonating Cord: A Case Report." The American journal of forensic medicine and pathology **40**(2): 140-143.

In the field of forensic pathology, suicides consist of a considerable portion of the workload. Among the many methods used to commit suicide, using a detonation cord explosive is quite unique. We report the case of a man who committed suicide by detonation cord resulting in decapitation. This case report highlights the fact that the injury patterns observed in explosion-related deaths can be highly variable and that in cases with isolated injuries postmortem imaging and histology are an important adjunct to the standard death investigation. The ultimate goal of explosion-related investigations should be geared toward a well-documented and complete postmortem examination with the appropriate use of ancillary studies that provide a clear interpretation of the mechanism, cause, and manner of death.

2732. Kharatishvili, I., et al. (2006). "A model of posttraumatic epilepsy induced by lateral fluid-percussion brain injury in rats." Neuroscience **140**(2): 685-697.

Although traumatic brain injury is a major cause of symptomatic epilepsy, the mechanism by which it leads to recurrent seizures is unknown. An animal model of posttraumatic epilepsy that reliably reproduces the clinical sequelae of human traumatic brain injury is essential to identify the molecular and cellular substrates of posttraumatic epileptogenesis, and perform preclinical screening of new antiepileptogenic compounds. We studied the electrophysiologic, behavioral, and structural features of posttraumatic epilepsy induced by severe, non-penetrating lateral fluid-percussion brain injury in rats. Data from two independent experiments indicated that 43% to 50% of

injured animals developed epilepsy, with a latency period between 7 weeks to 1 year. Mean seizure frequency was 0.3+/-0.2 seizures per day and mean seizure duration was 113+/-46 s. Behavioral seizure severity increased over time in the majority of animals. Secondarily-generalized seizures comprised an average of 66+/-37% of all seizures. Mossy fiber sprouting was increased in the ipsilateral hippocampus of animals with posttraumatic epilepsy compared with those subjected to traumatic brain injury without epilepsy. Stereologic cell counts indicated a loss of dentate hilar neurons ipsilaterally following traumatic brain injury. Our data suggest that posttraumatic epilepsy occurs with a frequency of 40% to 50% after severe non-penetrating fluid-percussion brain injury in rats, and that the lateral fluid percussion model can serve as a clinically-relevant tool for pathophysiologic and preclinical studies.

2733. Kharel Sitaula, R., et al. (2013). "Impacted iron nail in the orbit and maxillary sinus through a corneo-scleral perforation: a case report." Nepalese journal of ophthalmology : a biannual peer-reviewed academic journal of the Nepal Ophthalmic Society : NEPJOPH **5**(2): 268-271.

INTRODUCTION: Open globe injury is one of the commonest ophthalmic emergencies, and when accompanied by intraocular foreign bodies, the condition carries a poorer prognosis., OBJECTIVE: To report a rare case of perforating injury of the globe with an iron nail which got lodged in the maxillary sinus., CASE: A ten-year-old boy presented with the history of sudden painful loss of vision in his right eye. He reported that he was hit forcefully by the tail of a cow a day before the presentation. There was no perception of light in that eye. The ocular examination revealed a full thickness corneo-scleral perforation with prolapsed uveal tissue. The X-ray of the right orbit showed an impacted foreign body in the inferior orbit and computed tomography scan of the orbit confirmed the presence of a vertically impacted metal piece in the right orbit and right maxillary sinus. The repair of the perforation and removal of the impacted nail was done in two stages. The globe anatomy was maintained but the vision could not be restored due to the grave nature of the trauma., CONCLUSION: Perforating globe injury is an important cause of monocular blindness. Copyright © NEPjOPH.

2734. Kharitonova, K. I., et al. (1990). "[The experimental and clinical use of gelatin sponges with kanamycin and gentamycin for the prevention and treatment of suppurative complications in neurosurgery]." Eksperimental'noe i klinicheskoe primenenie zhelatinovykh gubok s kanamitsinom i gentamitsinom dlia profilaktiki i lecheniia gnoinykh oslozhnenii v neirokhirurgii.(3): 9-11.

Antiseptic gelatin sponges with kanamycin and gentamicin, which were studied in experiments on animals and used in the clinic, are a reliable measure for the prevention of suppuration in craniocerebral surgery in planned operations and in combination with debridement in penetrating injury of the skull and brain. For therapeutic purposes, local application of the agents is effective in focal suppurative processes in the skull and brain after surgical debridement of the purulent focus (abscess of the brain, osteomyelitis of the skull, etc.).

2735. Khatib, B., et al. (2017). "Updates in Management of Craniomaxillofacial Gunshot Wounds and Reconstruction of the Mandible." Facial plastic surgery clinics of North America **25**(4): 563-576.

This article includes updates in the management of mandibular trauma and reconstruction as they relate to maxillomandibular fixation screws, custom hardware, virtual surgical planning, and protocols for use of computer-aided surgery and navigation when managing composite defects from gunshot injuries to the face.

2736. Khatib, B. N., et al. (2017). "Application of virtual surgical planning to staged management of self-inflicted gunshot wounds to the maxillofacial skeleton: The oregon protocol." Journal of oral and maxillofacial surgery **75**(10): e367-e368.

Purpose: Self-inflicted gunshot wounds to the craniofacial region result in devastating functional disabilities and esthetic deformities, which are further magnified by the associated psychological trauma. Because a substantial number of these patients return to work, return to their pre-injury life style, and have a low rate of suicide recidivism, adequate reconstruction is essential to their comprehensive rehabilitation. [1, 2] The purpose of this investigation is to review our experience with virtual surgical planning in the setting of self-inflicted, high-velocity gunshot wounds to the face and propose a treatment protocol. Methods: We retrospectively reviewed 10 cases of self-inflicted high velocity gunshot wounds to the face presenting to Legacy Emanuel Hospital, Portland, OR, between 2010-2017 that were treated with

virtual surgical planning and computer-aided surgery. We propose a protocol for maxillofacial reconstruction after complex ballistic injury that utilizes staged reconstruction using computer-aided surgery in the primary hospital setting. The protocol involves 1) damage/hemorrhage control, airway stabilization, and maxillomandibular stabilization as indicated; 2) debridement of non-viable bone and soft tissue; 3) virtual reconstruction using commercially available craniomaxillofacial computer program and “back-conversion” of virtual plan into navigation system; 4) navigation assisted reconstruction of midfacial skeletal anatomy; 5) computer aided oro-mandibular reconstruction with or without microvascular free tissue transfer using custom guide stents and cutting guides; 6) navigation assisted, computer-aided palatomaxillary reconstruction with microvascular free tissue transfer using cutting guides and guide stents as indicated; 7) navigation- assisted reconstruction of the internal orbit; 8) and confirmation of accurate reconstruction using intraoperative CT imaging. Data Analysis: Data analysis for this retrospective case series is limited to descriptive statistics obtained via chart review. Subjective comparison of the computer- assisted presurgical plan to the postoperative CT scan was completed intraoperatively. Jaw position, facial projection, separation of the nose and mouth, and oral competence was evaluated postoperatively at least one month after surgery. Results: All patients had severe disruption of the mandible, oral-nasal communication, massive hard and soft tissue avulsion and varied degrees of involvement of the orbits, midface. The computer-assisted surgery was successfully implemented in all patients and proved to be a useful adjunct for: the restoration of orbital volume, facial projection and symmetry; the inset of composite tissue free flaps, and the facilitation of dental implant supported prosthetic rehabilitation. The majority of these patients were successfully orally intubated: 3 arrived spontaneously ventilating and were orally intubated for airway protection, 1 arrived with a cricothyrotomy and the remaining 5 were orally intubated on arrival. The average number of operating room visits during the initial hospitalization was 4.7 and hospital course ranged from 7-59 days. All patients were treatment planned with virtual surgical planning, 1 patient underwent rigid fixation without grafting, 2 patients were reconstructed with non-vascularized bone grafts and 6 received microvascular free flaps. Four received a single fibula for mandibular reconstruction, 2 received a double fibula reconstruction of both maxilla and mandible and one received a fibula for the mandible and a radial forearm for reconstruction of the midface. All three patients reconstructed without microvascular tissue became infected. All patients survived their hospitalization, had their tracheostomies removed, had adequate midface and mandibular projection, excellent jawposition, separation of their nose and mouth and fair oral competence. Conclusion: Virtual surgical planning for complex ballistic injury facilitates efficient and accurate primary reconstruction.

2737. Khattak, A., et al. (2010). "Etiological factors of brain abscess." Journal of Medical Sciences **18**(4): 194-196.

Objectives: To find out the etiological factors of brain abscesses in patients admitted in Hayatabad Medical Complex, Peshawar in the year 2009. Material and Methods: This descriptive study was carried out in the Neurosurgery Units of Hayatabad Medical Complex, Peshawar from January to December 2009. Forty eight consecutive cases with brain abscesses were included in the study. Diagnosis of brain abscess was established in all patients with CT scanning. The patients were evaluated for the predisposing factors. Results: The study population included 31 males and 17 females. Mean age was 29.2 ± 2.3 years. The predisposing factors for brain abscess were noted in 43 (89.6%) patients while no etiological factor was found in 5 (10.4%). Contiguous focus of infection was found in 18 (37.5%) patients, hematogenous spread in 16(33.3%) and direct inoculation in 9 (18.8%) patients. Conclusion: Brain abscess is a fatal condition. Every patient with brain abscess should be evaluated for a possible source of infection. Contiguous focus of infection is the commonest etiological factor. However in a few cases, no source of brain abscess can be found. Particular attention should be given to the early recognition of etiological sources and proper prophylactic approach should be adopted to prevent development of brain abscess.

2738. Khau, A. and J. Melinek (2019). "Two Cases of Tandem Bullets-One Homicide and One Suicide." The American journal of forensic medicine and pathology **40**(3): 262-265.

We report 2 unusual cases of tandem bullets. Case 1 is a homicide involving a piggyback screw. Case 2 is a suicide involving multiple tandem bullets as a result of improper ammunition size. Tandem bullet injuries can have a wide variety of presentations. Therefore, it is essential that forensic pathologists understand the mechanisms of tandem bullet wounds and familiarize themselves with the autopsy and radiological findings seen in tandem bullet injuries. This report supports that use of incorrect caliber ammunition and the lodgment of foreign objects in the barrel of a gun are possible causes of tandem bullet injuries.

2739. Khazei, A., et al. (2007). "Potential missed cerebral arterial gas embolism in patients with in-hospital ischaemic stroke." Diving and Hyperbaric Medicine **37**(2): 58-64.

Cerebral arterial gas embolism (CAGE) has been characterised as under-diagnosed, under-treated, and under-reported. It is associated with a number of commonly performed diagnostic and therapeutic procedures, and penetrating trauma to the neck or chest. This study was carried out to determine the frequency with which physicians at a university-based, tertiary-care teaching hospital with a hyperbaric facility considered the diagnosis of CAGE in patients with a stroke occurring during, or shortly after, a procedure known to be high risk for CAGE. A retrospective chart review was undertaken from April 2002 to March 2003 to identify all patients who had suffered an in-hospital ischaemic stroke (IHIS) within four hours of a high-risk procedure or penetrating trauma, and presented with symptoms consistent with the diagnosis of CAGE. Of the 150 cases of "stroke as a post-admit morbidity", 46 were classified as an IHIS. In 15 of these 46, a diagnosis of CAGE could not be excluded. Symptom onset occurred during the procedure in three cases and within one hour in five cases. Procedures most commonly associated with IHIS were percutaneous coronary angioplasty (6) and cardiopulmonary bypass (6). In only one of the 15 cases was CAGE considered in the differential diagnosis. Only two patients were functioning independently at the time of discharge, whilst two died. This study suggests that in our hospital the diagnosis of CAGE is rarely considered in patients presenting with symptoms of IHIS within four hours of a high-risk procedure. These findings are important because untreated CAGE is associated with major mortality and morbidity.

2740. Khil'ko, V. A., et al. (1988). "[Use of a point-scale assessment of patient status in the surgical treatment of craniocerebral injuries]." Ispol'zovanie ball'noi otsenki sostoianiia bol'nykh pri khirurgicheskom lechenii cherepno-mozgovoi travmy.(3): 19-24.

The indications and contraindications for surgical treatment in craniocerebral trauma (CCT) were based on estimation of the patient's condition in marks; the dynamics of changes of the results of the estimation in the pre- and postoperative periods were studied. A total of 375 patients with CCT were examined in different medical institutions according to a unified method. Neurosurgical interventions were carried out on 155 patients. All patients who underwent operation when their condition was rated below 15 marks died on the immediate postoperative days, whatever their age and whatever the time of the operation after the trauma. The probability of a favourable outcome increased to 40% in a condition rated 21-30 marks on the day of the operation and reached 69% when it was above 30 marks.

2741. Khil'ko, V. A., et al. (1996). "[The characteristics of the biochemical reactions of the cerebrospinal fluid in victims with gunshot wounds of the skull and brain in relation to treatment outcome]." Osobennosti biokhimicheskikh reaktsii tserebrospinal'noi zhidkosti u postradavshikh s ognestrel'nymi raneniiami cherepa i golovnogo mozga v zavisimosti ot iskhoda lecheniia. **155**(5): 46-49.

Biochemical reactions of the liquor were investigated in 68 patients with gunshot wounds of the skull and brain and in closed treatment of the brain wound. The reactivity of biochemical system plays a certain role in the development of infectious complications. In dead people the developing pathogenetical biochemical syndromes having a sanogenic role of clearance from antigens of the injured tissues turn pathogenesis into thanatogenesis.

2742. Khil'ko, V. A., et al. (1994). "[The prediction of the cranioplasty outcomes after gunshot wounds of the skull and brain]." Prognozirovanie iskhodov kranioplastiki posle ognestrel'nykh ranenii cherepa i golovnogo mozga.(2): 32-80.

A number of application programs for IBM PC AT was worked out to meet the requirements of a new method applied for prognostication of cranioplasty results in patients with craniocerebral injuries. This method uses an old one based on Bayes formula. The authors analysed 155 craniocerebral injuries which were inflicted in Afghanistan in the period from September 1984 till November 1988. It was proved that such methods increase the accuracy of prognostication as far as the outcomes of reconstructive operations for gunshot craniocerebral injuries are concerned.

2743. Khirwadkar, H., et al. (2011). "Postoperative subdural haematoma and pneumocephalus mimicking TIA." BMJ case reports **2011**.

An 86-year-old man presented with left hand numbness and weakness 10 days after a resection of squamous cell carcinoma of the right side of the scalp. A CT head scan identified a right-sided, hypodense subdural collection without midline shift, with associated pneumocephalus. When the images were reviewed on bony settings, minute drill holes were identified penetrating the outer tables as expected, but also the inner table of the calvarium. With this knowledge, the initial clinical diagnosis altered significantly from that of a transient ischaemic attack to a working diagnosis of a subdural haematoma as a complication of the penetrating injury to the cranium, in a patient with an elevated international normalised ratio.

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2744. Khmehl, V. V., et al. (2016). "[THE TREATMENT OF INJURED PERSONS WITH COMPLICATED PENETRATING THORACIC WOUNDINGS ON TERTIARY LEVEL OF THE MEDICAL CARE DELIVERY]." Klinichna khirurhiia(1): 47-49.

The results of examination and treatment of 36 injured persons with complicated penetrating thoracic woundings in tertiary centres were analyzed. Own experience of the pulmonary woundings surgical treatment, using application of videothoracoscopic and welding-coagulating equipment, was summarized.

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2745. Khodov, A. M., et al. (2012). "[Specific features of wounds with a self-defense traumatic weapon "Osa"]." Vestnik khirurgii imeni I. I. Grekova **171**(2): 50-51.

Specific features and outcomes of wounds with a traumatic weapon of self-defense "Osa" were analyzed in 24 patients. Mean age of the wounded was from 21 to76 years. In 20 patients there was a single wound, in 4 patients it was multiple, in 7--blunt, in 12--perforating and 5 patients had gutter wounds. All the patients were treated according to the principles of field military surgery. Five patients had severe wounds: penetrating fracture of the skull (2 of them died), fracture of the shoulder (1 case), injury of the main artery (1 case), of the pleura (1 case). The wounds were closed up by primary intention in 19 patients, by second intention in 4 patients. The authors' experience shows that a traumatic weapon of self-defense "Osa" rather often caused permanent harm to health and can be mortal. Active surgical strategy in treatment of such patients prevents the development of serious infectious complications.

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2746. Khokhlov, A. P., et al. (1993). "The changes in the permeability of the blood-brain barrier when under neurosurgical intervention." Molecular and chemical neuropathology **20**(3): 197-202.

The aim of this research was to determine the influence of anesthesia, drugs, and neurosurgical trauma on the permeability of the blood-brain barrier (BBB) for macromolecules. Protein markers of oligodendrocytes and astroglia were used. The research methods were unique. Two groups of patients were formed: with neurosurgical brain trauma and without it. Everyone in both groups was subjected to anesthesia. The results were unexpected and did not depend on surgery: 1. Neurosurgical brain trauma did not change the permeability of BBB. 2. Anesthesia resulted in increasing permeability of BBB with peak upon 24-48 h. 3. High blood levels of neurospecific proteins proved protein synthesis in glial cells. 4. Massive transferring of brain antigens into blood did not stimulate antibody synthesis during a period of 21 d. According to the high blood levels of neural proteins, the antigen-antibody reaction took place in blood and autoimmune complexes were eliminated before penetration into the brain. A new mechanism of brain autoimmune safety is discussed.

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2747. Khoo, L.-S. and T.-Y. Tan (2011). "Traumatic perilymphatic fistula secondary to stapes luxation into the vestibule: a case report." Ear, nose, & throat journal **90**(5): E28-31.

A penetrating ear injury with a perilymphatic fistula is not an uncommon occurrence in otolaryngologic practice, but stapes luxation is rare. We report the case of an 11-year-old boy who developed a traumatic perilymphatic fistula secondary to an atypical stapes luxation into the vestibule. After sustaining a penetrating injury to the right ear, the patient presented with otalgia, vertigo, vomiting, gait unsteadiness, and hearing loss. High-resolution computed tomography (HRCT) of the temporal bone detected pneumolabyrinth, indicating a perilymphatic fistula. The stapes had pivoted on the footplate at the oval window, and then it made an unusual 180degree flip and luxated deeply into the vestibule, with the capitulum stapedis pointing medially. Conservative management was chosen in view of the high surgical risks posed by the deeply luxated stapes and the likelihood of a fracture of the stapes footplate. This case illustrates the importance of an accurate diagnosis and interpretation of a traumatic perilymphatic fistula and stapes luxation as seen on HRCT of the temporal bone.

2748. Khoshyomn, S., et al. (2004). "Survival after severe penetrating non-missile brainstem injury: case report." The Journal of trauma **56**(5): 1131-1134.

2749. Khosla, D., et al. (2002). "Complex penetrating cranial base trauma: case report demonstrating multidisciplinary management." The Journal of trauma **52**(6): 1192-1197.

2750. Khoury, J. M. and D. M. O'Day (1999). "Retained intraocular metallic foreign body masquerading as a ciliary body melanoma with extrascleral extension." Archives of ophthalmology (Chicago, Ill. : 1960) **117**(3): 410-411.

2751. Khudaverdyan, A. Y. (2016). "Trepanation in the Late Bronze Age and Early Iron Age in Armenia." Homo : internationale Zeitschrift fur die vergleichende Forschung am Menschen **67**(6): 447-461.

In this study, trepanations in ancient Armenia are discussed. In total, 10 cases were studied. Seven were male, 1 female and 2 were children. Age of the individuals ranged from 6 to 65 years. Among nine cases of surgical trepanations four had possible healing signs. In these cases the individuals showed evidence of previous trauma to the skull or infection (mastoiditis, tuberculosis), suggesting that the operation had been carried out for therapeutic purposes. This provides further support for the suggestion that trepanation (or trephination) was performed primarily for therapeutic purposes, and because of cranial infection or injury. In one case, a symbolic trepanation could imitate real penetration into the skull cavity. This study shows that archaeological sites of Armenia and anthropological materials have a potential to supply essential information on ancient history of the Armenian people and the region.

2752. Khurshid, N. M., et al. (2006). "Neuroimage." JK Practitioner **13**(2): 109.

2753. Kieck, C. F. and J. C. de Villiers (1984). "Vascular lesions due to transcranial stab wounds." Journal of neurosurgery **60**(1): 42-46.

The cases of 109 patients with a transcranial or transorbital stab wound are presented. Angiography in 74 patients revealed 26 vascular lesions: 11 aneurysms, five carotid-cavernous fistulas, three other arteriovenous fistulas, three occlusions, two transections, and two instances of severe vascular spasm. The following important points and pitfalls are stressed: the 30% incidence of vascular lesions, the delayed onset of these lesions and neurological signs from 1 week to several months after trauma, and the incidence of delayed intracranial hemorrhage in four of 11 cases with traumatic aneurysms. The basal location of the lesions is described, and the authors warn against the misleading clinical picture of a trivial scalp wound in the absence of a "slot" fracture, with life-threatening neural and vascular damage on the opposite side. Aggressive investigation and treatment of these lesions are advocated because of the associated high morbidity and mortality rates, especially in patients with aneurysms.

2754. Kiel, R., et al. (2005). "[Wooden spike orbital injury]." Pfahlungsverletzung der Orbita. **222**(3): 252-254.

A 71-year-old female patient fell in her garden, inducing a skin wound on the temporal left eyebrow. Skin disinfection and wound closure were performed elsewhere, an X-ray image did not reveal a foreign body. She was referred to our service three days later with a progressive left periorbital swelling. Clinical inspection demonstrated a painfully, fluctuant swelling around the wound with an inflammatory pseudoptosis of the left eye. Vision was reduced on the left eye; anterior and posterior segments of both eyes were unharmed. After opening the wound sutures a purulent liquid was drained and a wooden fragment was found, measuring 22 x 0.5 mm. Because of restriction of abduction of the left eye, magnetic resonance imaging (MRI) was performed, detecting another organic intraorbital foreign body and a fracture of the left medial orbital wall. Anterior orbitotomy was performed and a wooden fragment was removed, measuring 47 x 0.6 mm. Under administration of intravenous antibiotics vision and ocular motility recovered

uneventfully. This case emphasizes the value of MRI in the diagnostics of retained wooden foreign bodies as well as the importance of a soigneuse inspection of skin wounds with a high risk for remaining foreign bodies.

2755. Kieser, J., et al. (2008). "Analysis of experimental cranial skin wounding from screwdriver trauma." International journal of legal medicine **122**(3): 179-187.

As part of a more extensive investigation of skin wounding mechanisms, we studied wounds created by five common screwdrivers (straight, star, square or Robertson, Posidriv and Phillips) on the shaven foreheads of 12 freshly slaughtered pigs. We fixed the different screwdriver heads to a 5-kg metal cylinder which was directed vertically onto each pig head by a droptube of 700 mm length. We examined skin lesions by photography and also by scanning electron microscopy (SEM). Our evaluation of differences in wound shape and size was based on geometric morphometric methods. Our results show that there are obvious morphological differences between the straight head and the other types. The straight-headed screwdriver penetrates the skin by a mode II crack which results in a compressed skin plug with bundles of collagen fibres forming skin tabs within the actual wound. The sharper-tipped screwdrivers wedge open the skin (mode I), with a clearly defined edge with no skin plugs. Geometric morphometric analysis indicates that shapes of skin wounds created by the five screwdriver types could be classified into three different groups. The straight head results in the most differentiated wound profile, with the Robertson or square and some specimens of star, and also the Posidriv and Phillips giving similar wound outlines. SEM evaluation of wounds created by a new and worn straight-head screwdrivers shows that the outline of the worn screwdriver head is reflected in the shape of the wound it created.

2756. Kihtir, T., et al. (1993). "Early management of civilian gunshot wounds to the face." The Journal of trauma **35**(4): 569-567.

We analyzed 54 civilian patients (1988-1992) with gunshot wounds (GSWs) of the face to review the management principles and results. Urgent airway control was needed in 18 cases (33%): by orotracheal intubation in 13, cricothyroidotomy in two, tracheostomy in two, and nasotracheal intubation in one. Central nervous system injury was seen in 12 (22%): 40% with orbital, 38% with mid-face, and 0% with lower face injuries. Two patients died of intracranial injuries (mortality, 4%). Vascular injury was present in five patients (9%), all detected by angiography. The local complication rate was 39% in the presence of intra-oral injury and 0% without intra-oral injury ($p < 0.001$). The maxilla was the most commonly fractured facial bone (41%) followed by the mandible in 28%. All maxillary, orbital, and zygomatic fractures were treated without reduction. One of the seven nasal fractures required open reduction for deformity. Six of the 15 mandible fractures were treated without reduction. Of eight patients treated with closed reduction, one developed nonunion. One patient treated with immediate open reduction developed osteomyelitis of the mandible and nonunion. Five patients (9%) had palate injuries. Two of them later developed intraoral fistulas following conservative treatment. The airway needs immediate attention in GSWs of the face. Computed tomographic scanning of the head or spine should be done when the bullet trajectory is above the lower face (the level of the mandible). Angiography is indicated when the trajectory of the bullet is suggestive. A conservative approach that effectively reduces the fractures is the procedure of choice. Open reductions should not be performed in the initial treatment.(ABSTRACT TRUNCATED AT 250 WORDS)

2757. Kikano, G. E. and K. C. Stange (1992). "Lead poisoning in a child after a gunshot injury." The Journal of family practice **34**(4): 498-504.

Lead poisoning is a common disease that, if not detected, can lead to developmental delay and other serious sequelae. We report the case of a child with retained intracranial lead pellets from a gunshot injury, in whom elevated blood lead levels were detected approximately 1 year after the injury. No environmental source of lead was found, and a twin sister living in the same dwelling had considerably lower lead levels. The patient's lead levels diminished after each of four courses of chelation, but rebounded each time to potentially toxic levels after termination of therapy. Physicians should be particularly alert in screening for elevated lead levels in children with retained bullet fragments. In patients in whom removal of the bullet fragments is impractical, the potential risks of long-term chelation therapy must be weighed against the risks of lead toxicity.

2758. Kilic, D., et al. (2011). "The factors affecting the morbidity and mortality in thoracic trauma: An analysis of 220 patients." Heart Surgery Forum **14**: S17.

Background: Thoracic trauma is one of the most challenging problems for thoracic surgeons. In this study we evaluate to the factors effects of trauma on mortality and morbidity. Method: A retrospective analysis of 220 cases of thoracic trauma, seen between 2003 and 2009, is presented. The majority of the patients were male (male-female ratio 3.7:1) and the average age was 45.1 (3-84) years. We used the injury severity score (ISS) to assess the severity of trauma. Also included associated with trauma location. Results: Blunt trauma (81%, n = 179), especially motor vehicle accidents (50.2%) and falls (16.1%) were the most frequent causes of chest injury. Also penetrating trauma was seen in 39 patients (19.7%). Mean hospital stay was 8.6 (1-35) days. Isolated thoracic trauma was seen in 126 patients. Rib fractures (n = 145), pulmonary contusion (n = 26), hemopneumothorax (n = 51), and isolated hemothorax (n = 43) were the most frequent lesions. Approaches were thoracotomy (n = 21), thoraco-abdominal insicion (n = 6), and median sternotomy (n = 2). Main indications for thoracotomy were pulmonary laceration (n = 5), great vessel injury (n = 3), and diaphragm rupture (n = 4). For the majority of cases observation and/or tube thoracotomy (47%). Mechanical ventilation (10%, n = 21) were sufficient and these patients' mean ISS was 62.8. Morbidity and Mortality ratios were 11% and 14% respectively. For patients who did not survive, the average ISS was 45.1.The average ISS for the total group was 23.8 (4-75). In a survival analysis the ISS was found to be the most significant determining survival (P < .0001). Compared ISS ratio between injuries included cranial (n= 27, mean ISS; 48.4 [SD: 23.9]), and abdominal (n = 12, mean ISS; 49 [SD: 22.3]) (P = .14). The patients with cranial trauma have a higher mortality rate (ratio; 9/18, 50%) then with abdominal (ratio; 1/11, 9%) (P = .022). Mean hospital stay higher in association with cranial trauma (13.4 [SD = 7.85]) than with abdominal trauma (9.8 [SD=4.15]) (P = .04). Conclusion: Mortality after thoracic trauma remains relatively high, especially in case of associated neurotrauma. The ISS is a valuable score for assessing the severity of trauma and predicting outcome.

2759. Kilty, S. and P. G. Murphy (2009). "Penetrating temporal bone trauma." The Journal of trauma **66**(3): E39-41.

2760. Kim, H. and A. Colantonio (2008). "Intentional traumatic brain injury in Ontario, Canada." The Journal of trauma **65**(6): 1287-1292.

BACKGROUND: Violence and traumatic brain injury (TBI) are two major public health concerns. This violence-related TBI, however, has not been studied in Canada and there is little literature on a profile of risk factors and injury severity regarding TBI because of self-inflicted/suicidal and assault/homicidal injury compared with unintentional TBI., METHODS: Cross-sectional study using the comprehensive data set (CDS) of Ontario trauma registry (OTR) from 1993 to 2001., SETTING: Data from a large trauma registry were used to assess demographic and injury-related characteristics, injury severity and incident time associated with TBI that were either caused unintentionally, were self-inflicted or resulted from an assault., RESULTS: This study identified 1,409 (8.0%) intentional TBIs and 16,211 (92.0%) unintentional TBIs. Of the intentional TBIs, 389 (27.6%) was self-inflicted TBI (Si-TBI) and 1,020 (72.4%) was other-inflicted TBI (Oi-TBI). The most common cause of Si-TBI was "jumping from high places" (32.1%), followed by "firearms" (30.6%). About half of Oi-TBI was because of "fight and brawl" (48.3%), followed by "struck by objects" (26.1%). Si-TBI was associated with younger age, female gender, and having more alcohol/drug abuse history. For Oi-TBI, younger age, male gender, having more alcohol/drug abuse history were independently associated., CONCLUSION: This research provides the first comprehensive overview of intentional TBI based on Canadian data. The CDS of the OTR provided the ability to identify who is at risk for intentional TBI. Prevention programs and more targeted rehabilitation services should be designed for this vulnerable population.

2761. Kim, H. K. and H. S. Park (2009). "Fibrin glue-assisted augmented amniotic membrane transplantation for the treatment of large noninfectious corneal perforations." Cornea **28**(2): 170-176.

PURPOSE: To evaluate and report the efficacy of fibrin glue (FG)-assisted augmented amniotic membrane transplantation (AMT) in patients with large corneal perforations., METHODS: In a retrospective case series, 10 patients with corneal perforations more than 2 mm in diameter were treated with "FG-assisted augmented AMT." A 5- or 7-ply "augmented amniotic membrane" (AM) was constructed by applying FG to each sheet of AM to repair the corneal perforation. The augmented AM was designed 0.5 mm larger than the diameter of the perforation. The augmented AM was transplanted onto the perforation site with 10-0 nylon suture. If needed, additional overlay AM was sutured on top., RESULTS: The mean ulceration diameter was 2.7 +/- 0.95 mm (range, 2-5 mm). All patients retained their own globes

after the procedure and had well-formed deep anterior chambers, and 90% of patients showed complete epithelialization over the AM. The mean reepithelialization time was 14.9 +/- 4.9 days (range, 10-24 days). No eyes showed evidence of infection or recurrent corneal melting during the follow-up period., CONCLUSIONS: FG-assisted augmented AMT was easily performed for repairing large corneal perforations. This surgical method was very helpful in stabilizing the wound in the early postoperative period.

2762. Kim, H. S., et al. (2019). "The efficacy of ECMO in patients of acute respiratory failure with severe traumatic injuries." Perfusion (Germany) **34**(1): 86.

Objective: We investigated efficacy of lung support-ECMO for patients who developed acute respiratory failure due to severe traumatic lung injuries but did not respond to conventional treatment. Methods: We retrospective reviewed the records of 23 consecutive patients who received lung support-ECMO due to acute respiratory failure due to severe trauma injuries between January 2007 and December 2015. The inclusion criteria for VV ECMO were based on the lung dysfunction measured with a PaO2/FiO2 ratio < 100 for a FiO2 of 1.0, pH<7.25 due to the lack of coorection in CO2 retention or incapable of maintaining one lung ventilation anesthesia during lung operation despite receiving the optimal treatment. VA or V-AV ECMO was performed for patients who the ejection fraction on 2D echocardiogram were below 20%(fig1). [Figure Presented] The continuous variable was expressed median(IQR). Results: 20 of the 23 patients were male and the age was 42(19, 48). The cause of acute lung injury were 11 cases of near-drowning, 4 traffic accidents, 2 crush injury to the chest, 2 fall down from significant height, a pulmo-nary hemorrhage due to gunshot to the chest, a mercury vapor poisoning, a paraquate pneumonitis and a hanging. 7 patients were accompanied by intracranial hemorrhage, and hypoxic brain damage was 2. Before the start of ECMO was the lowest PaO2/FiO 61.5(52.5, 73.2)mmHg 2, pH 7.26 (7.06, 7.32), PCO2 46(38.6, 73.2) mmHg, vasoactive inotropic score 2.22(0, 44.4), SOFA score 12(11, 15), and SAPS 2 score 56(44, 73). Dividing patients by the type of ECMO, 19 received VV ECMO, 2 initially received VA and VV followed by VV and V-AV ECMO, and 2 received V-AV. Of 12 patients were under-went CPR, 1 patient was E-CPR. 2 patients underwent operations just after VV ECMO; a left upper lobectomy due to gunshot and a repair of the right subclavian artery injury. The median support time of ECMO was 145(93, 205). Of the 23 patients required ECMO, 20 sur-vivors(83%) were discharged from the hospital after 28(14, 58) hospital day. Conclusion: We observed 87% in survival rates of lung support-ECMO patients who developed acute respira-tory failure due to severe traumatic injuries. Therefore, lung support-ECMO might be applied to severe trauma patients with acute respiratory failure who did not respond conventional treatment.

2763. Kim, J., et al. (2016). "Analysis of Facial Injuries Caused by Power Tools." The Journal of craniofacial surgery **27**(4): 953-957.

The number of injuries caused by power tools is steadily increasing as more domestic woodwork is undertaken and more power tools are used recreationally. The injuries caused by the different power tools as a consequence of accidents are an issue, because they can lead to substantial costs for patients and the national insurance system. The increase in hand surgery as a consequence of the use of power tools and its economic impact, and the characteristics of the hand injuries caused by power saws have been described. In recent years, the authors have noticed that, in addition to hand injuries, facial injuries caused by power tools commonly present to the emergency room. This study aimed to review the data in relation to facial injuries caused by power saws that were gathered from patients who visited the trauma center at our hospital over the last 4 years, and to analyze the incidence and epidemiology of the facial injuries caused by power saws. The authors found that facial injuries caused by power tools have risen continually. Facial injuries caused by power tools are accidental, and they cause permanent facial disfigurements and functional disabilities. Accidents are almost inevitable in particular workplaces; however, most facial injuries could be avoided by providing sufficient operator training and by tool operators wearing suitable protective devices. The evaluation of the epidemiology and patterns of facial injuries caused by power tools in this study should provide the information required to reduce the number of accidental injuries.

2764. Kim, J. and H. S. Jun (2020). "Traumatic Subarachnoid Hemorrhage and Subdural Hematoma Due to Acute Rebleeding of a Pseudoaneurysm with Dural Arteriovenous Fistula Between Inferolateral Trunk of the Internal Carotid Artery and Middle Cerebral Vein." World neurosurgery **143**: 315-318.

BACKGROUND: According to previous reports, pseudoaneurysms that are concomitant with a dural arteriovenous fistula (dAVF) are associated with penetrating trauma, blunt trauma, and skull fractures. Moreover, dAVFs between the inferolateral trunk of the internal carotid artery and middle cerebral vein are a rare disease manifestation. Pseudoaneurysms concomitant with dural arteriovenous fistulas (dAVF) are rare and traumatic pseudoaneurysms with dAVF typically developed slowly with less rebleeding than isolated traumatic aneurysms., CASE DESCRIPTION: Here, we report an extremely rare case of a traumatic pseudoaneurysm with a dAVF between the inferolateral trunk and middle cerebral vein. The traumatic pseudoaneurysm presented with acute pseudoaneurysm formation and rebleeding within 1 day of the trauma and was managed with direct surgery., CONCLUSIONS: The traumatic pseudoaneurysm was completely obliterated by surgical clipping, followed by decompressive craniectomy and postoperative coma therapy with propofol. Resulting from these surgical and postoperative treatments, 56 days after the operation the patient recovered fully and did not present any neurologic deficits.

2765. Kim, J. T., et al. (2010). "Total scalp replantation--salvage following prolonged ischaemia with poor prognostic factors." Journal of plastic, reconstructive & aesthetic surgery : JPRAS **63**(11): 1917-1920.

Case report of a salvaged total scalp, forehead, ear and cheek en-bloc replantation following an industrial avulsion injury with a warm ischaemia time of over 12 h. One arterial and two venous anastomoses using an interposed arterial graft instead of a vein graft was sufficient to produce a successful result. The patient was followed up for a two-year period. Scalp amputations can result in devastating disfigurement and psychological trauma especially in young female patients. The authors present a case with an unusually long ischaemia time in addition to several other poor prognostic factors. The key learning point and message here is that microvascular replantations achieve by far the best aesthetic and functional results compared with other procedures and should be attempted at all possible costs.

2766. Kim, J. W., et al. (2012). "Early reconstruction of orbital roof fractures: clinical features and treatment outcomes." Archives of plastic surgery **39**(1): 31-35.

BACKGROUND: Orbital roof fractures are frequently associated with a high energy impact to the craniofacial region, and displaced orbital roof fractures can cause ophthalmic and neurologic complications and occasionally require open surgical intervention. The purpose of this article was to investigate the clinical features and treatment outcomes of orbital root fractures combined with neurologic injuries after early reconstruction., METHODS: Between January 2006 and December 2008, 45 patients with orbital roof fractures were admitted; among them, 37 patients were treated conservatively and 8 patients underwent early surgical intervention for orbital roof fractures. The type of injuries that caused the fractures, patient characteristics, associated fractures, ocular and neurological injuries, patient management, and treatment outcomes were investigated., RESULTS: The patients underwent frontal craniotomy and free bone fragment removal, their orbital roofs were reconstructed with titanium micromesh, and associated fractures were repaired. The mean follow up period was 11 months. There were no postoperative neurologic sequelae. Postoperative computed tomography scans showed anatomically reconstructed orbital roofs. Two of the five patients with traumatic optic neuropathy achieved full visual acuity recovery, one patient showed decreased visual acuity, and the other two patients completely lost their vision due to traumatic optic neuropathy. Preoperative ophthalmic symptoms, such as proptosis, diplopia, upper eyelid ptosis, and enophthalmos were corrected., CONCLUSIONS: Early recognition and treatment of orbital roof fractures can reduce intracranial and ocular complications. A coronal flap with frontal craniotomy and orbital roof reconstruction using titanium mesh provides a versatile method and provides good functional and cosmetic results.

2767. Kim, K. A., et al. (2005). "Vector analysis correlating bullet trajectory to outcome after civilian through-and-through gunshot wound to the head: using imaging cues to predict fatal outcome." Neurosurgery **57**(4): 737-747.

OBJECTIVE: We identify radiographic imaging similarities found on head computed tomographic (CT) scans of patients with through-and-through gunshot wounds to the head with fatal outcomes., METHODS: A retrospective analysis was conducted over an 18-month period from June 2001 through December 2002. Two hundred seventeen gunshot wound patients were evaluated. Exclusion criteria included any patient with cardiopulmonary injury and instability, airway compromise, or extracranial injuries affecting prognosis. Thirty-seven patients with isolated gunshot

wounds to the head were included, 10 of which were fatal. Vital signs, examination results, Glasgow coma scale (GCS) score, intracranial pressure monitoring, surgical data, days in the intensive care unit, and CT scan appearance were collected. A Cartesian xyz coordinate system was created centered on the dorsum sella. Bullet pathways on CT scans were plotted and graphed onto a standardized magnetic resonance imaging scan., RESULTS: Ten patients progressed to brain death. GCS score and pupil irregularity were associated with fatal outcome ($P < 0.0001$). CT scans showed that brain shift was more common in survivors. Seventy percent of nonsurvivors had minimal brain shift. A tram-track sign on CT scans correlated with fatal outcome ($P = 0.005$). Vector analysis of nonsurvivors showed an area of the brain approximately 4 cm above the dorsum sella that, when penetrated through the midline, led to brain death ($P = 0.0006$). This zone was coined the zona fatalis., CONCLUSION: We confirm that GCS score and diabetes insipidus correlated with fatal outcome. In the setting of low-velocity gunshot wounds, fatal outcome and low GCS score were associated with a tram-track sign on CT scans. Bullet passage through a particular supra-dorsum sellar transventricular zone was associated with fatal outcome.

2768. Kim, L. H., et al. (2019). "Mortality prediction for civilian cerebral gunshot wounds: A decision-tree model based on a single trauma center." Journal of neurosurgery **131**(1): 102.

Introduction: Gunshot wound (GSW) remains one of the most lethal forms of head trauma. The lack of clear guidelines for managing civilian gunshot wounds complicates the surgical decision making process. We present a clinically applicable decision-tree model based on 15-year data from our level 1 trauma center. Methods: We retrospectively reviewed 95 consecutive patients who presented with cerebral GSWs between 2003 and 2018. Patients were divided into two cohorts based on survival status. Clinical information captured in our trauma database, EMR, and relevant imaging scans was reviewed for each patient. A decision-tree model was constructed based on variables showing statistically significant differences ($P=0.05$) between two groups on chi-square test. Results: After excluding patients who died at arrival and/or did not undergo brain imaging, 54 patients with radiologically confirmed intracranial injury were included. Survivors (53.7%) and non-survivors (46.3%) had similar average age and gender distribution. Non-survivors were significantly more likely to have self-inflicted ($P=0.049$) and perforating (entry and exit wound), as opposed to penetrating (entry wound only), injuries ($P=0.02$). Bi-hemispheric and posterior fossa involvement, cerebral herniation, and intraventricular hemorrhage (IVH) were the radiologic features more commonly present in patients who expired. Based on the decision-tree, in patients with Glasgow Coma Scale (GCS) >8, penetrating injury limited to a single hemisphere predicted survival. When initial GCS was 8 or lower, all patients with absent pupillary response failed to survive. Among patients with pupillary response, lack of 1) posterior fossa involvement, 2) cerebral herniation, 3) bi-hemispheric injury, and 4) IVH, was associated with survival. Conclusion: We present a decision-tree model to help neurosurgeons identify surgical candidates with favorable prognosis based on readily available clinical and radiological information in a time-sensitive setting. Further validation of the model in a large patient setting is recommended.

2769. Kim, L. H., et al. (2020). "Mortality prediction and long-term outcomes for civilian cerebral gunshot wounds: A decision-tree algorithm based on a single trauma center." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **75**: 71-79.

Gunshot wounds (GSW) are one of the most lethal forms of head trauma. The lack of clear guidelines for civilian GSW complicates surgical management. We aimed to develop a decision-tree algorithm for mortality prediction and report long-term outcomes on survivors based on 15-year data from our level 1 trauma center. We retrospectively reviewed 96 consecutive patients who presented with cerebral GSWs between 2003 and 2018. Clinical information from our trauma database, EMR, and relevant imaging scans was reviewed. A decision-tree model was constructed based on variables showing significant differences between survivors and non-survivors. After excluding patients who died at arrival, 54 patients with radiologically confirmed intracranial injury were included. Compared to survivors (51.9%), non-survivors (48.1%) were significantly more likely to have perforating (entry and exit wound), as opposed to penetrating (entry wound only), injuries. Bi-hemispheric and posterior fossa involvement, cerebral herniation, and intraventricular hemorrhage were more commonly present in non-survivors. Based on the decision-tree, Glasgow Coma Scale (GCS)>8 and penetrating, uni-hemispheric injury predicted survival. Among patients with GCS<=8 and normal pupillary response, lack of 1) posterior fossa involvement, 2) cerebral herniation, 3) bi-hemispheric injury, and 4) intraventricular hemorrhage, were associated with survival. Favorable long-term outcomes (mean follow-up 34.4months) were possible for survivors who required neurosurgery and stable patients who were conservatively managed. We applied clinical and radiological characteristics that predicted survival to construct a decision-tree to facilitate surgical decision-making for

GSW. Further validation of the algorithm in a large patient setting is recommended.

2770. Kim, L. J., et al. (2006). "Resolution of an infectious pseudoaneurysm in a cervical petrous carotid vein bypass graft after covered stent placement: case report." Neurosurgery **58**(2): E386-E386.

OBJECTIVE AND IMPORTANCE: Covered stenting of the carotid artery has been used to treat aneurysms and dissections. We describe a unique case of covered stenting in the setting of an infected psuedoaneurysm in a previously placed cervical-to-petrous vein bypass graft. Operating in an infected field and reopening a surgical wound at the craniocervical junction that had previously been exposed to penetrating trauma created substantial risks to open surgical repair. We therefore chose an endovascular strategy to repair this lesion., CLINICAL PRESENTATION: A 57-year-old diabetic man with a previously placed cervical-to-petrous vein bypass graft presented with chronic otitis media and acute hemorrhage from his right external auditory meatus. Evaluation revealed an infectious pseudoaneurysm of the vein graft at the skull base., TECHNIQUE: The patient was treated with intravenous antibiotics and endovascular placement of an 8-mm x 25-mm polytetrafluoroethylene-covered stent across the pseudoaneurysm. Angiography obtained 8 months later confirmed successful obliteration of the lesion., CONCLUSION: The patient's clinical outcome was excellent. Despite the active infection, covered stenting of the pseudoaneurysm was an effective treatment strategy, obviating the need for open debridement and graft revision.

2771. Kim, M.-H., et al. (2017). "The Use of Conjunctival Pedicle Flaps to Prevent Corneal Perforation in Graft-Versus-Host Disease." Seminars in ophthalmology **32**(4): 462-465.

PURPOSE: We report the clinical outcomes of two chronic graft-versus-host disease (cGVHD) corneal thinning cases that were successfully treated with conjunctival pedicle flaps in an effort to prevent impending corneal perforation., METHODS: The patients were treated with topical and systemic corticosteroids, therapeutic contact lenses, lubricants, and punctual plugs. Conjunctival pedicle flaps were used because conventional treatments had failed, and corneal perforation was imminent., RESULTS: Both patients were successfully treated with conjunctival pedicle flaps. Following conjunctival flap removal, one patient had corneal clarity restored following penetrating keratoplasty., CONCLUSIONS: Conjunctival pedicle flaps provided a strong barrier for the corneal surface and stabilized anterior chamber in cGVHD patients with impending corneal perforation following allogeneic hematopoietic stem cell transplant.

2772. Kim, M. K., et al. (2000). "Penetrating neck trauma in children: an urban hospital's experience." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **123**(4): 439-443.

OBJECTIVE: As the incidence of violent crime increases in our society, the rate of penetrating head and neck trauma in children also rises. The methods of management of pediatric penetrating neck wounds are addressed., METHODS: All clinical records of children younger than 18 years admitted with penetrating neck injuries between 1990 and 1997 were reviewed. The injuries were classified according to type and location of the neck wound. Demographic data, clinical presentation, diagnostic studies, and management techniques were evaluated., RESULTS: Thirty-five children aged 6 to 18 years old were evaluated for 31 missile wounds and 4 stab wounds. There were 30 boys and 5 girls. Fourteen percent of injuries were in zone 1, 60% in zone II, and 26% in zone III. Of the 33% of children with zone II penetrating neck traumas who underwent selective neck explorations, 86% had significant intraoperative findings. The mortality rates for zones I, II, and III were 60%, 29%, and 56%, respectively. The overall mortality rate was 40%., CONCLUSIONS: Penetrating neck trauma in children may lead to potentially life-threatening injuries. Selective management of penetrating head and neck injuries in children can be a safe and effective policy in an experienced trauma center.

2773. Kim, P. E., et al. (2002). "Radiographic assessment of cranial gunshot wounds." Neuroimaging clinics of North America **12**(2): 229-248.

Though advances in MRI will undoubtedly increase its use, particularly in the subacute period, CT will likely continue its primary role in the management of these injuries in the foreseeable future. The spectrum of imaging features of cranial gunshot injuries is vast, because they encompass all of the findings encountered in closed head injury

in addition to the wide variety of problems associated with penetration. Thus, only a brief summary of the many varied aspects of this complex problem is presented here as a review of the more salient issues.

2774. Kim, P. E. and C. S. Zee (1995). "The radiologic evaluation of craniocerebral missile injuries." Neurosurgery clinics of North America **6**(4): 669-687.

A brief overview of the imaging findings in craniocerebral missile injury is presented here. CT scanning has established itself as the primary imaging modality for the complex injuries seen in CMI as well as its acute and delayed complications. Plain x-ray, angiography, and magnetic resonance imaging have more limited but sometimes important roles in the management of these injuries. With regard to outcome prediction, imaging has also proved to be of some, albeit limited, usefulness, primarily as adjuncts to clinical criteria such as the GCS. Future research with CT as well as magnetic resonance imaging will likely expand the clinical role of these modalities, particularly in the realm of outcome analysis.

2775. Kim, R. C., et al. (1981). "Traumatic intracerebral implantation of Cladosporium trichoides." Neurology **31**(9): 1145-1148.

2776. Kim, S., et al. (2005). "Transorbital-intracranial injury by a chopstick: three-dimensional computed tomography." Acta ophthalmologica Scandinavica **83**(5): 609-610.

2777. Kim, S. H., et al. (2001). "Traumatic perilymphatic fistulas in children: etiology, diagnosis and management." International journal of pediatric otorhinolaryngology **60**(2): 147-153.

Post-traumatic perilymphatic fistulas have been described following ear and temporal bone injury, particularly in the setting of temporal bone fractures. However, indications for exploratory surgery in cases of trauma without temporal bone fracture are vague and not well described. We describe three children who presented with symptoms suggestive of perilymphatic fistula (PLF) without an associated temporal bone fracture: two with penetrating tympanic membrane injuries and one with blunt temporal bone trauma. All had symptoms of hearing loss and vestibular disturbance. Two of the children cooperated with ear-specific audiologic assessment, which demonstrated sensorineural hearing loss (SNHL) on the traumatized side. The third child showed audiometric evidence of a SNHL on the injured side, but due to his age, the degree of severity of the SNHL was unable to be appropriately addressed prior to the patient being surgically managed. All three children underwent exploratory surgery and were found to have bony defects in the region of the oval window. All were repaired with fascial grafts to the oval and round windows with complete resolution of vestibular symptoms. However, two of the three patients with documented post-operative audiograms suffered from persistent SNHL on the injured side. We conclude that exploratory middle ear surgery is indicated in patients suffering from blunt or penetrating temporal bone or middle ear trauma who demonstrate persistent vestibular symptoms, sensorineural hearing loss or radiographic evidence of oval window pathology. As this is a limited number of patients, a larger series may be warranted to study the actual incidence of post-traumatic PLF in the child with persistent hearing loss and vertigo after head or ear trauma.

2778. Kim, S.-H., et al. (2016). "Usability of Cryopreserved Aortic Allografts for Middle Hepatic Vein Reconstruction During Living-Donor Liver Transplantation." Journal of gastrointestinal surgery : official journal of the Society for Surgery of the Alimentary Tract **20**(5): 1049-1055.

Iliac vein allografts are suitable for middle hepatic vein (MHV) reconstruction during living-donor liver transplantation (LDLT), but their supply is often limited. Polytetrafluoroethylene (PTFE) grafts are easily available but have drawbacks of accidental gastric penetration and non-degradable foreign body. To replace the use of PTFE grafts, we started using cryopreserved aorta allografts (CAAs). This study presents the technical details and patency outcomes of using CAAs in MHV reconstruction. We reviewed the surgical techniques of CAA interposition and analyzed the patency rates in 74 patients who underwent LDLT during the 6-year study period. The two control groups received either cryopreserved iliac veins (n = 122) or PTFE grafts (n = 84). The surgical techniques for MHV reconstruction used to implant the CAA and PTFE grafts are very similar because the techniques developed for PTFE grafts were also applied to

CAAs. We inserted an arterial patch at the liver cut surface because the CAA wall is too thick to perform direct anastomosis. Two patients (2.7 %) underwent MHV stenting during the first month. The 1-year patency rate was 69.7 % in the CAA group vs. 39.2 % in iliac vein group vs. 57.2 % in PTFE group (p = 0.000). The overall graft and patient survival rates did not differ depending on the MHV interposition vessel materials (p > 0.1). CAAs combined with small-artery patches demonstrated high patency rates that surpass other vessel grafts, and thus, we suggest that CAA can be reliably used for MHV reconstruction when CAA is available.

2779. Kim, S. J. and I. S. Park (2013). "Urgent intracranial carotid artery decompression after penetrating head injury." Journal of Korean Neurosurgical Society **53**(3): 180-182.

We describe a case of intracranial carotid artery occlusion due to penetrating craniofacial injury by high velocity foreign body that was relieved by decompressive surgery. A 46-year-old man presented with a penetrating wound to his face. A piece of an electric angular grinder disc became lodged in the anterior skull base. Computed tomography revealed that the disc had penetrated the unilateral paraclinoid and suprasellar areas without flow of the intracranial carotid artery on the lesion side. The cavernous sinus was also compromised. Removal of the anterior clinoid process reopened the carotid blood flow, and the injection of glue into the cavernous sinus restored complete hemostasis during extraction of the fragment from the face. Digital subtraction angiography revealed complete recanalization of the carotid artery without any evidence of dissection. Accurate diagnosis regarding the extent of the compromised structures and urgent decompressive surgery with adequate hemostasis minimized the severity of penetrating damage in our patient.

2780. Kim, S. W., et al. (2013). "Self-inflicted trans-oral intracranial stab wound." Brain injury **27**(10): 1206-1209.

BACKGROUND: Intracranial stab wounds are low-velocity, penetrating injuries to the brain and fatality and outcome significantly depend on route, depth and location of cranial penetration. Due to the effective barrier provided by the adult calvarium, most injuries occur through the orbitae or temporal regions where bony layers are thin. Self-inflicted intracranial stab wounds are an even rarer form of traumatic brain injury, with common entry points being the orbital space and the nose. Intracranial brainstem injuries mostly result in death, with reported penetration areas being the pons or midbrain., CASE: The following report reviews a first reported case of self-inflicted intracranial stabbing via a trans-oral route with lesions to the medulla oblongata and cerebellum. Unlike previous cases of low velocity penetrating injuries to the brainstem, the patient underwent full neurologic recovery after manual knife removal and intensive rehabilitation., CONCLUSION: Self-inflicted transcranial injuries have been mentioned only briefly and sporadically in the literature. This article highlights a rare case of self-inflicted intracranial stabbing with a not yet reported entry route and brainstem lesion. Unlike the other fatal outcomes associated with such injuries, the patient underwent full neurological and functional recovery through a comprehensive approach that included intensive rehabilitation.

2781. Kim, S. W., et al. (2012). "Management of an unusual craniofacial impalement injury by a metallic foreign body." The Journal of craniofacial surgery **23**(2): e140-146.

Craniofacial penetrating injuries caused by foreign bodies other than bullets or glass from traffic crashes are quite rare. Hence, there is a lack of knowledge regarding systematic management strategies or analysis of complications for craniomaxillofacial surgeons. Between 2002 and 2010, 82 patients underwent surgery for penetrating craniofacial injuries in 2 craniomaxillofacial trauma centers. Among these patients, we included patients who had retained foreign metallic bodies. Data regarding age, sex, injury materials, entrance, injured structures, operative records, and complications were reviewed retrospectively for 8 patients. All of the patients were evaluated precisely in the emergency department without removal of retained materials, and a multidisciplinary team approach was performed for the removal of the foreign body under general anesthesia. In this study, 6 men and 2 women presented with penetrating injuries that retained metal objects. The mean age of the patients was 44.3 years. All of the patients were hemodynamically stable, and no active bleeding was found. However, all of the patients had postoperative complications. Three patients had damaged vascular structures, and 3 patients had injuries to facial nerve branches. Seven patients had posttraumatic stress disorder. Two patients underwent subsequent emergent procedures because of massive bleeding and cerebrospinal fluid leakage.Penetrating injuries in the head and neck regions are complicated. Although a multidisciplinary team approach was performed from initial management to outpatient management in

patients with unusual impalement injuries, numerous postoperative complications still remained. Preoperative patient informed consent was important.

2782. Kim, T. G., et al. (2019). "Relationship Between Nasal Fracture and Blowout Fracture: Can Nasal Fracture Be a Predictor of Blowout Fracture?" Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **77**(7): 1433.e1431-1433.e1436.

PURPOSE: Nasal and blowout fractures are the most common injuries from craniomaxillofacial trauma. Nasal fractures are easily diagnosed by clinical signs, such as pain and crepitus. However, blowout fractures are frequently asymptomatic and are easy to miss without computed tomographic (CT) scanning. This study analyzed the relation between the 2 fracture types to determine whether nasal fracture could be used as a predictor of blowout fracture., MATERIALS AND METHODS: CT scans of 1,368 patients who underwent reduction surgery for nasal fracture were retrospectively reviewed. The pattern of nasal fractures (n = 1,368) was classified as frontal or lateral according to the direction of impact. Blowout fractures (n = 297) were classified into 3 types according to the position of the fracture: medial, inferior, or inferomedial wall. After calculating the number of patients in each group, the relation between nasal and blowout fracture types was statistically analyzed., RESULTS: Of 305 patients with frontal-type nasal fractures, the incidence of medial, inferior, and inferomedial wall fracture was 26, 7, and 9, respectively. Of 1,063 patients with lateral-type nasal fractures, the incidence of medial, inferior, and inferomedial wall fracture was 118, 75, and 62, respectively. Medial wall fracture was most common in the 2 nasal fracture groups and showed a higher frequency in the lateral-type group., CONCLUSIONS: This study showed a strong relation between nasal fractures and medial wall blowout fractures. If nasal fracture is suspected, especially the lateral type, then thorough examination for medial wall blowout fracture, with a high index of suspicion, should be performed.

2783. Kim, T. G. and E. G. Sin (2021). "A Case of Penetrating Brain Injury Followed by Delayed Cerebrospinal Fluid Leakage." Korean journal of neurotrauma **17**(2): 168-173.

Although penetrating brain injury is rare, it is associated with high morbidity and mortality. In several studies, even if very few patients arrive at the hospital alive, half of them eventually die, and the other half have significant neurological sequelae. Cerebrospinal fluid (CSF) leakage caused by traumatic brain injury is common. Therefore, we should be aware of the complications, prognosis, and follow-up strategies of penetrating brain injuries. A 55-year-old man was brought to our hospital with diffuse cerebral contusion and skull fracture. Three weeks after successful surgery, the patient returned with a large amount of pneumocephalus and pneumoventricle caused by delayed CSF leakage. Fortunately, the patient was discharged without neurological deficits after reoperation. In the urgent situation of penetrating brain injury, the treatment and prognosis vary depending on the initial actions and clinical factors. In addition, we should be aware that a variety of complications, as well as CSF leakage, can occur in patients with penetrating brain injuries.

2784. Kim, T. W., et al. (2007). "Penetrating gunshot injuries to the brain." Journal of Korean Neurosurgical Society **41**(1): 16-21.

Objective: Civilian gunshot injuries to the brain are relatively rare and study of these injuries has been neglected in South Korea. We present our experience with penetrating gunshot injuries to the brain and review the outcome of surgical management, as well as other clinical predictors influencing the prognosis. Methods: We present a retrospective analysis of 13 patients with penetrating gunshot injuries to the brain who were treated at our hospital over a period of 22 years. Results: The Glasgow Coma Scale(GCS) score on admission was recorded to be: 3-5 in 1 patient, 6-8 in 3 patients, 9-12 in 2 patients and 13-15 in 7 patients. There were 11 patients who underwent surgical treatment, and the surgical mortality rate was 0%. The admission GCS score was the most valuable prognostic factor. The best results were found to be in patients admitted with an initial GCS higher than 13. There were no favorable outcomes in patients admitted with a GCS of 8 or lower. There was a correlation between the presence of a transventricular or bihemispheric trajectory and poor outcome. The patients admitted with unilobar wounds resulted in better outcome than those with bilobar or multilobar wounds. Retained deep intracranial bone or metal fragments were the most common postoperative complication. However, retained fragments did not increase the risk of infection or seizure. Conclusion: Our results suggest that a less aggressive approach, consisting of minimal local debridement and removal of the bone and metal fragments that are easily accessible, can be successfully used in civilian gunshot wounds to the brain.

2785. Kim, T.-W., et al. (2007). "Penetrating gunshot injuries to the brain." The Journal of trauma **62**(6): 1446-1451.

BACKGROUND: Civilian gunshot injuries to the brain are relatively rare and study of these injuries has been neglected in South Korea., METHODS: Thirteen patients with civilian craniocerebral gunshot injuries were admitted to the Chonnam National University Hospital during a period of 22 years. A retrospective analysis of these patients with regard to outcome and prognostic factors was performed., RESULTS: The Glasgow Coma Scale (GCS) score at admission was recorded to be 3 to 5 in one patient, 6 to 8 in three patients, 9 to 12 in two patients, and 13 to 15 in seven patients. The admission GCS score was the most valuable prognostic factor. Of the nine patients with a GCS score of more than 8, eight patients survived with favorable outcomes; of the four patients with a GCS score of less than 8, all had unfavorable outcomes (1 died, and 3 had severe disability). There was a correlation between the presence of a transventricular or bihemispheric trajectory and poor outcome., CONCLUSIONS: Patients with GCS scores of more than 8 or brain lesions limited to a single lobe of the brain can benefit from early aggressive management. Our results suggest that retained fragments after first debridement did not increase the risk of infection or seizure.

2786. Kim, U. R. and K. R. Sivaraman (2013). "Penetrating orbital injuries from plant material during pond and river diving." Indian journal of ophthalmology **61**(2): 76-77.

Diving into lakes and ponds is a common activity of rural children. We present two cases of penetrating orbital injuries from plant matter sustained in this manner. Such injuries pose a particular challenge because wooden foreign bodies are often missed during orbital exploration, and current imaging modalities cannot reliably identify retained organic material. When a patient presents with orbital penetration after a high-risk mechanism of injury, such as freshwater diving, the clinician must maintain a very high index of suspicion for retained wooden foreign body.

2787. Kim, Y. H., et al. (2018). "Unrecognized intraorbital wooden foreign body." Archives of craniofacial surgery **19**(4): 300-303.

Intraorbital wooden foreign bodies may present difficulties in diagnosis due to their radiolucent nature. Delayed recognition and management can cause significant complications. We present a case report that demonstrates these problems and the sequela that can follow. A 56-year-old man presented with a 3-cm laceration in the right upper eyelid, sustained by a slipping accident. After computed tomography (CT) scanning and ophthalmology consultation, which revealed no fractures and suggested only pneumophthalmos, the wound was repaired by a plastic surgery resident. Ten days later, the patient's eyelid displayed signs of infection including pus discharge. Antibiotics and revisional repair failed to solve the infection. Nearly 2 months after the initial repair, a CT scan revealed a large wooden fragment in the superomedial orbit. Surgical exploration successfully removed the foreign body and inflamed pocket, and the patient healed uneventfully. However, the prolonged intraorbital infection had caused irreversible damage to the superior rectus muscle, with upgaze diplopia persisting 1 year after surgery and only minimal muscle function remaining. We report this case to warn clinicians of the difficulties in early diagnosis of intraorbital wooden foreign bodies and the grave prognosis of delayed management.

2788. Kim, Y. U., et al. (2018). "The treatment of gunshot wound with maxillofacial fracture in a dog." Journal of Veterinary Clinics **35**(5): 215-217.

A one-year-old, intact male, 24 kg, mixed breed dog was referred to the Animal Medical Center, Iksan, Chonbuk, Korea for treatment of a gunshot wound to the head. Physical examinations revealed bilateral nasal bleeding and open-mouth breathing. Radiographic examination showed fracture of the right maxilla bone and multiple fractures of the nasal bone. A 1 cm × 1 cm× 1.8 cm region of mineral opacity material was observed in the right-cranial ventralnasal cavity and a 6 mm × 6mm× 9 mm region of mineral opacity material was present in the left-cranial dorsal-nasal cavity. The surgical procedure involved removal of bone fragments and the lodged bullet as well as the installation of three intraosseous wires. At two weeks after surgery, the patient exhibited no complications and had a good prognosis.

2789. Kin, K., et al. (2015). "[A Case of Transorbital Penetrating Brain Injury Caused by a Steel Wire Entirely Embedded in the Brain Parenchyma]." No shinkei geka. Neurological surgery **43**(10): 921-926.

Penetrating brain injury(PBI)is very rare in Japan. Because there is a very wide variety of pathological condition of PBI, the guideline for the treatment of PBI has not been established yet. We report the unique case of PBI caused by a steel wire piece completely embedded in the brain parenchyma. A 75-year-old man was brought to the emergency department due to ocular injury caused by a steel wire piece. Neurological examination revealed only left visual disturbance. CT scan revealed a steel wire piece located intraparenchymally between the left frontal lobe and the ventricles, but digital subtraction angiography showed no significant vascular injury in the surrounding structures. We performed an open surgery and removed the steel wire piece. Because the steel wire piece was completely embedded in the brain, we used intraoperative X-ray fluoroscopy to choose a less invasive approach for the brain. The patient suffered no additional neurological deficit and no sign of cerebral infection or seizure after surgery. He was discharged after a 4-week administration of antibiotics. In most cases of PBI caused by low velocity injury, foreign bodies are not completely embedded in the brain except for remnants after surgical removal. This is the first report of low velocity PBI caused by a foreign body completely embedded in the brain.

2790. King, D. E. (1992). "Discussion of "Cerebral tissue embolization due to head trauma: a case report with immunohistochemical confirmation"." Journal of forensic sciences **37**(3): 682-684.

2791. King, D. J., et al. (2019). "A systematic review of cross-sectional differences and longitudinal changes to the morphometry of the brain following paediatric traumatic brain injury." NeuroImage. Clinical **23**: 101844.

Paediatric traumatic brain injury (pTBI) is a leading cause of disability for children and young adults. Children are a uniquely vulnerable group with the disease process that occurs following a pTBI interacting with the trajectory of normal brain development. Quantitative MRI post-injury has suggested a long-term, neurodegenerative effect of TBI on the morphometry of the brain, in both adult and childhood TBI. Changes to the brain beyond that of anticipated, age-dependant differences may allow us to estimate the state of the brain post-injury and produce clinically relevant predictions for long-term outcome. The current review synthesises the existing literature to assess whether, following pTBI, the morphology of the brain exhibits either i) longitudinal change and/or ii) differences compared to healthy controls and outcomes. The current literature suggests that morphometric differences from controls are apparent cross-sectionally at both acute and late-chronic timepoints post-injury, thus suggesting a non-transient effect of injury. Developmental trajectories of morphometry are altered in TBI groups compared to patients, and it is unlikely that typical maturation overcomes damage post-injury, or even 'catches up' with that of typically-developing peers. However, there is limited evidence for diverted developmental trajectories being associated with cognitive impairment post-injury. The current review also highlights the apparent challenges to the existing literature and potential methods by which these can be addressed.

2792. King, D. J., et al. (2020). "Lesion Induced Error on Automated Measures of Brain Volume: Data From a Pediatric Traumatic Brain Injury Cohort." Frontiers in Neuroscience **14**.

Structural segmentation of T1-weighted (T1w) MRI has shown morphometric differences, both compared to controls and longitudinally, following a traumatic brain injury (TBI). While many patients with TBI present with abnormalities on structural MRI images, most neuroimaging software packages have not been systematically evaluated for accuracy in the presence of these pathology-related MRI abnormalities. The current study aimed to assess whether acute MRI lesions (MRI acquired 7–71 days post-injury) cause error in the estimates of brain volume produced by the semi-automated segmentation tool, Freesurfer. More specifically, to investigate whether this error was global, the presence of lesion-induced error in the contralesional hemisphere, where no abnormal signal was present, was measured. A dataset of 176 simulated lesion cases was generated using actual lesions from 16 pediatric TBI (pTBI) cases recruited from the emergency department and 11 typically-developing controls. Simulated lesion cases were compared to the “ground truth” of the non-lesion control-case T1w images. Using linear mixed-effects models, results showed that hemispheric measures of cortex volume were significantly lower in the contralesional-hemisphere compared to the ground truth. Interestingly, however, cortex volume (and cerebral white matter volume) were not significantly different in the lesioned hemisphere. However, percent volume difference (PVD) between the simulated lesion and ground truth showed that the magnitude of difference of cortex volume in the contralesional-hemisphere (mean PVD = 0.37%) was significantly smaller than that in the lesioned hemisphere (mean PVD = 0.47%), suggesting a small, but systematic lesion-induced error. Lesion characteristics that could explain variance in the PVD for each hemisphere were investigated.

Taken together, these results suggest that the lesion-induced error caused by simulated lesions was not focal, but globally distributed. Previous post-processing approaches to adjust for lesions in structural analyses address the focal region where the lesion was located however, our results suggest that focal correction approaches are insufficient for the global error in morphometric measures of the injured brain.

2793. King, D. J., et al. (2020). "Developmental divergence of structural brain networks as an indicator of future cognitive impairments in childhood brain injury: Executive functions." Developmental cognitive neuroscience **42**: 100762.

Brain insults during childhood can perturb the already non-linear trajectory of typical brain maturation. The diffuse effects of injury can be modelled using structural covariance networks (SCN), which change as a function of neurodevelopment. However, SCNs are estimated at the group-level, limiting applicability to predicting individual-subject outcomes. This study aimed to measure the divergence of the brain networks in paediatric traumatic brain injury (pTBI) patients and controls, and investigate relationships with executive functioning (EF) at 24 months post-injury. T1-weighted MRI acquired acutely in 78 child survivors of pTBI and 33 controls underwent 3D-tissue segmentation to estimate cortical thickness (CT) across 68 atlas-based regions-of-interest (ROIs). Using an 'add-one-patient' approach, we estimate a developmental divergence index (DDI). Our approach adopts a novel analytic framework in which age-appropriate reference networks to calculate the DDI were generated from control participants from the ABIDE dataset using a sliding-window approach. Divergence from the age-appropriate SCN was related to reduced EF performance and an increase in behaviours related to executive dysfunctions. The DDI measure showed predictive value with regard to executive functions, highlighting that early imaging can assist in prognosis for cognition.

2794. King, D. J., et al. (2021). "Structural-covariance networks identify topology-based cortical-thickness changes in children with persistent executive function impairments after traumatic brain injury." NeuroImage **244**: 118612.

Paediatric traumatic brain injury (pTBI) results in inconsistent changes to regional morphometry of the brain across studies. Structural-covariance networks represent the degree to which the morphology (typically cortical-thickness) of cortical-regions co-varies with other regions, driven by both biological and developmental factors. Understanding how heterogeneous regional changes may influence wider cortical network organization may more appropriately capture prognostic information in terms of long term outcome following a pTBI. The current study aimed to investigate the relationships between cortical organisation as measured by structural-covariance, and long-term cognitive impairment following pTBI. T1-weighted magnetic resonance imaging (MRI) from n = 83 pTBI patients and 33 typically developing controls underwent 3D-tissue segmentation using Freesurfer to estimate cortical-thickness across 68 cortical ROIs. Structural-covariance between regions was estimated using Pearson's correlations between cortical-thickness measures across 68 regions-of-interest (ROIs), generating a group-level 68 x 68 adjacency matrix for patients and controls. We grouped a subset of patients who underwent executive function testing at 2-years post-injury using a neuropsychological impairment (NPI) rule, defining impaired- and non-impaired subgroups. Despite finding no significant reductions in regional cortical-thickness between the control and pTBI groups, we found specific reductions in graph-level strength of the structural covariance graph only between controls and the pTBI group with executive function (EF) impairment. Node-level differences in strength for this group were primarily found in frontal regions. We also investigated whether the top n nodes in terms of effect-size of cortical-thickness reductions were nodes that had significantly greater strength in the typically developing brain than n randomly selected regions. We found that acute cortical-thickness reductions post-pTBI are loaded onto regions typically high in structural covariance. This association was found in those patients with persistent EF impairment at 2-years post-injury, but not in those for whom these abilities were spared. This study posits that the topography of post-injury cortical-thickness reductions in regions that are central to the typical structural-covariance topology of the brain, can explain which patients have poor EF at follow-up.

2795. King, N. S. (2002). "Perseveration of traumatic re-experiencing in PTSD; a cautionary note regarding exposure based psychological treatments for PTSD when head injury and dysexecutive impairment are also present." Brain injury **16**(1): 65-74.

This case study describes the psychological treatment of a man with co-existing PTSD, head injury and mild dysexecutive impairment. It describes the detrimental consequences when the re-experiencing of a traumatic event

appears to have become a perseverated response. In this case, the perseveration meant that the most distressing part of the traumatic event became unavoidable and lead to it being continuously re-experienced without remittance over a very prolonged period (7-10 days). This type of re-experiencing has not been reported before. It potentially has significant implications for the treatment of PTSD in such circumstances. It may also have implications for behavioural models of PTSD in general.

2796. King, P. M., et al. (1994). "Correlation of trauma scoring and outcome in a Canadian trauma centre." Canadian journal of surgery. Journal canadien de chirurgie **37**(3): 185-188.

OBJECTIVE: To study the effectiveness of treatment and the outcome in trauma patients, and to correlate these with trauma scoring systems., DESIGN: A prospective study over 1 year of the probability of survival after trauma, based on TRISS methodology. A computerized database provided outcome statistics., SETTING: A regional trauma centre in a Canadian university teaching hospital serving regional and referral patients., PATIENTS: Three hundred consecutive patients treated at a single trauma unit. Two patients were excluded because of lack of physiologic data. Blunt injuries (94%) were most frequently from motor vehicle accidents (46%)., INTERVENTIONS: Those appropriate to multidisciplinary trauma management in a level 1 trauma centre., MAIN OUTCOME MEASURES: Survival (Z values) and injury severity (M values) for the total group and subsets were calculated for comparison of outcomes with the Multiple Trauma Outcome Study baseline and other Canadian centres for multisystem and single-system injuries., RESULTS: The mean Injury Severity Score was 21.16 and the mean Revised Trauma Score was 6.75. There were 51 (17%) deaths--a Z value for the study group of 2.26. The M value was 0.78. Forty of the 51 single-system injuries were head injuries and accounted for 15 deaths. The Z value for multisystem injuries only was 0.54, and the M value was 0.77., CONCLUSIONS: The TRISS method for analysing blunt trauma is comparable to other trauma scoring systems. The correlation of outcome analysis with other scoring systems is affected by exclusion rates, pre-referral resuscitation and single- versus multiple-injury mix of cases.

2797. King, R. B., et al. (2009). "The unique palladium-centered pentagonal antiprismatic cationic bismuth cluster: a comparison of related metal-centered 10-vertex pnictogen cluster structures by density functional theory." Inorganic chemistry **48**(17): 8508-8514.

Structures for the metal-centered 10-vertex pnictogen clusters M@Pn(10)(4+) (M = Ni, Pd, Pt; Pn = As, Sb, Bi) based on polyhedra with 3-fold, 4-fold, and 5-fold symmetry have been studied by density functional theory. Among these nine M/Pn combinations, only Pd@Bi(10)(4+) and Pt@Bi(10)(4+) are predicted to have the D(5d) pentagonal antiprism as the lowest energy structure in accord with experimental observation of this cluster in the ternary halide Bi(14)PdBr(10) as well as the prediction of the Wade-Mingos rules for these arachno systems. The lowest energy structures for the arsenic and antimony clusters M@Pn(10)(4+) (Pn = As, Sb) and Ni@Bi(10)(4+) are predicted to have structures derived from a tetracapped trigonal prism that has been severely distorted for M@As(10)(4+) (M = Pd, Pt). The volumes of the As(10) polyhedra other than the pentagonal prism are too small to contain interstitial palladium or platinum atoms so that major distortions are predicted for such clusters leading to partial opening of the polyhedron.

2798. King, R. E., et al. (2004). "Mandible fracture patterns: a suburban trauma center experience." American journal of otolaryngology **25**(5): 301-307.

PURPOSE: Mandible fractures are among the most frequently seen injuries in the trauma center setting. Recent shifts in the mechanism and age distribution of patients sustaining these injuries are well documented. This study attempts to define current, predictable patterns of fracture based on patient characteristics and mechanism of injury., MATERIAL AND METHODS: The charts of 134 patients with 225 mandible fractures treated over a 7-year period by the Otolaryngology-Head and Neck Surgery, Plastic and Reconstructive Surgery and Oral-Maxillofacial Surgery services, our institution, were retrospectively reviewed. Patients were categorized based on age, mechanism of fracture, and anatomic location of fracture. Multivariate analysis of data was performed to determine significant relationships among groups., RESULTS: Violent crimes such as assault and gunshot wounds accounted for the majority of fractures (50%) in this study, with motor vehicle accidents less likely (29%). Overall, parasymphyseal fractures were most frequent (35%), whereas angle and body fractures were also common (15% and 21%, respectively). There was a statistically significant association of motor vehicle accidents with parasymphyseal fractures (45%), and gunshot wounds with body fractures (36%), whereas assault victims had a higher than predicted frequency of angle fractures (27%) and fewer

parasymphyseal fractures (19%). Patients aged 17 to 30 were more likely to suffer from gunshot wounds, whereas older adults (age 31-50) were more likely to be assault victims. Patients over age 50 suffered fractures from falls at a higher than expected rate. Although children and young adults seemed to suffer more parasymphyseal fractures and older adults body fractures, these correlations failed to show statistical significance. Parasymphyseal fractures were most frequently associated with fractures at other sites within the mandible, ipsilateral body fractures being the most common., CONCLUSIONS: Updated data on the association of patient age and mechanism of injury with fracture pattern can guide treating physicians in anticipating and diagnosing traumatic mandible fractures.

2799. Kinoshita, A., et al. (1991). "Wound healing following stab injury on rat cerebral cortex." Neurological research **13**(3): 184-188.

We examined how wound healing was initiated and completed. Stab injury was made over the right parietal cortex with 2.5 mm depth and 4 mm length. Either 3 days, 7 days or 1 month after this operation, operated rats were perfused and fixed with 4% paraformaldehyde. The brains were removed, embedded in paraffin, cut coronally at a level of caudate-putamen complex and thin-sliced into 6 microns thick sections with a microtome. The sections were stained immunohistochemically for detection of glial fibrillary acidic protein (GFAP), and co-stained for myelination with Woelcke's staining method. Sections were also stained immunohistochemically for Laminin after pretreatment by pepsin. Furthermore, the sections were stained either haematoxylin-eosin staining, Laidlaw's Reticulum staining for evaluation of reticulin and phosphotungusten acid haematoxylin (PTAH) staining for delination of collagen. We, first, confirmed astrocytic proliferation induced by the stab injury. Then, astrocytes can be seen crowded around the injured site 7 days after injury. Both Laminin and Reticulum stain show the so-called neovascularization around the stab wound 7 days after injury when astrocytes proliferated most vigorously as mentioned above. PTAH stain showed collagenous fibre 1 month after injury when astrocytes congregated along the wound site, and Laminin fibres were localized to the injury site. Reticulin fibres disappeared. In conclusion, it takes more than a month for the wound site to regain the steady state.

2800. Kirby, S. and R. M. Sadler (1995). "Injury and death as a result of seizures." Epilepsia **36**(1): 25-28.

The literature contains little information regarding the incidence of injury or death in the general population caused by seizures. We prospectively surveyed all patient visits to the four emergency departments serving adults in the Halifax-Dartmouth metropolitan area (adult population 260,935) from September 1, 1990 to August 31, 1991 to identify patients treated as a result of a seizure. The medical examiner's records were also surveyed for deaths related to seizures. We identified 560 patient visits precipitated by seizures of all types and etiologies except those secondary to acute trauma. Injuries or deaths occurred during 84 of 560 seizures (15%). Sixty-three patients incurred 89 injuries during 77 seizures (some patients had more than one injury, and some patients had injuries on more than one occasion). The incidence of seizures resulting in injury was 29.5 in 100,000 population. The most common injuries were head contusions and head lacerations. Most injuries were minor and required little or no treatment. Deaths occurred during seven seizures (1.2%). The incidence of death as a complication of seizures was 2.68 in 100,000 population. Deaths were not restricted to patients with epilepsy. We conclude that the incidence of seizures causing injury or death in the general population was 32.2 in 100,000 population and that 15% of seizures brought to medical attention resulted in injury or death. Most injuries were minor but seven patients died during seizures, indicating that seizures remain a life-threatening event.

2801. Kirik, A., et al. (2020). "Prognostic factors in craniocerebral gunshot wounds: Analysis of 30 patients from the neurosurgical viewpoint." Kranyoserebral atesli silah yaralanmalarinda prognostik faktorler: Norosirurji bakis acisindan 30 hastanin analizi. **26**(6): 859-864.

BACKGROUND: Craniocerebral gunshot wounds (CGW) are the most lethal injuries of the cranium. CGW is mostly secondary to military conflicts but may also be seen in civilian life. These injuries also have severe consequences, such as epilepsy, hydrocephalus, infection and late-term cognitive dysfunctions. The present study aims to present our series of CGW and to discuss the prognostic factors and consequences of these injuries., METHODS: The data of patients who were treated in our department for CGW between 2011 and 2019 were retrospectively reviewed in this study. The injury type, wounding site, surgical management and outcomes were analyzed. Radiological evaluation was also performed., RESULTS: Thirty patients were treated with the diagnosis of CGW. All of the patients were male and the

mean age was 27.9 years. The frontal lobe was affected in 12 (40%) patients, while temporal lobe in eight, occipital lobe in six, parietal lobe in three, and posterior fossa in one patients. Twenty-three patients underwent surgical treatment, seven patients were treated conservatively. Thirteen (43.3%) patients died despite the treatment., CONCLUSION: Mortality in CGW is high. Ventricular injuries, bihemispheric or midline injuries, perforating injuries, brain stem injuries and low GCS score at admission are prognostic factors for CGW. Appropriate management is mandatory to obtain a better clinical outcome.

2802. Kirkpatrick, P. J. (1997). "Use of near-infrared spectroscopy in the adult." Philosophical transactions of the Royal Society of London. Series B, Biological sciences **352**(1354): 701-705.

Adult near-infrared spectroscopy is a potential method for observing changes in cerebral oxygenation non-invasively. Access of light to the adult brain requires requires penetration through extracranial tissues; hence the detection of changes in cerebral chromophore concentration can only be achieved by using near-infrared spectroscopy in the reflectance-mode thereby adding variables which are difficult to control. These include the effects of variable anatomy, different intra-optode distances and the presence of an extra- to intracranial collateral blood supply. Although movements of oxygenated haemoglobin concentration following specific cerebral stimuli can be demonstrated, the challenge of separating changes which occur within the extracranial compartment from those occurring in the intracranial compartments remains. Our experience with near-infrared spectroscopy in the three adult clinical scenarios of carotid endarterectomy, head injury and carbon dioxide stress testing will be presented. The influence of extracranial contamination is demonstrated, as are the methods we have developed to help control for extracranial contamination. Provisional experience with spatially resolved spectroscopy technology will also be presented.

2803. Kirmani, B. F., et al. (2013). "Role of intravenous levetiracetam in seizure prophylaxis of severe traumatic brain injury patients." Frontiers in neurology **4**.

Traumatic brain injury (TBI) can cause seizures and the development of epilepsy. The incidence of seizures varies from 21% in patients with severe brain injuries to 50% in patients with war-related penetrating TBI. In the acute and sub-acute periods following injury, seizures can lead to increased intracranial pressure and cerebral edema, further complicating TBI management. Anticonvulsants can be used for seizure prophylaxis according to the current Parameters of Practice and Guidelines in a subset of severe TBI patients, and for a limited time window. Phenytoin is the most widely prescribed anticonvulsant in these patients. Intravenous levetiracetam, made available in 2006, is now being considered as a viable option in acute care settings if phenytoin is unavailable or not feasible due to side-effects. We discuss current data regarding the role of intravenous levetiracetam in seizure prophylaxis of severe TBI patients and the need for future studies.

2804. Kirova, D., et al. (2002). "Use of metal laboratory splint in the management of a defective mandibular fracture." Bulgarian Medicine **10**(3): 17-18.

We present a case of defective mandibular fracture as a result of a severe firearm wound complicated by an inflamation process. The absence of a part of the mandible and tissues in the mouth floor required all individual approach to the reposition and final fixation of the fractured fragments.

2805. Kirschen, M. P., et al. (2019). "Epidemiology of Brain Death in Pediatric Intensive Care Units in the United States." JAMA pediatrics **173**(5): 469-476.

Importance: Guidelines for declaration of brain death in children were revised in 2011 by the Society of Critical Care Medicine, American Academy of Pediatrics, and Child Neurology Society. Despite widespread medical, legal, and ethical acceptance, ongoing controversies exist with regard to the concept of brain death and the procedures for its determination., Objectives: To determine the epidemiology and clinical characteristics of pediatric patients declared brain dead in the United States., Design, Setting, and Participants: This study involved the abstraction of all patient deaths from the Virtual Pediatric Systems national multicenter database between January 1, 2012, and June 30, 2017. All patients who died in pediatric intensive care units (PICUs) were included., Main Outcomes and Measures: Patient demographics, preillness developmental status, severity of illness, cause of death, PICU medical and physical length of stay, and organ donation status, as well as comparison between patients who were declared brain dead vs those who

sustained cardiovascular or cardiopulmonary death., Results: Of the 15344 patients who died, 3170 (20.7%) were declared brain dead; 1861 of these patients (58.7%) were male, and 1401 (44.2%) were between 2 and 12 years of age. There was a linear association between PICU size and number of patients declared brain dead per year, with an increase of 4.27 patients (95% CI, 3.46-5.08) per 1000-patient increase in discharges (P < .001). The median (interquartile range) of patients declared brain dead per year ranged from 1 (0-3) in smaller PICUs (defined as those with <500 discharges per year) to 10 (7-15) for larger PICUs (those with 2000-4000 discharges per year). The most common causative mechanisms of brain death were hypoxic-ischemic injury owing to cardiac arrest (1672 of 3170 [52.7%]), shock and/or respiratory arrest without cardiac arrest (399 of 3170 [12.6%]), and traumatic brain injury (634 of 3170 [20.0%]). Most patients declared brain dead (681 of 807 [84.4%]) did not have preexisting neurological dysfunction. Patients who were organ donors (1568 of 3144 [49.9%]) remained in the PICU longer after declaration of brain death compared with those who were not donors (median [interquartile range], 29 [6-41] hours vs 4 [1-8] hours; P < .001)., Conclusions and Relevance: Brain death occurred in one-fifth of PICU deaths. Most children declared brain dead had no preexisting neurological dysfunction and had an acute hypoxic-ischemic or traumatic brain injury. Brain death determinations are infrequent, even in large PICUs, emphasizing the importance of ongoing education for medical professionals and standardization of protocols to ensure diagnostic accuracy and consistency.

2806. Kirshner, H. S. and W. G. Webb (1982). "Word and letter reading and the mechanism of the third alexia." Archives of neurology **39**(2): 84-87.

Four patients, two with global aphasia and two with Broca's aphasia, demonstrated the seemingly paradoxical ability to read words but not their component letters. Picture naming was only moderately impaired, and repetition of word and letter names was intact, excluding both a generalized dysnomia and an articulatory disturbance as the cause of the literal alexia. Matching tests revealed processing deficits in three of the patients, more severe for letters than for words. Oral reading of word lists showed that short, high-frequency, and picturable words were read best, whereas nonsense trigrams, which require phonetic processing, were the most difficult. The residual reading of patients with severe Broca's or global aphasia and the "third alexia" appears to involve purely visual, nonphonetic mechanisms for word recognition, using posterior left hemisphere or even minor hemisphere centers. Letter reading, by contrast, along with phonetic reading of syllables, appears to be a more specialized, anterior left hemisphere process.

2807. Kirumbi, L., et al. (2018). "Assessing the effect of nurses' strike on intrapartum care in migori county, Western Kenya." International Journal of Gynecology and Obstetrics **143**: 466.

Objectives: Nurses offer critical care to patients, support all clinical care and are involved in management in health care facilities. Industrial strikes by nurses can lead to far reaching negative repercussions. Kenya experienced a nationwide nurses' strike from June to October 2017. This strike resulted in the partial or complete closure of some public healthcare institutions. Many patients seeking maternity care were forced to go to private facilities. Those who could not afford private care were presumably unattended in their homes. We studied the effect of the nurses' strike on key intrapartum outcomes. Method: East Africa Preterm Birth Initiative (PTBi-EA) aims to reduce neonatal mortality and morbidity due to prematurity across 17 health facilities, including two missionary facilities, in Migori County, Kenya. Monthly data is collected from maternity registers for all mothers admitted and babies born in each facility. We used data collected from April to December 2017 to compare the number of facility-based deliveries, neonatal mortality rate, overall stillbirth rate, in the following time periods: pre-strike (April-May 2017), during-strike (June-October 2017) and post-strike (November- December 2017). Results: A total of 6984 births were registered from April to December 2017. The monthly average of births decreased by 30% (from 1370 births to 413 births) from pre-strike to during-strike but recovered in the post-strike period to a monthly average of 1089 births. The overall stillbirth rate (per 1000 births) increased from 24.7 in the pre-strike period to 34.1 during-strike and then decreased to 28.4 post-strike. The neonatal mortality rate (per 1000 live births) also increased from pre-strike to during-strike (from 8.6 to 10.9) but changed to 9.1 post-strike. Conclusions: This analysis suggests that the nurses' strike compared to the pre-strike and post-strike period decreased access to patient care, which as a result adversely effected key intrapartum outcomes. The continuity of healthcare service delivery is key to improving and maintaining maternal, neonatal and child health care and outcomes.

2808. Kiss, L. and A. Remescu (2001). "[Injuries to the duodenum and pancreas in 42 operated cases]." Despre leziunile duodeno-pancreatice prin prisma a 42 de cazuri operate. **96**(1): 23-35.

42 consecutive patients who sustained injuries to the duodenum or/and pancreas were admitted to our hospital. Over a twenty year period 32 blunt injuries and 10 penetrating injuries were encountered. Penetrating injuries were always suspected and treated by time: following blunt injury diagnostic delay was encountered in 14 patients and insufficient surgical procedure because of intra-operative misinterpretation in 2 patients. Most of the patients had associated intra-abdominal organ injuries. Adjusts to diagnosis such as abdominal roentgenograms, serum amylase levels and gastroduodenography was not helpful. CT scan and ultrasound allowed to confirm the suspected diagnosis in 3 cases only. Intraoperative diagnosis was also challenging. Complete mobilization of the strictures surrounding the duodenum and the pancreas to provide entire exposure was necessary in 12 patients treated first in a peripheral hospital, diagnosis of the injury have been missed at first laparotomy and reoperation was necessary in all of them. Suture closure of the duodenum and drainage of the pancreatic region wee the most common reparative techniques used. More complicated procedures with pancreatic and/or duodenal resection were performed in 12 patients. Overall mortality in patients surviving more than 24 hours was 14%. Suture live dehiscence after delayed operation (4) and 2 deaths due to brain injury.

2809. Kita, T., et al. (1997). "The expression of tumor necrosis factor-alpha in the rat brain after fluid percussive injury." International journal of legal medicine **110**(6): 305-311.

To investigate the role of tumor necrosis factor-alpha (TNF alpha) after traumatic head injury in rats, moderate brain injury of 1000 mmHg was generated by an original fluid percussion injury device. TNF alpha levels in cerebrospinal fluid (CSF) gradually increased during the first 1 h, rose to a maximal elevation at 3 h and 6 h and returned to basal values by 24 h. Horseradish peroxidase tracer experiments revealed that primary microvascular damage appeared as early as 15 min after impact, but rapidly recovered and 1 h after impact secondary microvascular damage occurred in the hippocampus and parasagittal cortex. By immunoelectron microscopy, TNF alpha reactions were detected in the lysosomes of microglia accumulated at the impact site of the cortex 30 min after impact, and 1 h after impact these reactions were mainly detected at the glial cells (such as microglia and astrocytes) in the hippocampus and parasagittal cortex. Therefore the delayed microvascular damage observed in sites remote from the impact may be induced by TNF alpha which is synthesized mainly by glial cells. The present study suggests that TNF alpha conveyed from the microglial cells is one co-factor contributing to the fluid percussive brain edema formation after moderate brain injury.

2810. Kitakami, A., et al. (1999). "Transorbital-transpetrosal penetrating cerebellar injury--case report." Neurologia medico-chirurgica **39**(2): 150-152.

A 4-year-old boy presented with a transorbital-transpetrosal penetrating head injury after a butter knife had penetrated the left orbit. The knife tip reached the posterior fossa after penetrating the petrous bone. Wide craniotomy and the pterional, subtemporal, and lateral suboccipital approaches were performed for safe removal of the object. The patient was discharged with left-sided blindness, complete left ophthalmoplegia, and hypesthesia of the left face. Early angiography is recommended to identify vascular injury which could result in fatal intracranial hemorrhage.

2811. Kiyokawa, K., et al. (1999). "A surgical method for treating anterior skull base injuries." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **27**(1): 11-19.

Skull base surgery was performed on 18 patients with anterior skull base injuries. The operative technique consisted of opening the operative field in the anterior skull base via a coronal incision and a frontal craniotomy, debridement of the anterior skull base including the injured dura mater, performing drainage from the anterior skull base to the nasal cavity by ethmoidectomy, and reconstructing the resulting dural and anterior skull base defect using bilateral temporal musculo-pericranial flaps and a bone graft. Seventeen of the 18 patients recovered without any complications, although epidural abscesses in the anterior skull base had been present in four patients at the time of the operation. Only one patient developed an epidural abscess in the anterior skull base after the operation. None of the patients developed any other complications including meningitis, recurrent liquorrhoea or cerebral herniation. Satisfactory aesthetic results were achieved in 16 of the 18 patients. In one patient, uneven deformity of the forehead, which was caused by the partial sequestration of the frontal bone due to postoperative infection, was observed. In another patient, a depressed deformity of the forehead, which was caused by the partial loss of the frontalis muscle following the use of the frontal musculo-pericranial flap instead of a temporal musculo-pericranial flap, was observed.

Anterior skull base reconstruction using bilateral temporal musculo-pericranial flaps provides excellent results in terms of patient recovery and aesthetics.

2812. Kjelland, C. and W. Thirsk (2011). "Penetrating craniofacial trauma from a vice clamp: case report and discussion." CJEM **13**(1): 57-61.

Penetrating craniofacial trauma, although uncommon, has a high potential for death or serious morbidity from injury to vital neurovascular structures. An in situ facial foreign body, particularly if large, presents significant challenges beyond safe and timely removal. Airway management, stabilization of the object, management of increased intracranial pressure, and identification of injuries to local structures are all issues that may require addressing. We present a case of penetrating facial trauma from a vice clamp, with an in situ foreign body, that illustrates several of these challenges and provides a forum for their discussion.

2813. Klages, U., et al. (1975). "[Survival time, capacity of action and radiological diagnosis after gunshot wounds of the cranium (author's transl)]." Uberlebenszeit, Handlungsfahigkeit und rontgenologische Diagnostik bei Schussverletzungen des Schadels **76**(4): 307-319.

Three cases of suicidal temporal gunshots. Different circumstances in the clinical course and in the ability of action.--In one case there was a bullet tract in the lower temporal region with considerable destruction of the base of the skull, followed by immediate inability of action and early death. Another case with a transtemporal gunshot without radiological signs of a laceration of the base of skull showed severe disturbance of cerebral functions for some days and remaining blindness. In the third case there was a pistol shot in the temporal region with retained missile, full ability of acting and undisturbed consciousness. Causative for the differences in the effect of the gunshots are differences of weapons and amunition and the anatomical position of the wound track in the temporal region. Discussion about the role of concussion of the brain by different rate of transgression of energy from the missile to the skull. Reference to the importance of X-ray analysis and to a radiographic documentation of the findings in such cases.

2814. Klancnik, M., et al. (2018). "PENETRATING ORBITOCRANIAL INJURY." Acta clinica Croatica **57**(4): 792-796.

- A case of a 37-year-old female patient is presented. The patient was admitted to the Surgical Emergency Unit after accidental fall on a metal rod when she had sustained stab injury of the right orbit with penetration into the right frontal brain lobe. Multi-slice computed tomography (MSCT) showed penetrating injury and fracture of the right orbital roof without eyeball damage and endocranial impressed bone fragments into the right frontal brain lobe. Urgent surgical intervention was performed by a maxillofacial surgeon and neurosurgeon, including reposition of bone fragments of the orbital roof and cranioplasty. Reconstruction of Tenon's capsule of the right eyeball was performed by an ophthalmologist. From the intraoperative wound swab of the orbit, Bacillus cereus was isolated, therefore the patient was administered ciprofloxacin and rifampicin as recommended by an infectious disease (ID) specialist. Follow up brain MSCT at 15 days and magnetic resonance imaging of the brain at 25 days showed brain edema in the right frontal area and signs of local brain abscess. Intravenous administration of the ciprofloxacin and metronidazole antibiotics with corticosteroids for edema suppression were ordered by the ID physician. Fourteen weeks after this therapy, brain MSCT showed complete abscess regression and no neurologic deficit with only mild psychomotor changes.

2815. Klapper, S. R., et al. (1995). "Atypical mycobacterial infection of the orbit." Ophthalmology **102**(10): 1536-1541.

PURPOSE: To describe the clinical presentation and successful management of an orbital infection caused by Mycobacterium abscessus, a formerly unrecognized cause of orbital disease after penetrating trauma., METHODS: An orbital infection due to M. abscessus is described, and previously reported ocular and extraophthalmic infections caused by M. abscessus are reviewed., RESULTS: A 5-year-old boy had acute, painless visual loss shortly after being struck in his left lower eyelid with a fishing rod. Radiologic evaluation established a mass in the orbital apex. Initial biopsy and cultures of the apex mass were negative; however, additional orbital exploration and cultures demonstrated M. abscessus to be the causative organism. The orbital infection was treated successfully with long-term oral clarithromycin. Review of the literature on ocular/adnexal and soft tissue infections caused by atypical mycobacteria shows characteristic clinical and histopathologic features., CONCLUSIONS: To the authors' knowledge, only seven

patients with atypical mycobacterial infections of the ocular adnexa have been reported. The patient reported in the current study illustrates the difficulty in establishing the preoperative diagnosis of atypical mycobacterial infections of the orbit. A chronic draining wound or a localized orbital abscess, after penetrating trauma, should alert the physician to the possibility of an M. abscessus infection. Clarithromycin, an oral macrolide antibiotic, appears to be the most effective medical therapy for these patients.

2816. Klein, D. M. and M. E. Cohen (1978). "Pasteurella multocida brain abscess following perforating cranial dog bite." The Journal of pediatrics **92**(4): 588-589.

2817. Kleinsasser, N., et al. (1996). "[Nasal cerebral heterotopic tissue (nasal glioma) in the adult: a rare cause of primary cerebrospinal fluid rhinorrhea]." Nasale zerebrale Heterotopie (nasales Gliom) des Erwachsenen: seltene Ursache einer primaren Rhinoliquorrhoe. **75**(8): 483-487.

BACKGROUND: Nasal cerebral heterotopia is a congenital lesion that is mainly detected in early childhood. The rare cases of this disorder found in adult patients are located intranasally. A common symptom is compromised nasal air passage. Clinical findings include polypoid masses in either the nasal cavity or the paranasal sinuses. To our knowledge, primary cerebrospinal fluid (CSF) rhinorrhea has been reported only twice in these patients., PATIENT: A 64-year-old female patient presented with CSF rhinorrhea proven by beta 2-transferrin testing. Previous head injury or intranasal manipulation were excluded. Anterior rhinoscopy revealed a watery drainage from the right middle meatus. CT scan showed a defect in the lateral roof of the right ethmoid sinus, approximately 5 mm in diameter; MRI revealed a mass in the right ethmoid and frontal sinuses, penetrating the anterior skull base. The lesion was resected by an extranasal approach. It showed a fibrous connection to the frontal lobe. Histologically, the lesion consisted of neural tissue composed of gray and white matter, both with a normal structuring. Dura and skull base were reconstructed. There were no signs of a CSF leak postoperatively., RESULTS AND CONCLUSIONS: The differential diagnosis of CSF rhinorrhea includes traumatic events and neoplasms, elevated intracranial pressure, and connate lesions as encephaloceles and, in rare cases, nasal cerebral heterotopia.

2818. Klevno, V. and M. Kislov (2017). "A rare case of injury of head with a construction plug-driving gun." Rechtsmedizin **27**(4): 372.

Background. Cases of penetrating injury of the head with construction tools are rather rare in forensic medicine. However, we have encountered such a case. Material and methods. It appeared from the investigation materials submitted for review that the foreman heard a groan and found a construction worker, lying on the floor, with the bit of the plug-driving gun protruding from his left orbital region. The construction worker was taken to medical facility in an extremely severe condition. Results. Computer tomography identified penetrating injury of the head. The wound canal passed through medial parts of the left orbit, penetrated into the cranial cavity damaging the upper wall of the left orbit. The condition of the patient remained extremely severe regardless of the treatment undertaken, it aggravated progressively, and the death occurred on the 11th day following the trauma. Examination of the wound canal identified that it passes through periorbital fat (not damaging the left eye ball), damages the inner and superior wall of the left orbit, the matter of the left and right hemispheres of the brain, pia mater and ends in a non-perforating manner near dura mater of the right hemisphere of the brain (total length of the wound canal is 19.7 cm, along a certain part of its length it had a distinct cylindrical form with a diameter of 0.8 cm with a layer of construction foam). Discussion and conclusions. This example clearly shows that thorough examination of the wound canal and its context is important for identify the injuring tool with maximum precision.

2819. Klimek, L., et al. (1993). "[A new procedure for removal of foreign bodies in the area of the head]." Ein neues Verfahren zur Entfernung von Fremdkopern im Kopfbereich. **96**(4): 213-216.

Identification and extraction of penetrating cranial foreign bodies can cause problems in some cases. Small fragments localized deep in the orbit or cerebrum can be especially hard to detect. Severe bleeding and traumatized anatomy can make orientation difficult. We used a new localizing device, computer-assisted surgery (CAS), to good effect in six such cases. CAS is a localizing technique designed to assist the head surgeon during surgery, providing real-time position information. The method is based upon a three-dimensional volume model of the patient's skull generated

by preceding computed tomography imaging procedures (CT or MRI). Intraoperative correlation of a 3D-model and the patient's skull allows for real-time position display of a surgical instrument on the monitor screen. Thereby the surgeon is able to localize even small foreign bodies without extensive exploration. In the case of multiple foreign bodies the surgeon calls up a simple documentation facility recording which of the visible fragments have already been extracted. We successfully used the system for extraction of orbital foreign bodies in four and intracerebral foreign bodies in two cases. In a 4-year-old child with gunshot injury the bullet was located in the precentral region and was easily extracted with the CAS system. In a 21-year-old man 39 glass fragments were extracted from the left orbit. In a 36-year-old man a bone fragment was dislocated to the apex of the orbit directly under the optic nerve. Location and extraction were achieved without damage to the orbital structures with the help of the CAS system.

2820. Klimo, P., Jr. and B. T. Ragel (2010). "Introduction: military neurosurgery, past and present." Neurosurgical focus **28**(5): Introduction.

For a physician has the worth of many other warriors, both for the excision of arrows and for the administration of soothing drugs. Homer, Iliad XI.514-515 Ever since armed conflict has been used as a means to settle disputes among men, there have been those who have been tasked to mend the wounds that ravage a soldier's body from the weapons of war. The Iliad portrays the pivotal 10th year of the legendary Trojan War, during which a schism in the Greek leadership prolongs the extended siege of the city of Troy. In the midst of this martial epic come the lines quoted above, quietly attesting to the value of the military physician, even under the crude conditions of the Greek Dark Age. They are uttered by Idomeneus, one of the foremost Greeks, when he is enjoining one of his comrades, Nestor, to rescue the injured Greek physician Machaon and take him back from the line to treat his wounds. He is afraid that Machaon will be captured by the Trojans, a loss far greater than that of any other single warrior. Duty to country has helped shape the careers of many neurosurgeons, including iconic US figures such as Harvey Cushing and Donald Matson. This issue of Neurosurgical Focus celebrates the rich history of military neurosurgery from the wars of yesterday to the conflicts of today. We have been humbled by the tremendous response to this topic. The 25 articles within this issue will provide the reader with both a broad and an in-depth look at the many facets of military neurosurgery. We have attempted to group articles based on their predominant topic. We also encourage our audience to read other recently published articles. The first 8 articles relate to the current conflicts in Afghanistan and Iraq. The lead article, written by Randy Bell and colleagues from the National Naval Medical Center and Walter Reed Army Medical Center, discusses what is arguably one of the most important contributions by military neurosurgeons from these 2 conflicts: the rapid and aggressive use of decompressive craniectomies. This is followed by articles on decompressive craniectomy techniques by Ragel and colleagues and cranioplasty outcomes by Stephens and colleagues. After reading these articles, the reader will come away with an appreciation of the often complex nature of wartime penetrating and closed-head injuries and the remarkable recovery that many injured soldiers make with time.

2821. Kline, D. G. and H. J. LeBlanc (1971). "Survival following gunshot wound of the pons: neuroanatomic considerations. Case report." Journal of neurosurgery **35**(3): 342-347.

The successful treatment of a civilian gunshot wound of the vermis and pons is described. A large missile fragment was removed from a depth of 2 cm within the pons at the level of the facial colliculus. Despite initial coma and subsequent irregular respiration with sleep apnea, the patient survived. Neurological, radiographic, and operative findings are correlated with the anatomy of the pons.

2822. Kloc, W., et al. (1995). "[Anterior cranial fossa injury with telescopic antenna penetrating through the orbit with rhinorrhea and brain damage]." Uraz przedniego dolu czaszki teleskopowa antena drazaca przez oczodol z plynotokiem nosowym i uszkodzeniem mozgu. **29**(2): 257-262.

The authors report a case of injury of the anterior cranial fossa by foreign body penetrating through the orbit with rhinorrhoea and brain damage in a child. Early operation prevented primary and secondary complications.

2823. Klodnicki, M., et al. (2010). "A grisly event in the Kenai Peninsula." Emergency radiology **17**(5): 423-425.

We report an unusual manifestation of penetrating facial trauma. It was suffered by a recreational fly fisherman who was hiking away from a casting spot when he fell and was impaled by a section of his graphite flyrod. The

circumstances of his injury, its clinical manifestations, and its imaging findings are discussed. Emergency physicians and radiologists should be aware of the computed tomography appearance of impaled foreign bodies and their capability to penetrate deeply to reach critical vascular and neurologic structures. The role of imaging in penetrating trauma to the face and skull base for guiding appropriate intervention is emphasized.

2824. Kloss, K. (1977). "[Stab wounds of the brain. A case report (author's transl)]." Ein Beitrag zu den Stichverletzungen des Gehirns. **89**(16): 551-553.

The case history is presented of a 10-year-old boy who stabbed himself accidentally during play with a knife which penetrated deep into the temporal lobe of the brain via the orbit. The child was fully conscious on admission to hospital without any obvious neurological signs. The knife was removed surgically and the immediate postoperative findings of ptosis, chemosis and slight restriction of movement of the left eye regressed rapidly.

2825. Klug, W. (1968). "[Perforating brain-skull injuries caused by accidents and their treatment]." Unfallbedingte perforierende Schadel-Hirn-Verletzungen und deren Behandlung. **322**: 609-614.

2826. Klugar, M., et al. (2014). "The effectiveness of hyperbaric oxygen therapy on mortality in adults with craniotrauma: A systematic review protocol." JBI Database of Systematic Reviews and Implementation Reports **12**(12): 54-66.

Review question/objective What is the effectiveness of hyperbaric oxygen therapy (HBOT) on the mortality of patients with craniotrauma? Background Craniotrauma and traumatic brain injury (TBI) is a major health problem worldwide and across all ages. It is a major cause of death and disability.1,2 Disability, as a result of TBI, has significant functional, social and economic consequences.2,3 According to the Institute of Health Information and Statistics in the Czech republic, TBI occurs at a frequency of 150 cases per 100,000 inhabitants which is about 36 000 per year; in 2009, 32,589 cases was hospitalized.4 Traumatic brain injury in the age group of 45 years was the leading cause of death in 2003;1 however, more recent studies showed a variation in age groups and a shift towards older adults, especially in high income countries.5 A TBI incidence of 150 to 300 cases per 100,000 people per year has been reported in North America and Europe. Over 200 cases per 100,000 are admitted to hospital in Europe. The incidence is even worse in low-income and middle-income countries.6 The World Health Organization estimates that TBI will be the third highest cause of global mortality and disability by 2020.7 Mass et al.,8reported that TBI is classified by clinical severity, as determined by Glasgow Coma Scale (GCS); structural damage, as determined by computer tomography scans (CT) or magnetic resonance (MR); and the mechanism of TBI, whether closed or penetrating. There are three recognized degrees of TBI: mild; moderate; and severe.8,9,10 Traumatic brain injury could appear as a monotrauma, which means that only the brain is affected by injury. Traumatic brain injury could also manifest as part of a polytrauma, in which injury of two or more physical regions or organ systems are present, with at least one of the injuries being life-threatening.11 According to clinical and experimental results reported by Adamidese et al.,3 brain damage may not solely be caused by primary injury alone, but may progress during the following hours and days as secondary damage.3,12 Menon13 analogously stated that the basic principle for neuro-intensive care is that ischemia due to injury leads to further damage of brain tissues. The causes of secondary damage can be intracranial (brain lesions, edema, increased intracranial pressure, seizures, vasospasm, and infection) or general (hypotension, hypoxia, hyper/hypocapnia, hyper/hypoglycemia, anemia, coagulopathy, pyrexia, electrolyte imbalance, and infection).3 According to Gopinath et al.14 and Bouma et al.,15 the reduction of the brain blood flow and brain supply occurs within the first 24 hours. A lack of oxygen leads to a reduction of oxidative phosphorylation. The resources of glucose obtained from anaerobic glycolysis are used for output of energy.This process causes an excessive accumulation of lactate and deprives the energy for protein synthesis. Bergsneider et al.,16 Lifshitz et al.,17 Verweij et al.18 and Sahni et al.19 reported that this inefficient anaerobic metabolism leads to a reduction of energy in cells and initiates a cascade of biochemical processes that causes mitochondrial dysfunction, prolonged metabolism and death of cells. Ng et al. reported that cell death, such as necrosis and apoptosis, does not appear only in the areas immediately surrounding the site of injury, but also in further areas.20 Van der Brink et al. also presented results that showed the significant correlation of the partial pressure of oxygen in brain tissue ischemia and the end outcome.21 Many standard therapeutical approaches can be used for the care of traumatic brain injury patients, with the exception of standard intensive care monitoring. the specific values that should be measured and calculated include intracranial pressure, cerebral blood flow, cerebral perfusion pressure, jugular

blood oxygen and lactate. The general aim for the care of traumatic brain injury patients is to optimize cerebrovascular haemodynamics including head elevation to 30°, sedation, paralysis, barbiturate–induced coma, cerebrospinal fluid drainage, artificial ventilation-appropriate oxygenation, osmotherapy, therapeutic hypothermia, hyperventilation, decompressive crani tomy.3,8 Hyperbaric oxygen therapy (HBOT) is not used as standard therapy.3,25 Hyperbaric oxygen therapy as a potential treatment has been discussed since the beginning of hyperbaric medicine.12 Hyperbaric oxygen therapy is characterized by inhalation of pure oxygen (FiO2 = 100%) in a hyperbaric chamber under pressure that is higher than atmospheric pressure, which is 1 ATA (atmosphere absolute).22,23 The range of pressure used for HBOT is between 1.5 ATA and 3 ATA for 30 to 120 minutes.3,12,19,22,24-29 An inhalation of oxygen at a pressure of 3 ATA increases partial pressure of arterial oxygen to 200 kPa and more,which leads to the dissolution of O2/100ml blood in plasma from 6.6 to 6.8 ml. This quantity of oxygen is sufficient for the metabolic needs of basic vital organs and tissues.30 According to Huang and Obenhaus,22 HBOT was shown to be neuro-protective in many neurological diseases. Theoretically, the usage of HBOT should lead to a decrease in brain cell damage as well as mortality. Pressure that is above atmospheric increases oxygen delivery to brain cells and enhances aerobic metabolism, which leads to the restoration of mitochondrial functions.25 The clinical studies of varied design, including randomized controlled trials (RCTs), quasi-experimental, and case studies, were focused on substantiating the effect of HBOT on the damaged brain as a result of TBI. Patients included into these studies had suffered from acute or chronic TBI of mild to severe degree, both in civilian and military environment. Adults with TBI of varied causes were also included. The size of patient groups was below 170 patients. The examined HBOT was set from 1.5 ATA for 60 minutes to 2.4 ATA for 90 minutes. The number of HBOT sessions received by patients was between30 to 40.19,23-29,31 Most of the studies investigated the effect of HBOT alone or as an additional therapy to standard regimen.19,26,27,29,31 Other studies compared outcomes in patients who had underwent HBOT against those who were treated by standard regimen or NHO.24,28 Rockswold et al.25 compared HBOT combined with NBH against standard regimen. Investigators were focused on examining heterogeneous outcomes using various scales, including Glasgow Outcome Scale (GOS),25 Disability Rating Scale (DRS), Rancho Los Amigos Scale (RLAS),19 and Glasgow Coma Scale (GCS).19,23-29,31 A range of monitored variables were also examined, including intracranial pressure (ICP), continuous metabolic monitoring (microdialysis of lactate, glucosis, pyruvate), critical level of brain tissue PO2, cerebral blood flow (CBF), oxygen toxicity markers (IL-6, IL-8), and mortality.24,25,27 The Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports, Cochrane Library and PROSPERO register were searched for systematic reviews conducted on the same topic. A systematic review focused on HBOT in the context of TBI was previously conducted in 2004 by Bennett et al.32 and published in 2012 by the same authors.33 The title of the systematic review from 2012 was “Hyperbaric oxygen therapy for the adjunctive treatment of traumatic brain injury”.33 This systematic review was conducted according to Cochrane methodology. Authors included solely RCTs that compared the effects of treatments with HBOT against those without HBOT. Participants were patients suffering from acute TBI as a result of blunt injury and had been admitted to intensive care unit or intensive neurosurgical units. Authors divided outcomes in two groups: primary (functional outcomes and mortality) and secondary (activities of daily living, ICP, magnetic resonance imaging, progress in GCS, adverse effects of HBOT, and cost-effectiveness). Compared to the systematic reviewss conducted by Bennett et al.,33 we will follow Joanna Briggs Institute methodology and we will not focus only on RCTs but also on other types of study designs as well. For many reasons, including financial, technical, capacity etc., it is particularly difficult to conduct RCTs of high quality in the field of hyperbaric medicine. On the other hand, th re are a lot of studies of high quality with designs other than RCTs. As specified in our inclusion criteria, we do not solely include acute TBI but will also include chronic TBI. Bennett et al.33 included studies with patients below the age of 18. We will therefore exclude any studies that involved children. Moreover, it is particularly important to look at the critical status of patients with acute craniotrauma and the initiation of HBOT, as some authors have recommended postponing HBOT until the patient is stabilized.34 Collectively, we will consider the initiation of HBOT in acute craniotrauma patients as part of the intervention for the systematic review. 1. Within the first 24 hours 2. After 24 hours 3. After 48 hours 4. After “stabilization” of patients (one week). Our systematic review will be conducted at the end of 2014, more than two years since the systematic review by Bennett et al.33 was written, thus more recent studies could be found. This review will undertake rigorous, systematic, consecutive and logical steps, which are aimed to critically appraise, summarize, analyze, and interpret collected data to present existing knowledge about the effects of HBOT on mortality of adults with cranial trauma.

2827. Kmietowicz, Z. (2014). "Paralysed man walks again after cell transplantation." BMJ (Clinical research ed.) **349**: g6396.

2828. Knerlich, F. and R. Verheggen (2005). "Neurological picture. Feeding cats might be dangerous: penetrating orbital and brain injury without neurological deficits." Journal of neurology, neurosurgery, and psychiatry **76**(10): 1359.

2829. Knowlin, L. T., et al. (2018). "Cardiac injury following penetrating chest trauma: Delayed diagnosis and successful repair." Journal of Pediatric Surgery Case Reports **39**: 45-47.

Penetrating cardiac trauma is rare and often results in poor outcomes in the pediatric population. Clinical presentation may range from relative stability to cardiovascular collapse and arrest. We present a case of a cardiac gunshot injury in an 11 year old who was shot in the back, sustaining a through and through injury to left chest. The missile projectile penetrated the left ventricle with subsequent diaphragmatic and splenic injury. The cardiac injury was not identified on initial examination or intraoperative repair of diaphragmatic injury. After becoming unstable in the pediatric intensive care unit, a bedside thoracotomy was performed and the cardiac injury was successfully repaired. In the setting of penetrating thoracic trauma, a normal cardiac exam, echocardiography, or intraoperative findings should not eliminate the possibility of a cardiac injury. The key factor for patient survival is early diagnosis of injury and emergent intervention. Background: Penetrating cardiac trauma is rare and often results in poor outcomes in children. Clinical presentation may range from relative stability to cardiovascular collapse and arrest. Case report: We present a case of an 11-year old male who was shot in the back sustaining a through and through injury to left chest. A missile projectile penetrated the left ventricle with subsequent diaphragmatic and splenic injury. A cardiac injury was not identified during initial examination or laparoscopic repair of a diaphragmatic injury. Five hours after the initial presentation, the child became unstable in the pediatric intensive care unit, a bedside thoracotomy was performed and the cardiac injury was identified and successfully repaired. Conclusion: In the setting of penetrating thoracic trauma, a normal cardiac exam, echocardiography, or intraoperative findings should not eliminate the possibility of a cardiac injury. The key element for patient survival is early diagnosis of injury and emergent intervention.

2830. Knudson, S. A., et al. (2021). "Same-Admission Microvascular Maxillofacial Ballistic Trauma Reconstruction Using Virtual Surgical Planning: A Case Series and Systematic Review." Craniomaxillofacial Trauma and Reconstruction.

Study Design: Retrospective case series; systematic review. Objective: It is unknown whether the use of virtual surgical planning (VSP) to facilitate same-admission microsurgical reconstruction of the mandible following acute maxillofacial ballistic trauma (MBT) is sufficient to achieve definitive reconstruction and functional occlusion. Methods: A single-center retrospective analysis was conducted for patients who underwent microsurgical reconstruction of the mandible using VSP after acute MBT. The PubMed/MEDLINE, Embase, ScienceDirect, and Scopus databases were systematically reviewed using blinded screening. Studies were evaluated via thematic analysis. Results: Five patients were treated by same-admission and microsurgical reconstruction of the mandible using VSP. We observed an average of 16.4 ± 9.1 days between initial presentation and reconstruction, an average length of stay of 51.6 ± 17.9 days, 6.2 ± 2.8 operations, and 1.6 ± 0.9 free flaps per patient. Four types and 8 total flaps were employed, most commonly the anterior lateral thigh flap (37.5%). Care yielded complete flap survival. Each patient experienced at least 1 minor complication. All patients achieved centric occlusion, oral nutrition, and an approximation of their baseline facial aesthetic. Follow up was 191.0 ± 183.9 weeks. Systematic review produced 8 articles that adhered to inclusion criteria. Consensus themes in the literature were found for clinical goal and function of VSP when practicing MBT reconstruction, yet disagreement was found surrounding optimal treatment timeline. Conclusions: Same-admission microsurgical reconstruction after MBT is safe and effective to re-establish mandibular form and function. VSP did not delay reconstruction, given the need for preparation prior to definitive reconstruction.

2831. Knutson, K. M., et al. (2014). "Neural correlates of apathy revealed by lesion mapping in participants with traumatic brain injuries." Human brain mapping **35**(3): 943-953.

Apathy, common in neurological disorders, is defined as disinterest and loss of motivation, with a reduction in self-initiated activity. Research in diseased populations has shown that apathy is associated with variations in the volume of brain regions such as the anterior cingulate and the frontal lobes. The goal of this study was to determine the neural signatures of apathy in people with penetrating traumatic brain injuries (pTBIs), as to our knowledge, these have not been studied in this sample. We studied 176 male Vietnam War veterans with pTBIs using voxel-based lesion-symptom mapping (VLSM) and apathy scores from the UCLA Neuropsychiatric Inventory (NPI), a structured inventory of

symptoms completed by a caregiver. Our results revealed that increased apathy symptoms were associated with brain damage in limbic and cortical areas of the left hemisphere including the anterior cingulate, inferior, middle, and superior frontal regions, insula, and supplementary motor area. Our results are consistent with the literature, and extend them to people with focal pTBI. Apathy is a significant symptom since it can reduce participation of the patient in family and other social interactions, and diminish affective decision-making. Copyright © 2013 Wiley Periodicals, Inc.

2832. Knutson, K. M., et al. (2013). "Injured brain regions associated with anxiety in Vietnam veterans." Neuropsychologia **51**(4): 686-694.

Anxiety negatively affects quality of life and psychosocial functioning. Previous research has shown that anxiety symptoms in healthy individuals are associated with variations in the volume of brain regions, such as the amygdala, hippocampus, and the bed nucleus of the stria terminalis. Brain lesion data also suggests the hemisphere damaged may affect levels of anxiety. We studied a sample of 182 male Vietnam War veterans with penetrating brain injuries, using a semi-automated voxel-based lesion-symptom mapping (VLSM) approach. VLSM reveals significant associations between a symptom such as anxiety and the location of brain lesions, and does not require a broad, subjective assignment of patients into categories based on lesion location. We found that lesioned brain regions in cortical and limbic areas of the left hemisphere, including middle, inferior and superior temporal lobe, hippocampus, and fusiform regions, along with smaller areas in the inferior occipital lobe, parahippocampus, amygdala, and insula, were associated with increased anxiety symptoms as measured by the Neurobehavioral Rating Scale (NRS). These results were corroborated by similar findings using Neuropsychiatric Inventory (NPI) anxiety scores, which supports these regions' role in regulating anxiety. In summary, using a semi-automated analysis tool, we detected an effect of focal brain damage on the presentation of anxiety. We also separated the effects of brain injury and war experience by including a control group of combat veterans without brain injury. We compared this control group against veterans with brain lesions in areas associated with anxiety, and against veterans with lesions only in other brain areas. Copyright Published by Elsevier Ltd.

2833. Knutsson, F. (1971). "[Aneuroradiographic case 1896]." ETT neuroradiologiskt fall 1896. **85**(8): 247-248.

2834. Ko, K. (1998). "Superimposed holographic image-guided neurosurgery. Technical note." Journal of neurosurgery **88**(4): 777-781.

Computerized tomography scanning-derived narrow band reflection holograms of patients undergoing craniofacial procedures were created to evaluate the applicability of superimposing these three-dimensional images (3-D) on the operative field during neurological surgery. These sterilized radiological holograms were positioned over the surgical site by using bone sutures as registration points between the skull and the 3-D image to serve as a visual template between the patient and surgeon. Surgeries were then performed with the surgeon looking through the radiological hologram at the patient. Holograms were accurate to within 2 mm (plus or minus) of the actual calvarial anatomy. The use of the holographic image as a visual guide during surgery eliminated intraoperative guesswork or free-handed contouring. To the author's knowledge, this is the first report of the superimposed holographic image used in situ during surgery.

2835. Ko, K., et al. (2005). "Holographic interferometry of cerebral pulsations." Surgical neurology **63**(2): 118-122.

BACKGROUND: Holographic interferometry is a noninvasive method used to analyze the mechanical displacement affecting an object undergoing deformation. This technique has been primarily applied to inanimate entities owing to the difficulty in producing stress forces in living subjects. In this report, the possibility of harnessing cerebral pulsations as a displacement force to produce interferograms in neurosurgical patients was studied., METHODS: This work evaluates the application of this technology to patients with areas of calvarial defects. Using a pulse ruby laser, holographic interferograms were created in neurosurgical patients with areas of calvarial loss. The cardiac cycle was used to trigger the firing of the laser., RESULTS: The holographic interferograms were accurate up to within 0.5 mm in outlining the region of bony deficiency., CONCLUSION: Holographic interferometry imaging was successfully accomplished using cerebral pulsations as a cyclic displacement-producing force. This method accurately outlined the area of bony loss. A discussion of this technology is included.

2836. Kobayashi, M. and P. F. Mellen (2009). "Rubber bullet injury: case report with autopsy observation and literature review." The American journal of forensic medicine and pathology **30**(3): 262-267.

Rubber bullets are one of the less-lethal (nonlethal) weapons, which are increasingly used to incapacitate dangerous individuals, avoiding use of firearms. An autopsy examination of a man who was shot with improved rubber bullets revealed that the bullet caused pulmonary contusion. The bullet was 30 g in weight and consisted of a sponge foam nose with 40-mm diameter and a plastic body. He was not incapacitated and died of suicidal gunshot wound. The case raised a question as to how severe an injury is necessary to deter a person without causing death. A variety of rubber bullets have been used in the world, and they have occasionally produced severe or lethal injuries. A review of the literature demonstrated that the feature of injuries appeared to be related to the type of missile. It becomes more important for a forensic pathologist to be familiar with rubber bullets and injuries caused by them as the use of less-lethal weapon increases.

2837. Kocak, A. and M. H. Ozer (2004). "Intracranial migrating bullet." The American journal of forensic medicine and pathology **25**(3): 246-250.

Retained bullets and fragments following a civilian gunshot injury are quite frequent in practical neurosurgery. It is usually possible to extract the foreign body surgically, while rare cases are conservatively treated because of technical reasons. Conservative treatment may present complications, and a rare form of this presentation is migration of the bullet. A 20-year-old man presented with migrating bullet from a supratentorial to opposite infratentorial area. We consider that in the migrating bullet fragment cases, if there is no contraindication, the most reasonable treatment is its urgent surgical removal. This report reveals a supratentorial bullet migrating to the infratentorial contralateral area, and related literature considering the different mechanisms of migration is discussed.

2838. Kochanek, P. (2019). "Controversies in brain injury-preclinical data helps." Journal of neurotrauma **36**(13): A151.

Despite considerable support for therapeutic efficacy for a number of acute therapies targeting traumatic brain injury (TBI) in pre-clinical studies in individual laboratories, there has been a failure of translation to successful clinical trials. Many explanations for this have been suggested, with concerns raised with regard to both the pre-clinical and clinical investigations. In an attempt to address this translation failure, we developed Operation Brain Trauma Therapy (OBTT), a multicenter pre-clinical therapy and biomarker screening consortium for severe TBI. The approach taken by OBTT has attempted to target two of the perceived major limitations in preclinical research; 1) the need to test drugs simultaneously across multiple models, in order to address the multiple TBI endophenotypes that are identified clinically on imaging, and 2) the need for a higher level of rigor in carrying out pre-clinical therapy screening. OBTT has screened 12 therapies (nicotinamide, erythropoietin, cyclosporine, simvastatin, levetiracetam, glibenclamide, Kollidon VA-64, AER-271, amantadine, minocycline, E64d and P7C3-A20) in >1500 rats across three TBI models (parasagittal fluid percussion [FPI], controlled cortical impact [CCI], and penetrating ballistic-like brain injury [PBBI]). We assigned 22-points per model across behavioral and histological outcomes, generating an overall score for each therapy. Two therapies, levetiracetam and glibenclamide ranked the highest. Only levetiracetam showed efficacy in multiple models. Glibenclamide showed marked model dependence, with efficacy largely restricted to CCI?uggesting potential use in contusion. Thus, precisionbased clinical trials may be needed and could be directed by a pre-clinical multi-model screening approach. Another potentially important finding from OBTT is that the pre-clinical literature may be overly optimistic. We conclude that although there are many challenges to successfully carrying out rigorous pre-clinical therapy screening, the work of OBTT suggests that rigorous multicenter preclinical therapy screening may represent an important avenue to enhance the chance for successful translation. Finally, several potential paradigms for pre-clinical therapy development based on the OBTT approach will be presented.

2839. Kochanek, P., et al. (2016). "Operation brain trauma therapy: Synopsis of the first nine therapies in multi-center preclinical drug screening." Journal of neurotrauma **33**: A135.

OBTT is a multi-center pre-clinical drug and biomarker screening consortium supported by the U.S. DoD. It evaluates therapies across three severe TBI models (parasagittal fluid percussion injury [FPI], controlled cortical impact [CCI] and penetrating ballistic-like brain injury (PBBI) in rats). FPI is the mildest model while PBBI is the most severe. OBTT's goals are 1) to define therapies showing efficacy across models which should have the best chance for clinical

translation, and/ or 2) to define model-dependent therapeutic effects to guide precision medicine-based clinical trials. The results of the first 5 therapies tested by OBTT (nicotinamide, erythropoietin, cyclosporine [CsA], simvastatin, and levetiracetam) were published in J Neurotrauma. OBTT has assessed 4 additional therapies (glibenclamide, kollidon-VA64, AER 271, and amantadine). Only levetiracetam has shown benefit in multiple models, including benefit in at least one model on cognitive outcome, histology, and serum biomarker levels. The second most successful drug, glibenclamide demonstrated improved motor function and reduced contusion volume, but benefit was largely restricted to CCI. Several other therapies showed model dependent effects (tissue sparing by nicotinamide in CCI, some benefit from CsA in FPI but toxicity in PBBI, and benefit from amantadine on behavior in PBBI but deleterious effects in FPI). Glial fibrillary acidic protein (GFAP) has performed well as a serum biomarker showing correlations with histology and theranostic utility. Levetiracetam merits additional pre-clinical and clinical investigations. However, it failed to show benefit in our micropig model. Glibenclamide also merits additional investigations in contusion. Amantadine may require testing in penetrating TBI. Finally, our work suggests utility of GFAP in pre-clinical screening.

2840. Kochanek, P., et al. (2017). "Overview of the first 12 therapies evaluated by operation brain trauma therapy, a pre-clinical multi-center consortium for TBI." Journal of neurotrauma **34**(13): A77.

Operation brain trauma therapy (OBTT) is a multi-center pre-clinical drug and biomarker screening consortium supported by the US DoD. OBTT screens therapies across three models in rats (parasagittal fluid percussion injury [FPI], controlled cortical impact [CCI] and penetrating ballistic-like brain injury [PBBI]) reflecting a range of phenotypes. Our goals include 1) to define therapies efficacious across models with the best chance for clinical translation, and 2) to define model-dependent effects to guide trials in targeted pathologies. The results of the first 5 therapies tested (nicotinamide, erythropoietin [EPO], cyclosporine [CsA], simvastatin, and levetiracetam) were published. OBTT has now screened 10 therapies, with ongoing testing of drugs 11-12. Drugs 6-12 include glibenclamide, kollidon-VA64, AER-271, amantadine, minocycline, E-64d and P7C3-A20. Levetiracetam showed benefit in multiple models. The second most successful drug, glibenclamide showed multiple benefits in CCI. Other therapies showed model dependent effects: tissue sparing by nicotinamide in CCI, benefit from CsA in FPI but toxicity in PBBI, benefit from amantadine in PBBI. Serum glial fibrillary acidic protein (GFAP) and Ubiquitin carboxy-terminal hydrolase-L1 were assessed at 4 and 24 h. GFAP predicted 21 d histology and drug effects. Levetiracetam merits additional testing and is being evaluated in our large animal model. Glibenclamide and Amantadine merit additional testing in contusion and penetrating brain injury, respectively. Our data support theranostic use of serum GFAP.

2841. Kochanek, P., et al. (2019). "Exploring additional approaches to therapy ranking in operation brain trauma therapy." Journal of neurotrauma **36**(13): A5.

Operation brain trauma therapy (OBTT) is a multicenter pre-clinical therapy and biomarker screening consortium. It screened 12 therapies (nicotinamide, erythropoietin, cyclosporine, simvastatin, levetiracetam, glibenclamide, Kollidon VA-64, AER-271, amantadine, minocycline, E64d and P7C3-A20) in >1500 rats across three TBI models (parasagittal fluid percussion [FPI], controlled cortical impact [CCI], and penetrating ballistic-like brain injury [PBBI]). We assigned 22-points per model across behavioral and histological outcomes, generating an overall score for each therapy. Levetiracetam and glibenclamide ranked the highest. We now take two additional therapy ranking approaches. First we examined therapeutic efficacy within models. Second, to maximize positive signals, we examined the impact of eliminating negative points. Several findings emerged. Using a minimum threshold of ≥+3-points to reflect efficacy within models, no therapy produced a signal in PBBI. Levetiracetam, which produced the highest overall score, produced its strongest signal in FPI, however, no other therapy in FPI reached threshold. In contrast, levetiracetam, glibenclamide, nicotinamide, and Kollidon VA-64 all met/exceeded threshold in CCI (in that order). Eliminating negative points did not impact scoring for levetiracetam; it generated no negative points across models. However, glibenclamide, nicotinamide, Kollidon VA64, minocycline, and simvastatin all reach threshold (in that order). Eliminating negative points, levetiracetam and glibenclamide remained the highest scoring therapies; both generated ≥2X the points of any other therapy. Glibenclamide showed maximal efficacy in CCI. We conclude, levitiracetam and glibenclamide merit additional pre-clinical/clinical study, with model dependence for glibenclamide. Eliminating negative points minimally impacted our conclusions. Alternative therapeutic approaches should also be explored across OBTT, particularly in PBBI (i.e., targeting regeneration, cell-based therapies, or combination therapy).

2842. Kochanek, P. M., et al. (2012). "Cross model comparison of behavior, neuropathology, and serum biomarkers after controlled cortical impact, parasagittal fluid percussion, and penetrating ballistic-like brain injury: Results from operation brain trauma therapy." Journal of neurotrauma **29**(10): A23.

Introduction Operation Brain Trauma Therapy (OBTT) is a unique multi-center pre-clinical drug-screening consortium and the first systematic multicenter cross-model comparison in the TBI field. Hypothesis: controlled cortical impact (CCI), fluid percussion (FPI), and penetrating ballistic-like brain injury (PBBI) yield differences in neuropathology and biomarker profiles at injury levels generating behavioral deficits. Methods In all three models, male, adult Sprague-Dawley rats (total n = 140) were subjected to TBI using the established protocol at each center. Rats studied in the FPI model also had indwelling arterial catheters to monitor acute effects of drug administration on MAP and blood gases, and in each site, body temperature was controlled. In each model, established outcomes were evaluated including various motor and cognitive tasks over 21d. The motor tasks assessments were completed by d10 at all sites. Subsequently, Morris water maze (MWM) was used to assess cognitive function, including a hidden platform paradigm and probe trial across sites. At 21d, rats were sacrificed and in each model serial brain sections were assessed for lesion volume and either hemispheric or cortical tissue volume loss. Serum was obtained at 4h post-TBI to quantify initial levels of UCHL-1 and GFAP as assessments of neuronal and astrocyte damage resulting from primary injury, respectively. Results Motor testing revealed deficits in 1) beam walking and beam balance tasks after CCI, 2) rotarod performance after PBBI, and 3) cylinder task performance after FPI (all $P < 0.05$ vs. sham). Average latency to find the hidden platform (across all testing days) on the MWM paradigm was increased 19 - 12%, 121 - 13%, and 18 - 14% of sham in CCI, PBBI, and FPI, respectively ($P < 0.05$ vs. sham in CCI and PBBI). Lesion volume was 11.18 - 1.16%, and 15.01 - 2.38% of contralateral hemisphere in CCI, and PBBI, respectively and 2.84 - 0.57% of the contralateral cortex in FPI. Lesion volume in both CCI and PBBI were greater than FPI, $P < 0.05$. Surprisingly, serum UCHL-1 levels at 4h after injury were highest after FPI ($P < 0.004$ vs. CCI and $P < 0.001$ vs. PBBI) while serum GFAP levels at 4h were highest after CCI ($P < 0.0001$ vs. FPI), intermediate in PBBI ($P < 0.0003$ vs. FPI), but also modestly increased in FPI ($P = 0.04$ vs. sham). Conclusions We conclude that CCI, FPI, and PBBI produced distinct functional deficits, neuropathology, and early biomarker profiles. Our findings support the concept that cellular injury mechanisms and therapeutic targets may differ across TBI models and/or injury severities suggesting that multi-model therapeutic screening could provide unique insight into therapy development for clinical translation.

2843. Kochanek, P. M., et al. (2014). "Multicenter comparison of five therapies reveals therapeutic potential for levetiracetam: Operation brain trauma therapy." Journal of neurotrauma **31**(12): A105.

Operation Brain Trauma Therapy (OBTT) is a multi-center pre-clinical drug and biomarker screening consortium testing therapies for TBI. OBTT utilizes the parasagittal fluid percussion injury (FPI), controlled cortical impact (CCI), and penetrating ballistic-like brain injury (PBBI) models in rats to screen therapies at three sites using rigorous/blinded protocols. Identical groups (sham, TBI-vehicle, TBIlow dose, and TBI-high dose) are used across sites and motor, cognitive, histological, and serum biomarker outcomes assessed over 21 d. The code for each outcome is simultaneously broken across sites and therapies are given an overall score (maximum = 22 points/model). The first five therapies tested included nicotinamide (50 or 500 mg/kg IV at 15 min and 24 h), erythropoietin (EPO, 5000 or 10,000U/ kg IV at 15 min), cyclosporin-A (CsA, 10 or 20 mg/kg, IV at 15 min and 24 h), simvastatin (1 or 5 mg/kg POX14 d), or levetiracetam (54 or 170 mg/kg IV at 15 min). Dosing was literature-based. The first four therapies produced modest/no effects across models. Nicotinamide showed some motor benefit and tissue sparing in CCI, EPO showed no benefit across models, CsA showed tissue sparing in FPI but toxicity in CCI and PBBI, Simvastatin showed modest motor benefit across models but no cognitive or histological benefit. Levetiracetam, however, showed benefit on multiple outcomes including on MWM and probe trial in FPI, motor function, MWM, and tissue loss in CCI, and probe trial in PBBI. In OBTT, Levetiracetam, given as a single IV bolus early post-TBI, shows promise. It merits exploration of therapeutic window, dose optimization, testing in models with second insults, and testing in our large animal model. Support: US Army, W81XWH-10-1-0623.

2844. Kochanek, P. M., et al. (2018). "Operation Brain Trauma Therapy: 2016 Update." Military medicine **183**(suppl_1): 303-312.

Operation brain trauma therapy (OBTT) is a multi-center, pre-clinical drug and biomarker screening consortium for traumatic brain injury (TBI). Therapies are screened across three rat models (parasagittal fluid percussion injury, controlled cortical impact [CCI], and penetrating ballistic-like brain injury). Operation brain trauma therapy seeks to define therapies that show efficacy across models that should have the best chance in randomized clinical trials (RCTs)

and/or to define model-dependent therapeutic effects, including TBI protein biomarker responses, to guide precision medicine-based clinical trials in targeted pathologies. The results of the first five therapies tested by OBTT (nicotinamide, erythropoietin, cyclosporine [CsA], simvastatin, and levetiracetam) were published in the Journal of Neurotrauma. Operation brain trauma therapy now describes preliminary results on four additional therapies (glibenclamide, kollidon-VA64, AER-271, and amantadine). To date, levetiracetam was beneficial on cognitive outcome, histology, and/or biomarkers in two models. The second most successful drug, glibenclamide, improved motor function and histology in CCI. Other therapies showed model-dependent effects (amantadine and CsA). Critically, glial fibrillary acidic protein levels predicted treatment effects. Operation brain trauma therapy suggests that levetiracetam merits additional pre-clinical and clinical evaluation and that glibenclamide and amantadine merit testing in specific TBI phenotypes. Operation brain trauma therapy has established that rigorous, multi-center consortia could revolutionize TBI therapy and biomarker development.

2845. Kochanek, P. M., et al. (2016). "Approach to Modeling, Therapy Evaluation, Drug Selection, and Biomarker Assessments for a Multicenter Pre-Clinical Drug Screening Consortium for Acute Therapies in Severe Traumatic Brain Injury: Operation Brain Trauma Therapy." Journal of neurotrauma **33**(6): 513-522.

Traumatic brain injury (TBI) was the signature injury in both the Iraq and Afghan wars and the magnitude of its importance in the civilian setting is finally being recognized. Given the scope of the problem, new therapies are needed across the continuum of care. Few therapies have been shown to be successful. In severe TBI, current guidelines-based acute therapies are focused on the reduction of intracranial hypertension and optimization of cerebral perfusion. One factor considered important to the failure of drug development and translation in TBI relates to the recognition that TBI is extremely heterogeneous and presents with multiple phenotypes even within the category of severe injury. To address this possibility and attempt to bring the most promising therapies to clinical trials, we developed Operation Brain Trauma Therapy (OBTT), a multicenter, pre-clinical drug screening consortium for acute therapies in severe TBI. OBTT was developed to include a spectrum of established TBI models at experienced centers and assess the effect of promising therapies on both conventional outcomes and serum biomarker levels. In this review, we outline the approach to TBI modeling, evaluation of therapies, drug selection, and biomarker assessments for OBTT, and provide a framework for reports in this issue on the first five therapies evaluated by the consortium.

2846. Kochanek, P. M., et al. (2016). "Synthesis of Findings, Current Investigations, and Future Directions: Operation Brain Trauma Therapy." Journal of neurotrauma **33**(6): 606-614.

Operation Brain Trauma Therapy (OBTT) is a fully operational, rigorous, and productive multicenter, pre-clinical drug and circulating biomarker screening consortium for the field of traumatic brain injury (TBI). In this article, we synthesize the findings from the first five therapies tested by OBTT and discuss both the current work that is ongoing and potential future directions. Based on the results generated from the first five therapies tested within the exacting approach used by OBTT, four (nicotinamide, erythropoietin, cyclosporine A, and simvastatin) performed below or well below what was expected based on the published literature. OBTT has identified, however, the early post-TBI administration of levetiracetam as a promising agent and has advanced it to a gyrencephalic large animal model--fluid percussion injury in micropigs. The sixth and seventh therapies have just completed testing (glibenclamide and Kollidon VA 64), and an eighth drug (AER 271) is in testing. Incorporation of circulating brain injury biomarker assessments into these pre-clinical studies suggests considerable potential for diagnostic and theranostic utility of glial fibrillary acidic protein in pre-clinical studies. Given the failures in clinical translation of therapies in TBI, rigorous multicenter, pre-clinical approaches to therapeutic screening such as OBTT may be important for the ultimate translation of therapies to the human condition.

2847. Kodadek, L. M., et al. (2015). "Retained transcranial knife blade with transection of the internal carotid artery treated by staged endovascular and surgical therapy: technical case report." Neurosurgery **11 Suppl 2**: E372-E375.

BACKGROUND AND IMPORTANCE: We describe the use of proximal and distal endovascular coil embolization of the internal carotid artery followed by operative removal of a retained foreign object transecting the petrocavernous portion of the internal carotid artery., CLINICAL PRESENTATION: A 20-year-old man sustained a stab wound to the left temporal skull and presented with a retained knife blade. He reported a headache at presentation, but remained neurologically intact with a Glasgow Coma Scale of 15. Computed tomography imaging and subsequent angiography

confirmed complete transection of the petrocavernous segment of the left internal carotid artery with effective tamponade by the knife blade in situ and satisfactory collateral flow across the Circle of Willis. Coil embolization of the left internal carotid artery was performed. Retrograde embolization of the petrocavernous internal carotid segment distal to the injury was performed via vertebral and posterior communicating artery access. Antegrade embolization of the internal carotid artery proximal to the injury was completed and the patient was transferred to the operating room for craniectomy and foreign body extraction. Postoperative computed tomography angiography revealed no parenchymal hemorrhage, mass effect, or midline shift, and successful embolization of the internal carotid artery. At 6-week follow-up, the patient remained neurologically intact with no infectious or vascular complications., CONCLUSION: Staged endovascular and surgical therapy provides complete assessment and effective control of damaged vessels when retained intracranial foreign bodies are present. Given the high risk of vascular injury with retained transcranial foreign bodies, this strategy should be considered a safe approach for these challenging cases.

2848. Kodadek, L. M., et al. (2015). "Retained transcranial knife blade with transection of the internal carotid artery treated by staged endovascular and surgical therapy: Technical case report." Operative Neurosurgery **11**(2): E372-E375.

BACKGROUND AND IMPORTANCE: We describe the use of proximal and distal endovascular coil embolization of the internal carotid artery followed by operative removal of a retained foreign object transecting the petrocavernous portion of the internal carotid artery. CLINICAL PRESENTATION: A 20-year-old man sustained a stab wound to the left temporal skull and presented with a retained knife blade. He reported a headache at presentation, but remained neurologically intact with a Glasgow Coma Scale of 15. Computed tomography imaging and subsequent angiography confirmed complete transection of the petrocavernous segment of the left internal carotid artery with effective tamponade by the knife blade in situ and satisfactory collateral flow across the Circle of Willis. Coil embolization of the left internal carotid artery was performed. Retrograde embolization of the petrocavernous internal carotid segment distal to the injury was performed via vertebral and posterior communicating artery access. Ante-grade embolization of the internal carotid artery proximal to the injury was completed and the patient was transferred to the operating room for craniectomy and foreign body extraction. Postoperative computed tomography angiography revealed no parenchymal hemorrhage, mass effect, or midline shift, and successful embolization of the internal carotid artery. At 6-week follow-up, the patient remained neurologically intact with no infectious or vascular complications. CONCLUSION: Staged endovascular and surgical therapy provides complete assessment and effective control of damaged vessels when retained intracranial foreign bodies are present. Given the high risk of vascular injury with retained transcranial foreign bodies, this strategy should be considered a safe approach for these challenging cases.

2849. Koehler, P. J. (2012). "Eduard Hitzig's experiences in the Franco-Prussian War (1870-1871): the case of Joseph Masseau." Journal of the history of the neurosciences **21**(3): 250-262.

It is well known that Fritsch and Hitzig published the results of their experiments on cortical stimulation in 1870, the year in which the Franco-Prussian War (FPW) broke out. Several tall stories are found about Hitzig's role in the FPW; stories that have not been well documented. During this war, he worked at the military hospital in Nancy, where he was allowed to admit to his ward soldiers with head wounds. He made a close observation of the 20-year-old French soldier Joseph Masseau, who suffered from a right-sided cerebral abscess following a gunshot wound sustained during the Loire campaign on December 10, 1870 and was looked after in the military hospital of Nancy in January and February 1871. Hitzig related the clinical and autopsy observations to his recent experimental findings. A translation into English of part of the case report is provided.

2850. Koenigs, M., et al. (2009). "Superior parietal cortex is critical for the manipulation of information in working memory." The Journal of neuroscience : the official journal of the Society for Neuroscience **29**(47): 14980-14986.

In recent years, theoretical perspectives on posterior parietal function have evolved beyond the traditional visuospatial processing models to include more diverse cognitive operations, such as long-term and working memory. However, definitive neuropsychological evidence supporting the superior parietal lobule's purported role in working memory has been lacking. Here, we studied human brain lesion patients to determine whether the superior parietal lobule is indeed necessary for working memory. We assessed a wide range of memory functions in three participant groups: superior parietal lesions (n = 19), lesions not involving superior parietal cortex (n = 146), and no brain lesions (n = 55). Superior parietal damage was reliably associated with deficits on tests involving the manipulation and

rearrangement of information in working memory, but not on working memory tests requiring only rehearsal and retrieval processes, nor on tests of long-term memory. These results indicate that superior parietal cortex is critically important for the manipulation of information in working memory.

2851. Koestler, J. and R. Keshavarz (2001). "Penetrating head injury in children: a case report and review of the literature." The Journal of emergency medicine **21**(2): 145-150.

Head trauma is exceedingly common in children, but rarely presents as a penetrating injury to the skull. Most of the recommendations on evaluation, management, and follow-up of such injuries are based on the adult literature. We report a case of penetrating head injury from a tapered metal object in a 4-year old child.

2852. Kogan, A., et al. (2019). "Does duration of donor brain injury impact heart transplantation outcomes?" Clinical transplantation **33**(8): e13660.

AIM: We aimed to study the implications of pre-transplantation time intervals on HT outcomes., METHODS: Brain injury time (BIT) was defined as the period from the donor brain injury to brain death declaration. Brain death interval (BDI) was defined as the period from brain death to application of an aortic cross-clamp during donor heart procurement. Allograft ischemia was defined as the time from donor aortic cross-clamp to aortic unclamping. End points included mortality and rejections., RESULTS: Between 1997 and 2017, we assessed 173 patients. Kaplan-Meier analyses showed that prolonged donor BIT, BDI, allograft ischemia, and total injury time had no significant effect on mortality and rejections. Patients were subdivided into short BIT (<97 hours, n = 87) and long BIT (>=97 hours, n = 86) groups. No differences in rejection scores nor in time to first rejection were noted. Kaplan-Meier analysis showed a similar long-term survival in the two groups. Sub-analysis of both groups according to their median BDI (12 hours) revealed no differences in mortality or time to rejection., CONCLUSIONS: Pre-transplantation time intervals do not affect mortality or rejection. Our findings have important clinical implications regarding HT allocation and organ availability.

2853. Kohli, A. and N. K. Aggarwal (2006). "Firearm fatalities in Delhi, India." Legal medicine (Tokyo, Japan) **8**(5): 264-268.

Studies on firearm fatalities in various countries have been published. However, pattern and incidence of fatal firearm injuries in Delhi has largely gone unreported. This study was taken up with the objective of reporting the pattern and incidence of fatal firearm injuries in Delhi and comparing it with the pattern seen in other countries. One hundred and seven firearm fatalities autopsied during the last 6 years were studied. 46.7% victims were aged between 20 and 30 years and 90.7% were males; similar findings were seen in other countries. 92.6% were victims of homicidal attacks, 6.5% suicidal and 0.9% accidental. This is in sharp contrast to the pattern in other countries where suicides were the predominant group and homicides accounted for a small number of cases. A high presence of illegal country made guns was an explanation for this trend. Single firings were the norm. Chest (39%) and head (29.6%) were the two most common entry sites for the bullets, a pattern somewhat similar to that of other countries. Survival time, cause of death and recovery of projectiles was also studied. Elimination of illegal country made guns is of the utmost importance in order to curb the high homicidal firearm fatality rate in this region.

2854. Kohli, E. and U. Tshering (2019). "Penetrating Head Trauma Secondary to Bow-and-Arrow Injury." The Journal of emergency medicine **56**(4): 448-449.

2855. Kohlmann, R., et al. (2015). "Community-acquired adult Escherichia coli meningitis leading to diagnosis of unrecognized retropharyngeal abscess and cervical spondylodiscitis: a case report." BMC infectious diseases **15**: 567.

BACKGROUND: Escherichia coli is a rare cause of community-acquired meningitis in adults unless predisposing factors are present (e.g., previous penetrating cranio-cerebral injury or neurosurgery, immunosuppression, chronic alcoholism, history of cancer, diabetes mellitus, advanced age)., CASE PRESENTATION: We describe the case of a 53-year-old woman, resident in Germany, suffering from community-acquired bacterial meningitis caused by CTX-M-9 type extended spectrum beta-lactamase producing Escherichia coli. Because typical predisposing factors were not apparent,

pathogen identification resulted in expanded diagnostics to exclude a distant or contiguous primary focus. By magnetic resonance tomography, a previously unrecognized large retropharyngeal abscess with cervical spondylodiscitis was detected. In retrospect, the patient had complained about neck pain for a few weeks prior to meningitis onset, but the symptoms were interpreted as being related to a herniated disk. Meningitis and osteomyelitis resolved completely under surgical treatment and meropenem therapy., CONCLUSION: In case of adult Escherichia coli meningitis, underlying diseases should always be carefully excluded, especially if predisposing factors are not apparent.

2856. Kohlmeier, R. E., et al. (2001). "Suicide by firearms: a 15-year experience." The American journal of forensic medicine and pathology **22**(4): 337-340.

A retrospective review of 1704 cases of suicide involving firearms investigated by the Bexar County Medical Examiner's office between 1984 and 1998 was performed. The age distribution was similar in male and female victims, and the type of weapon was not associated with age. Approximately 78% of the victims used a handgun (87% of female and 76% of male victims). In 4.0% of head wound cases, the site of the entrance wound was the back of the head. Thus, this report refutes the common belief that all gunshot wounds to the back of the head represent homicides. In 1.9% of the cases, the wounds were inflicted at intermediate range. With handguns, the right temple was the most common site, but with rifles and shotguns, the most common site was the mouth.

2857. Koike, M., et al. (2013). "Differences in expression patterns of cathepsin C/dipeptidyl peptidase I in normal, pathological and aged mouse central nervous system." The European journal of neuroscience **37**(5): 816-830.

Cathepsin C (CC) (EC 3.4.14.1, dipeptidyl peptidase I) is a lysosomal cysteine protease that is required for the activation of several granule-associated serine proteases in vivo. CC has been shown to be constitutively expressed in various tissues, but the enzyme is hardly detectable in central nervous system (CNS) tissues. In the present study, we investigated the regional and cellular distribution of CC in normal, aging and pathological mouse brains. Immunoblotting failed to detect CC protein in whole brain tissues of normal mice, as previously described. However, low proteolytic activity of CC was detected in a brain region-dependent manner, and granular immunohistochemical signals were found in neuronal perikarya of particular brain regions, including the accessory olfactory bulb, the septum, CA2 of the hippocampus, a part of the cerebral cortex, the medial geniculate, and the inferior colliculus. In aged mice, the number of CC-positive neurons increased to some extent. The protein level of CC and its proteolytic activity showed significant increases in particular brain regions of mouse models with pathological conditions--the thalamus in cathepsin D-deficient mice, the hippocampus of ipsilateral brain hemispheres after hypoxic-ischemic brain injury, and peri-damaged portions of brains after penetrating injury. In such pathological conditions, the majority of the cells that were strongly immunopositive for CC were activated microglia. These lines of evidence suggest that CC is involved in normal neuronal function in certain brain regions, and also participates in inflammatory processes accompanying pathogenesis in the CNS.

2858. Kojima, T., et al. (1987). "Successful removal of air gun bullets from the third ventricle." Neurosurgery **20**(2): 322-325.

A patient with air gun bullets in the 3rd ventricle associated with delayed ventricular hemorrhage is presented. Through an anterior transcallosal approach, the surgeon successfully removed the bullets without any significant permanent sequelae.

2859. Kok, Y. O., et al. (2010). "Foreign bodies of the face: A Singapore perspective." Annals of the Academy of Medicine Singapore **39**(11): S186.

Background/Hypothesis: Facial foreign body (FB) implantation can present as frustrating diagnostic and therapeutic dilemmas to both patients and surgeons. Judicious use of computed tomography (CT) scans may help localise FBs and reduce repeat surgeries. The authors aimed to identify risk factors predictive of multiple FB removal surgeries and propose imaging recommendations. Methods: The authors conducted a retrospective review of 31 patients who underwent surgical exploration and removal of facial FB. Variables studied were injury mechanism, anatomical location of FB, depth and tissue plane of implantation, FB material, dimensions, preoperative imaging, number of surgeries performed, presence of facial fractures and neurovascular complications. Results: Thirty-one

patients underwent surgical removal. Mean age was 34 years (80.6% males). Commonest FB material was glass (35.5%). Majority of FB injuries was work (48.4%) and motor vehicle accidents-related (35.2%). Orbital and periorbital involvement (70.8%) was most common and 40.9% of them had associated ocular injuries. Of the patients, 45.2% required more than one surgery. Fifty percent of them (n = 7) had FB implanted in facial bones. Concomitant fractures were present and fixation was needed in all. Orbitozygomatic fracture was most common (67%). FB material most associated with fractures was metal (78%). The other 50% (n = 7) were penetrating wounds with small calibre FBs missed on superficial visual inspection during the first surgery. CT scan after initial failed FB removal resulted in successful removal in all cases. Discussion & Conclusion: Based on the authors' experience, X-rays are limited in facial FB localization. CT scans should be considered in patients with risk factors of suspected facial fractures, periorbital injuries, metal FBs, ballistic injuries and deep penetrating wounds with small calibre FBs not visible on superficial visual inspection. These recommendations may lead to better clinical outcomes in future similar cases.

2860. Koko, A. M., et al. (2018). "Camel bite: An uncommon cause of penetrating head injury in a preteenager." British journal of neurosurgery **32**(1): 93.

Objectives: To describe an unusual case of penetrating head injury caused by camel bite and outline the management. Design: Case report. Subjects: Twelve year old boy with head injury caused by camel bite. Methods: A twelve year old boy was referred from primary health care centre with alteration in level of consciousness and fever, fifteen days after bitten by father's camel. The camel had picked up the boy by its teeth, shaken him and thrown away onto the ground. At presentation his Glasgow coma score was thirteen and febrile with axillary temperature of 38.9 degree celsius. There was both right and left sided temporo-parietal wound with eviscerated brain tissue. Brain Computed tomography scan showed bilateral temporo-parietal bone fractures, abscesses and depressed segment on the left side and surrounding edema. Patient was optimised with, intravenous fluids, intravenous antibiotics and anticonvulsant. Subsequently had bilateral temporo-parietal craniectomies, eleva-tion of depress segment, debridement and drainage of abscesses. Patient improved remarkably and parents were counselled for cra-nioplasty after three months. Results: Patient had good outcome and is being planned for cranioplasty. Conclusions: Management of camel bites injury can be challenging to both the Neurosurgeon and patients due to its complexities, as can present with both penetrating and blunt traumatic brain injury in an individual. The index case had occurred in rutting season (November-March), therefore care should be taking when handling camels especially during this period.

2861. Köksal, V. and T. M. Guler (2015). "Acute cortical blindness due to depressed occipital skull fracture: A pediatric case." Child's Nervous System **31**(10): 1981.

Objective: Although linear skull fractures are common in children, depressed fractures constitute 25% of cases. A depressed skull fracture is defined as the displacement of bony fragments below the level of the whole thickness of skull through the dura or also the brain parenchyma. The depressed skull fractures are classified as open fractures and closed fractures according to the integrity of the overlying skin. Neurological findings according to depressed skull fractures are related with the severity of the trauma, compression of the broken bone to the parenchyma, the presence of contamination in open depressed fractures and the dural damage. Also the functions of the cortical area under compression affects the kinds of neurological deficits. The development of acute blindness is a very rare complication of depressed skull fractures reported in the literature. The depression of the bony island into the sagittal sinus also makes it difficult to repair for this case. Methods: 6-year old male admitted to the emergency department with acute blindness after car accident. CT scan showed a depressed skull fracture of closed type in the occipital region. Emergent decompressive surgery was done because of the presence of acute blindness during admission to the hospital. The superior sagittal sinus preserved well during surgery. Results: It was obtained during admission that a bony island was depressed over the superior sagittal sinus causing 1-1.5 cm compression to the parenchyma related with visual field. Because of acute visual loss emergent surgery was applied. Visual loss was totally improved by the second day postoperatively. Conclusion: Types of depression fracture, neurological status of the patient and presence of neurological findings can affect necessity and also the time of surgery. In the presence of acute blindness emergent surgery should be done also for closed type depressed skull fractures.

2862. Kok-van Alphen, C. C., et al. (1982). "Automutilation of the cornea. I. Ophthalmological aspects." Documenta ophthalmologica. Advances in ophthalmology **52**(3-4): 327-332.

Automutilation of the cornea occurs more frequently than is generally supposed. The patient, particularly at his first visit, certainly will not reveal the cause of the cornea lesion. In two University Eye Clinics 19 patients were seen in whom the diagnosis of automutilation of the cornea could be made. It is important for the ophthalmologist to bear the possibility of automutilation in mind. In 6 of our patients corneal grafts were performed. All these grafts failed because of further automutilation. Corneal transplantation is certainly not indicated; these operations were performed because the patient's true condition had not been spotted in time. Better forms of treatment are tarsorrhaphy or the application of closely occluding bandages. In this way fair results were obtained in 2 cases. It is wrong to force the patient to a confrontation (i.e. to tell him that automutilation is suspected). Confrontation can lead to more severe mental disorders. In all cases psychiatric treatment is absolutely essential. The ophthalmological prognosis for this condition is poor and psychiatric help is quite often refused.

2863. Kolasa, P. and Z. Kaurzel (2001). "[Post-traumatic pulsating exophthalmus coexisting with congenital carotid-cavernous fistula]." Pourazowy wytrzeszcz tetniacy na tle wrodzonej przetoki szyjno-jamistej. **35 Suppl 5**: 58-63.

Pulsating exophthalmus develops most frequently in the course of penetrating or bitemporal head trauma. Idiopathic form is even more rare. Orbit venous system over-loading with pathological arterial blood infiltration is the cause of pulsating exophthalmus. A patient with congenital carotid-cavernous fistula (right eyeball enlargement and noise), suffering from head trauma after road accident has been presented. Carotid-cavernous fistula was diagnosed and than treated casually by endovascular closure of the infiltration between internal carotid artery and cavernous sinus. After 5-month treatment regression of the noise and exophthalmus was observed.

2864. Kolodziejczyk, D. and W. D. Hirsch (1992). "[Epidural "sulmycin implant" coverage for local prevention of infection in surgical management of open craniocerebral injuries]." Epidurale "Sulmycin Implant"-Abdeckung zur lokalen Infektionsprophylaxe bei der operativen Versorgung offener Schadel-Hirn-Verletzungen. **22**(6): 272-275.

In various series reported in the literature on the operative management of severe head injuries with compound depressed skull fractures and penetrating wounds of the brain, the rates of infection differ from 1 to 17%. In this paper the operative experience with 22 cases of penetrating head injuries is discussed. In conventional operative therapy, depressed skull fracture and lacerated dura were covered by "Sulmycin Implant" containing Gentamycin as a helpful bacteriological barrier. 18 patients survived, 7 patients had severe neurological defects, 5 patients had mild neurological deficits and 6 patients recovered completely. There were no signs of suppurative complications in superficial wounds or in the brain. 4 patients died due to their severe brain damage with multiple contusional lesions. Postoperative complications were as follows: one patient suffered extradural and one patient subdural rebleeding. Another patient with a frontal base skull fracture suffered a pneumatocele because the fracture was not correctly covered. The revision was done successfully using the "Sulmycin Implant". Presently, however, the intradural use of "Sulmycin Implant" is not recommended without further testing for the level of gentamycin in the cerebrospinal fluid which is released by the "Sulmycin Implant".

2865. Komabayashi, Y., et al. (2005). "Case of an intraorbital wooden foreign body penetrating the maxillary sinus." Practica Oto-Rhino-Laryngologica **98**(11): 861-864.

A 62-year-old man suffered a penetrating injury to his left periorbital region with a wooden foreign body. He consulted an ophthalmologist and plastic surgeon. He was diagnosed with a conjunctival laceration and blowout fracture. His conjunctiva was consequently sutured. One month after injury, he consulted our clinic for diplopia. Severly limited trading in the upper and lower directions were observed. Computed tomography (CT) and Magnetic resonance imaging (MRI) revealed an orbital floor fracture. When we performed an anterior orbitotomy, a 50 mm long, 10 mm wide wooden foreign body covered with granulation tissue in the orbit was found which had penetrated the maxillary sinus. It was removed from the orbit. In this case, wooden foreign body could not be identified preoperatively.

2866. Kominato, Y., et al. (2007). "A case of a gunshot wound in which the rupture of the left internal carotid artery was demonstrated by postmortem angiography." Legal medicine (Tokyo, Japan) **9**(1): 22-24.

A 54-year-old man was shot into the face by a robber while sleeping in bed. Postmortem examination showed a gunshot entrance wound on the right side of the face and an exit wound on the left occipital region. Internal

examination demonstrated massive contusion involving the brain stem and inferior surfaces of the occipital lobes and radial linear fractures of the left occipital skull. Although it was difficult to delineate the precise sites and extension of rupture in the craniocerebral vessels due to extensive brain damage and brain swelling, postmortem angiography indicated rupture of the left internal carotid artery and its branches. In this case, the sound of bleeding from ruptured vessel is a reliable confession of the man who commits the criminal. Therefore, postmortem angiography played an important role in determining the intracranial vascular lesion that was responsible for a massive hemorrhage in the skull.

2867. Komisarow, J. M., et al. (2019). "The assassination of Robert F. Kennedy: An analysis of the senator's injuries and neurosurgical care." Journal of neurosurgery **130**(5): 1649-1654.

On June 5, 1968, having won the Democratic Party presidential primary in California, Senator Robert F. Kennedy delivered a victory speech to supporters at the Ambassador Hotel in downtown Los Angeles. Just after 12:15 am (Pacific daylight savings time), a lone assassin shot Kennedy 3 times at point-blank range. One of the bullets struck Kennedy in the right posterior auricular region. Within the ensuing 26 hours, Kennedy was transported to 2 hospitals, underwent emergency surgery, and eventually died of severe brain injury. Although this story has been repeated in the press and recounted in numerous books, this is the first analysis of the senator's injuries and subsequent surgical care to be reported in the medical literature. The authors review eyewitness reports on the mechanism of injury, the care rendered for 3 hours prior to the emergency craniotomy, the clinical course, and, ultimately, the autopsy.

2868. Komolafe, E. O., et al. (2011). "Peculiarities and Management challenges of open fronto-orbital head injuries - An institution experience." British journal of neurosurgery **25**(2): 160.

Objectives: To draw attention to the current challenges in the management of open fronto-orbital injuries in a developing country. Design: Prospective observational study. Subjects: Adults with combined frontal and orbital open head injury Methods: Clinical study of all adult head injuries associated with combined frontal and orbital open injuries over the past three years to determine its pattern, peculiarities, associated disability, and management challenges. Prospective audit using a proforma to capture data on patient and injury characetristics, treatment given and outcomes at 6 weeks and three months. Mortality and morbidity data was collected. Results: Thirty-five adult patients with open frontoorbital injuries were admitted to a single neurosurgical unit in Nigeria between x and y (insert dates). 30 males and five females were admitted giving a M:F of 6:1. The age ranged from 18years to 75years. Road traffic injury was the most common cause 26(74.3%) followed by Gunshot injury 5(14%). More than half of the patients 21(60%) presented later than 24 hours. Only 9(55.7%) patients had other injuries. The left side of the face was involved in 21 (60%) patients. The most common complication noted was unilateral loss of vision with enophthalmos 27(77.1%). All the patients underwent surgery ie debridement, elevation (with or without removal) of bone fragments and duroplasty in some. Two patients developed sympathetic ophthalmitis. Three patients (8.6%) had cranioplasty with methamethylacrylate. The other patients had no cranial reconstruction. Four mortalities were noted in the series. Conclusions: Adequate treatment and acceptable cosmetic outcome of these injuries depends on timely and multidisciplinary approach to management. Survival rates were high with low morbidity. Despite the unavailability of reconstructive surgery acceptable outcomes were achieved. Cosmesis is given low importance by our patient group.

2869. Komolafe, E. O., et al. (2004). "Gun burner injury: a peculiar accidental self-inflicted missile head injury." British journal of neurosurgery **18**(3): 233-239.

The objective of this study was to report the pattern of unusual accidental missile head injuries from the use of the locally-manufactured Dane gun, which presented at the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria. Six illustrative patients are presented, each with a peculiar injury. All the patients except one, who died prior to surgery, had wound debridement and elevation of associated fractures with removal of the metallic foreign body. With the exception of the patient that died prior to surgical intervention, all did well without noticeable neurological deficits. Missile injury to the head is increasing. Firearm-related death is also on the increase and our environment is not exempted. Accidental injuries from stray bullets are fairly common; however, self-inflicted injuries are usually due to the improper handling of firearms, particularly by novices, suicide attempts and faulty technology of locally made firearms.

2870. Kompanje, E. J. O., et al. (2006). "Organ donations and unused potential donations in traumatic brain injury, subarachnoid haemorrhage and intracerebral haemorrhage." Intensive care medicine **32**(2): 217-222.

OBJECTIVE: To obtain insight into the occurrence of brain death and the potential for brain dead and controlled non-heart-beating organ donors (CNHB) in patients with traumatic brain injury (TBI), subarachnoid haemorrhage (SAH) and intracerebral haemorrhage (ICH) in a large neurosurgical serving area (2.1 million inhabitants)., DESIGN: Retrospective analysis of data concerning patients with TBI, SAH and ICH who died during the course of ICU treatment during 1999-2003., SETTING: A 16-bed neuro-intensive care unit., PATIENTS: Patients with TBI, SAH or ICH who died during the course of ICU treatment., MEASUREMENTS AND RESULTS: The number of ICU deaths in patients with TBI, SAH and ICH declined from 111 in 1999 to 64 in 2003. In total, 476 deaths occurred. Of these, 177 patients were not included in the analysis. Two hundred ninety-nine (299) ventilated patients had two or more absent brainstem reflexes (ABSR) and a Glasgow Coma Score of 3-4 at the moment of treatment withdrawal and formed the potential for organ donation; 61 of these patients were treated until full brain death. Organs of 57 patients could be harvested. We analysed the reasons that organs were not procured in the 242 remaining patients. The most important reasons were family refusal (32%), medical contraindications (14%), and the treating physician not considering potential organ donation (20%). The missed potential is 162/299 (54%)., CONCLUSIONS: The number of actual and potential organ donors is declining, but a considerable number of potential CNHB donors exists. Refusal by relatives is the most important reason for failure to procure organs.

2871. Kompanje, E. J. O., et al. (2011). "Is organ donation from brain dead donors reaching an inescapable and desirable nadir?" Transplantation **91**(11): 1177-1180.

The brain dead patient is the ideal multiorgan donor. Conversely, brain death (BD) is an undesirable outcome of critical care medicine. Conditions that can lead to the state of BD are limited. An analysis showed that a (aneurysmal) subarachnoid hemorrhage, traumatic brain injury, or intracerebral hemorrhage in 83% precede the state of BD. Because of better prevention and treatment options, we should anticipate on an inescapable and desirable decline of BD. In this article, we offer arguments for this statement and discuss alternatives to maintain a necessary level of donor organs for transplantation.

2872. Kon, T., et al. (2002). "[Shotgun injury of head and neck: case report]." No shinkei geka. Neurological surgery **30**(5): 517-521.

A 48-year-old male was hit by a shotgun blast from behind while he was hunting. He was only 7 meters away when one of his colleagues pulled the trigger accidentally. About 180 lead pellets penetrated his head and neck. When he was brought to our hospital, he was alert and complained of occipital and nape pain, but had no apparent neurological deficits. We administered 200 mg of dimercaprol immediately and removed 77 pellets by midline suboccipital incision on the next day. Afterwords, we performed four minor operations using a fluoroscope, and removed another 70 pellets by day 29. In addition, we administered a 100 mg x 3 dose of dimercaprol every other week. He was discharged 41 days after the accident without any acute signs of lead poisoning. Though serum lead level did not rise to critical level, EDTA was continued after his discharge to prevent delayed lead poisoning from the retained pellets. Since we seldom encounter this type of patient in Japan, delayed lead poisoning by shotgun injury was discussed with reference to the literature.

2873. Kondo, T., et al. (1995). "Fatal injuries of the brain stem and/or upper cervical spinal cord in traffic accidents: nine autopsy cases." Science & justice : journal of the Forensic Science Society **35**(3): 197-201.

Nine forensic autopsy cases were studied. All had injuries of the brain stem and/or upper cervical spinal cord due to traffic accidents. Among the nine subjects, eight were pedestrians and one was a left, front seat occupant of a vehicle. Examination of these 9 cases revealed that three had ponto-medullary avulsion, two had medullary avulsion and the other four had laceration of the upper cervical spinal cord. Atlanto-occipital dislocation was observed in five cases, and a ring fracture around the foramen magnum in the other two cases. Intraventricular haemorrhage, probably due to tears of the choroid plexus caused by hyperextension or hyperflexion of the head, was found in seven cases. In just one of these seven cases, both of the lateral ventricles were filled with dark red haemocoagulum. Hyperextension is considered to occur more commonly in road trauma cases where the victim is alcoholically intoxicated.

2874. Kondo, T., et al. (2018). "Autopsy Case of a Penetrating Wound to the Left Cerebral Hemisphere Caused by an Accidental Shooting With a Crossbow." The American journal of forensic medicine and pathology **39**(2): 164-168.

A crossbow is a bow that shoots an arrow when a gun-like trigger is pulled. Deaths caused by accidental crossbow shootings are extremely rare. Here we describe an autopsy case of a penetrating wound to the left cerebral hemisphere caused by an accidental shooting with a crossbow. A man in his early 60s who lived with his wife and had used crossbows for 20 years as his hobby was found one early morning in the shed of his house, collapsed and bleeding from the head and neck. He was taken to a hospital and died after approximately 3 days of conservative treatment. At autopsy, a penetrating wound between the upper part of the left anterior neck and the left frontoparietal region was evident. Traumatic intracerebral hematoma was observed in the left frontal lobe, and severe traumatic subarachnoid hemorrhage was present throughout the brain. Cerebral contusion and hematoma without any organization were noted around the penetration. The cause of death was determined to be cerebral contusion and intracerebral hematoma due to the penetrating wound by the crossbow arrow. He was probably trying to load an arrow into the crossbow by placing it on the floor, pointing upward, and made a mistake in its operation that resulted in the shooting of the arrow. This case is unique because it was a rare accidental death caused by a crossbow arrow, and a detailed histopathological examination was performed.

2875. Kondrot, E. C., et al. (1996). "Delivery of perilimbal anesthesia." Journal of cataract and refractive surgery **22**(2): 155.

2876. Kong, A. P., et al. (2010). "A multidisciplinary organ donor council and performance improvement initiative can improve donation outcomes." The American surgeon **76**(10): 1059-1062.

The shortage of organs available for transplantation has become a national crisis. The Department of Health and Human Services established performance benchmarks for timely notification, donation after cardiac death (DCD), and conversion rates (total donors/eligible deaths) to guide organ procurement organizations and donor hospitals in their attempts to increase the number of transplantable organs. In January 2007, an organ donor council (ODC) with an ongoing performance improvement case review process was created at a Level I trauma center. A critical care devastating brain injury protocol and a DCD policy were instituted. Best performance benchmarks were evaluated before and after establishment of the ODC. At our center, the total number of referrals increased from 96 in 2006 to 139 in 2007 and 143 in 2008. Timely notification rate increased from 64 per cent in 2006 to 83 per cent in 2007 and 2008 ($P < 0.01$). DCD rate increased from 0 per cent in 2006 to 13 per cent in 2007 ($P = 0.06$) and 10 per cent in 2008 ($P = 0.09$). Conversion rate increased from 53 per cent in 2007 to 78 per cent in 2008 ($P = 0.05$) and 73 per cent in 2009 ($P = 0.16$). Organs transplanted per eligible death trended upward from 1.80 in 2007 to 2.54 in 2009 ($P = 0.20$). As a consequence, the establishment of a multidisciplinary ODC and performance improvement initiative demonstrated improved donation outcomes.

2877. Kong, V., et al. (2017). "Civilian cerebral gunshot wounds: a South African experience." ANZ journal of surgery **87**(3): 186-189.

BACKGROUND: Cerebral gunshot wounds represent one of the most lethal forms of traumatic brain injury, but there is a paucity of literature on the topic, especially from the developing world. We reviewed our experience and describe the spectrum and outcome of civilian cerebral gunshot wounds in a major metropolitan trauma centre in South Africa., METHODS: This was a retrospective study of all patients with isolated cerebral gunshot wounds managed by the Pietermaritzburg Metropolitan Trauma Service over a 5-year period from 2010 to 2014., RESULTS: One hundred and two patients were included, 92% (94/102) were male and the mean age was 29 years. Fifty-four per cent (55/102) of all patients were from urban areas. The mean time from injury to arrival was 6 h (standard deviation: 5) for urban patients and 15 h (standard deviation: 5.2) for rural patients ($P < 0.001$). Ninety-four per cent (94/102) of all injuries were related to interpersonal violence and involved low velocity firearms. Twenty per cent of all patients (20/102) had a Glasgow Coma Scale 3-8, 20% (20/102) 9-12 and 61% (61/102) 12-15. All 102 patients underwent computed tomography scans. Thirty per cent (31/102) required neurosurgical interventions. The overall mortality rate was 22% (22/102). There was a significant difference in mortality between urban and rural patients (9% versus 36%, $P < 0.001$)., CONCLUSIONS: Cerebral gunshot wounds are associated with significant mortality and protracted delay to definitive care is common in our

setting. Those who survive the delayed transfer to definitive care generally do well and have reasonably good clinical outcomes. Copyright © 2016 Royal Australasian College of Surgeons.

2878. Kong, V. Y., et al. (2019). "Civilian cerebral gunshot wounds in rural South African patients are associated with significantly higher mortality rates than in urban patients." European journal of trauma and emergency surgery : official publication of the European Trauma Society **45**(1): 145-150.

INTRODUCTION: This study focuses on a specific and often dramatic injury, namely gunshot wounds (GSW) of the head in order to determine whether there is a discrepancy in outcome between patients who sustain their injury in a rural setting and those who sustain it in an urban setting., MATERIALS AND METHODS: This study involves a retrospective review of our prospectively maintained regional electronic trauma registry. All patients who sustained a cerebral GSW from January 2010 to December 2014 were reviewed., RESULTS: During the 5-year study period, a total of 102 patients sustained an isolated cerebral GSW. Ninety-two per cent (94/102) were male and the mean age was 29 years. Ninety-four per cent (94/102) of injuries were related to interpersonal violence. Of the 102 patients in the study, 54% (55/102) were urban and were transported directly to our trauma centre. The remaining 46% (47/102) were rural and were transported to a rural district hospital prior to being referred to our trauma centre. The time of injury was available in 60% (61/102) of patients. The mean time from injury to arrival for all patients was 11 h (SD 7). The mean time from injury to arrival was significantly shorter for urban versus rural, 6 h (SD 5) and 15 h (SD 5), respectively ($p < 0.001$). The median admission GCS score was significantly lower in rural compared to urban patients ($p = 0.022$). The need for neurosurgery, need for ICU admission or length of hospital stay was not significantly different between rural and urban patients. Rural patients have a fourfold higher mortality compared with urban patients (36 vs 9%, $p = 0.001$). Amongst survivors, there was no significant difference in median length of hospital stay or mean discharge GCS., CONCLUSIONS: Cerebral GSWs are highly lethal injuries associated with significant mortality. Rural patients have a significantly longer transfer time, lower GCS on arrival and higher mortality than urban patients. Efforts should be directed at improving the pre-hospital EMS system in order to reduce delay to definitive care so that patient outcome can be optimised.

2879. Kong, V. Y., et al. (2018). "Developing a simplified clinical prediction score for mortality in patients with cerebral gunshot wounds: The Maritzburg Score." Annals of the Royal College of Surgeons of England **100**(2): 97-100.

Introduction Cerebral gunshot wounds are highly lethal and literature on the clinical scores for mortality prediction is limited. Materials and methods A retrospective study was undertaken over a 5-year period at the Pietermaritzburg Metropolitan Trauma Service in South Africa. A simplified clinical prediction score was developed based on clinical and/or physiological variables readily available in the resuscitation room. Results A total of 102 patients were included; 92% (94/102) were male and the mean age was 29 years; 22% (22/102) died during the admission. The presence of visible brain matter (odds ratio 12.4, $P = 0.003$) and motor score less than 5 (odds ratio 89.6, $P < 0.001$) allows the prediction success of 92% (sensitivity 73% and specificity 98%). The area under the receiver operating characteristic curve was 94% (95% confidence interval 88-100%, $P < 0.001$). Conclusions The presence of visible brain matter, together with a motor score of less than 5, allows accurate identification of non-survivors of cerebral gunshot wounds. Further study is required to validate this score.

2880. Kong, V. Y., et al. (2018). "Validation of the Baragwanath mortality prediction score for cerebral gunshot wounds: the Pietermaritzburg experience." European journal of trauma and emergency surgery : official publication of the European Trauma Society **44**(4): 615-620.

INTRODUCTION: Cerebral gunshot wounds (GSW) are highly lethal injuries. To date, only one clinical scoring system to predict mortality in a developing world setting has been described. This is the Baragwanath mortality prediction score ("ABC": admission blood pressure, brain matter spillage and consciousness level)., MATERIALS AND METHODS: We performed a retrospective review of prospectively entered data for a cohort of patients with isolated cerebral GSWs over a 5-year period (January 2010-December 2014) in our institution. We aimed to validate the Baragwanath ABC mortality prediction score in our population., RESULTS: During the 5-year study period, 102 patients with isolated cerebral GSWs were reviewed, 22% (22/102) of which died. Based on the total ABC score (1-5), the mortality was 0% for 1, 21% for 2, 67% for 3, 92% for 4, and 100% for 5. The ABC score has a sensitivity of 82% (95% CI 60-95%), specificity of 96% (95% CI 89-99%), PPV of 86% (95% CI 66-96%) and NPV of 95% (95% CI 86-99%).,

CONCLUSIONS: The Baragwanath mortality prediction score accurately predicts non survival of patients with a cerebral GSW in our patient cohort. Further validation studies in other populations are required before this system can be widely adopted.

2881. Kong, V. Y., et al. (2018). "A raised serum lactate level is an independent predictor of in-hospital mortality in patients with isolated cerebral gunshot wounds." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde **108**(5): 413-417.

BACKGROUND: Cerebral gunshot wounds (CGSWs) represent a highly lethal form of traumatic brain injury, and triaging these patients is difficult. The prognostic significance of the serum lactate level in the setting of CGSWs is largely unknown., OBJECTIVES: To examine the relationship between elevated serum lactate levels and mortality in patients with isolated CGSWs., METHODS: A retrospective review of the regional trauma registry was undertaken at the Pietermaritzburg Metropolitan Trauma Service, South Africa, over a 5-year period from 1 January 2010 to 31 December 2014. All patients with an isolated CGSW were included., RESULTS: A total of 102 patients with isolated CGSWs were identified. Of these, 92.2% (94/102) were male. The mean age (standard deviation) was 29 (8) years, and the in-hospital mortality rate was 21.6% (22/102). The mean serum lactate level was significantly higher among non-survivors than among survivors (6.1 mmol/L v. 1.3 mmol/L; p<0.001). Lactate levels among non-survivors were <2 mmol/L in 4.5%, 2 - 3.99 mmol/L in 9.1%, 4 - 5.99 mmol/L in 36.4% and >=6 mmol/L in 50.0%. The odds ratio for mortality with a lactate level of 4 - 5.99 mmol/L was 67 (95% confidence interval (CI) 1.7 - 2 674.2), while for a lactate level of >=6 mmol/L it was 1 787 (95% CI 9.0 - 354 116.1). The serum lactate level accurately predicted mortality even after adjustment for other variables. Based on a receiver operating curve analysis, an optimal cut-off of 3.3 mmol/L for serum lactate as a predictor for mortality was identified (area under the curve = 0.957)., CONCLUSIONS: CGSWs are associated with significant mortality, and a raised serum lactate level appears to be an independent predictor of in-hospital mortality. It is a potentially useful adjunct in the resuscitation room for identifying patients with a very poor prognosis.

2882. Kong, V. Y., et al. (2018). "Routine cervical spine immobilisation is unnecessary in patients with isolated cerebral gunshot wounds: A South African experience." Emergency medicine Australasia : EMA **30**(6): 773-776.

OBJECTIVE: Routine immobilisation of the cervical spine in trauma has been a long established practice. Very little is known in regard to its appropriateness in the specific setting of isolated traumatic brain injury secondary to gunshot wounds (GSWs)., METHODS: A retrospective study was conducted over a 5 year period (January 2010 to December 2014) at the Pietermaritzburg Metropolitan Trauma Service, Pietermaritzburg, South Africa in order to determine the actual incidence of concomitant cervical spine injury (CSI) in the setting of isolated cerebral GSWs., RESULTS: During the 5 year study period, 102 patients were included. Ninety-two per cent (94/102) were male and the mean age was 29 years. Ninety-eight per cent of the injuries were secondary to low velocity GSWs. Twenty-seven (26%) patients had cervical collar placed by the Emergency Medical Service. The remaining 75 patients had their cervical collar placed in the resuscitation room. Fifty-five (54%) patients had a Glasgow Coma Scale (GCS) of 15 and underwent plain radiography, all of which were normal. Clearance of cervical spine based on normal radiography combined with clinical assessment was achieved in all 55 (100%) patients. The remaining 47 patients whose GCS was <15 all underwent a computed tomography (CT) scan of their cervical spine and brain. All 47 CT scans of the cervical spine were normal and there was no detectable bone or soft tissue injury noted., CONCLUSION: Patients who sustain an isolated low velocity cerebral GSW are highly unlikely to have concomitant CSI. Routine cervical spine immobilisation is unnecessary, and efforts should be directed at management strategies aiming to prevent secondary brain injury. Further studies are required to address the issue in the setting of high velocity GSWs.

2883. Konovalov, A. N., et al. (1985). "[Toward a single inter-disciplinary classification of cranio-cerebral injuries]." K edinoi mezhdistsiplinarnoi klassifikatsii cherepno-mozgovoi travmy. **85**(5): 651-658.

The article presents clinical criteria of the diagnosis of concussion, contusion and compression of the brain in the acute period of a craniocerebral injury. The authors specify the major signs of a moderate and deep stun, sopor, as well as moderate, deep and coma de passe. Unified evaluations of the severity of the state of a patient with a craniocerebral injury are described.

2884. Koo Ng, N. K. F., et al. (2009). "Image guidance removal of a foreign body in the orbital apex." Orbit (Amsterdam, Netherlands) **28**(6): 404-407.

Retrieval of foreign bodies lodged in the orbit present a challenging surgical problem. The trans-nasal approach when combined with image-guided navigation allows clear identification of structures and increased safety. We report a case of a successful removal of a foreign body under image-guidance using a trans-nasal approach.

2885. Kopacz, A. A., et al. (2021). "Novel Predictive Markers on Computed Tomography for Predicting Early Epidural Hematoma Growth in Pediatric Patients." Journal of neurosciences in rural practice **12**(4): 689-693.

Objective Epidural hematoma (EDH), most often caused by rupture of the middle meningeal artery secondary to head trauma with fracture of the temporal bone, is a potentially fatal condition that can lead to elevated intracranial pressure, herniation, and death within hours following the inciting traumatic incident, unless surgical evacuation is accomplished. Several markers have been found to be associated with hematoma expansion in intracerebral hemorrhage (ICH) patients, including: the CT Blend Sign, Swirl Sign, and Black Hole Sign. This study aims to examine these markers, along with intradural air close to or in the region of an EDH and/or close to a significant fracture, fractures involving the skull base, and complicated (i.e., comminuted or displaced) fractures for possible associations to EDH growth in the pediatric population. Predicting hematoma growth is a crucial part of patient management, as surgery can be a life-saving intervention. Methods Scans from all pediatric patients with EDH from 2012 to 2019 across two separate health systems were examined and measurements were taken to determine whether these additional factors are of predictive value. Specifications such as length, transverse, and height measurements were taken from CT images. Statistical Analysis The average percent change in the hematoma measurements was used to determine which predictive factors were associated with a "noteworthy increase," namely, an increase of greater than 25%. Additionally, the average percent change in hematoma size was evaluated for patients whose original imaging showed either all three CT signs or intradural air in all three specified locations. Results Most of the proposed markers were associated with EDH growth in this cohort. The established CT signs were also supported. This is notable, as most of the research on these signs has been in adult populations rather than pediatric. Conclusions Adding these novel imaging signs could aid in the decision to operate on versus observe PEDH patients, thereby preventing unnecessary procedures or preserving brain function quickly when surgery is indicated. This study serves as a starting point for several other investigations into the validity of the proposed markers as well as a reevaluation of the current signs in the pediatric population.

2886. Kopczak, A. and G. K. Stalla (2014). "Neuroendocrine disorders after traumatic brain injury. A review for clinicians." Internistische Praxis **54**(2): 323-333.

In the last years, there is increasing interest in hypophyseal dysfunction as a consequence of traumatic brain injury. Posttraumatic hypopituitarism can be caused directly (i.e. by gunshot, stitch damage or fractures of the sella turcica) or by indirect damage (i.e. reduced perfusion in case of oedema or traumatic subarachnoid hemorrhage). Acute hormonal dysfunctions as central hypogonadism or hypercortisolism are physiological processes to adapt to critical illness. There is no need to treat them. In the post-acute chronic phase (>3 to 5 months), the prevalence of posttraumatic hypopituitarism is described to be about 27% in severely ill patients which are in need of a prolonged rehabilitation therapy. Risk factors are low initial GCS, older age, brain swelling, basal scull fracture and diffuse axonal injury. The most common disorders are isolated partial insufficiencies, mostly the gonadotropic (13%), the somatotropic (11%) or the corticotropic axis (11%) is affected. Combined partial insufficiencies can also occur. Panhypopituitarism is a rare disorder. The symptoms caused by posttraumatic hypopituitarism overlap with the sequelae of the traumatic brain injury, which makes it difficult to recognize and to diagnose pituitary insufficiency in these patients. Following screening parameters can be used: fT4 (thyroid axis), testosterone or estradiol in combination with FSH and LH (gonadotrop axis), IGF-1 (screening for the somatotrop axis), prolactin (lactotrop axis) and fasting cortisol (screening for the corticotrop axis). Low IGF-1 is a marker for growth hormone deficiency (GHD), but normal IGF-1 values do not exclude GHD. To diagnose corticotropic and somatotrop insufficiencies, stimulation tests are required. Hormone replacement therapy

seems to be useful. However, there is a lack of therapeutical studies to clearly show a benefit in substituted individuals in most cases.

2887. Kopell, B., et al. (2020). "Transcranial Magnetic Stimulation for Pain, Headache and co-morbid depression: INS-NANS Expert Consensus Panel Review and Recommendation." Brain stimulation **13**(6): 1851.

Background: Persistent Post-Traumatic Brain Injury (PTBI) Related Headache (PTBI-HA) is one of the most common debilitating chronic pain conditions in patients after a mild/moderate traumatic brain injury. Unfortunately, conventional pharmacological treatments for PTBI-HA have not been shown to be effective. Under the guidance of a steering committee composed of International Neuromodulation Society (INS) and the North American Neuromodulation Society (NANS) leadership, this expert panel provided TMS treatment recommendations for the PTBI-HA. Methods: Individual studies were first rated by the guideline established by American Academy of Neurology Classification of Evidence for Therapeutic Studies. The overall clinical evidence was then rated based on Type of Study Design and Level of Certainty, and recommendation was provided based on the US Preventive Service Task Force (USPSTF) and Centers for Disease Control and Prevention (CDC) criteria. Based on the existing clinical outcome evidence for the short-term efficacy (1-2 month) in alleviating PTBI-HA symptoms, the majority of the task group members rated the Study Design as I (Randomized Controlled Trials) for TMS at M1 or left LDLPFC, Level of Certainty in Evidence as High for PTBI-HA. Results/Conclusions: The task group also rated USPSTF recommendation as A (Extremely Recommendable) and CDC recommendation as IA (Strongly Recommended) for the clinical implementation of the rTMS at either M1 or left LDLPFC for mild PTBI-HA with the latter being considered as alternate treatment location for patients with PTBI-HA and co-morbid severe depression.

2888. Kordestani, R. K., et al. (1997). "Cerebral arterial spasm after penetrating craniocerebral gunshot wounds: transcranial Doppler and cerebral blood flow findings." Neurosurgery **41**(2): 351-360.

OBJECTIVE: The goals of the study were to determine the incidence and time course of cerebral arterial spasm in patients with penetrating craniocerebral gunshot wounds, to study the relationship between vasospasm and subarachnoid hemorrhage (SAH) in these patients, and to evaluate the effects of vasospasm on outcome., METHODS: Thirty-three patients with craniocerebral gunshot wounds underwent computed tomography at admission and then underwent transcranial doppler ultrasonography (TCD). Velocities in the middle cerebral artery and the extracranial internal carotid artery were measured. Vasospasm was defined as a middle cerebral artery velocity greater than 120 cm per second and a hemispheric index (ratio of middle cerebral artery to internal carotid artery velocity) greater than 3. Intravenous xenon-133 cerebral blood flow (CBF) studies were performed for 10 patients., RESULTS: TCD was initiated, on average, 1.1 days after injury; 205 studies (mean, 6.3 studies/patient) were performed 0 to 33 days after injury. TCD showed vasospasm in 14 patients (42.4%). Xenon-133 studies performed within 24 hours of TCD measurements indicating spasm demonstrated normal or low CBF in three of five patients with spasm, ruling out hyperemia as the cause of elevated flow velocities in these three patients. Seven patients had unilateral vasospasm, and seven had bilateral spasm. Vasospasm was most prominent from Days 5 through 11. Vasospasm was distributed across all levels of injury severity, as defined by the Glasgow Coma Scale. Initial computed tomographic scans demonstrated SAH in all 14 patients with vasospasm but in only 9 of 19 without spasm (100 versus 47%, $P < 0.0001$, binomial distribution probability test). Outcomes for patients with vasospasm were slightly worse than for those without spasm (35.7 versus 47.4% good outcomes, respectively); however, this difference did not reach statistical significance ($P = 0.12$)., CONCLUSION: These findings demonstrate that delayed cerebral arterial spasm is a frequent complication in patients with craniocerebral gunshot wounds and is strongly associated with SAH. The frequency, time course, and severity of spasm are comparable with those observed with aneurysmal SAH and traumatic SAH caused by closed head injury. This study offers new insights into the hemodynamic pathophysiology after gunshot wounds to the brain and suggests that increased vigilance for vasospasm may be of benefit.

2889. Kordestani, R. K., et al. (1995). "Cerebral hemodynamic disturbances following penetrating craniocerebral injury and their influence on outcome." Neurosurgery clinics of North America **6**(4): 657-667.

Available data on the subject of cerebrovascular dynamics after penetrating craniocerebral injury and their effect on outcome were reviewed. Following penetrating injury, CBF is depressed, as is cerebral metabolism. This decreased flow likely is associated with poor outcome as previously shown in closed head injuries. A phenomenon

interrelated with a decreased blood flow is posttraumatic vasospasm. Vasospasm occurs in a significant percentage of patients as demonstrated both by TCD and angiography, and there is a strong relationship with SAH. Vasospasm following penetrating injury has an onset and time course similar to that seen in both closed head injury and aneurysmal SAH. Vasospasm following penetrating craniocerebral injury may be a cause of secondary ischemic injury, but further study is needed before the prognostic significance of this phenomenon is defined. For now, drawing a parallel with closed head injury and aneurysmal SAH, it can be inferred that vasospasm following cranial gunshot wound may be an important pathophysiologic factor. Because interventions are available to combat vasospasm, including medications (e.g., nimodipine), volume expansion, and elevation of blood pressure, the authors believe that identification and treatment of this potentially damaging condition are compelling, especially in patients whose CT scans demonstrate SAH.

2890. Korolev, M. F. and N. A. Zaets (1971). "[Use of angiography in otorhinolaryngology]." O primenenii angiografii v otorinolaringologii. **33**(1): 114-116.

2891. Kosa, F., et al. (1978). "[Bullet embolism of the median cerebral artery]." Az arteria cerebri media soret-emboliaja. **21**(1): 75-79.

A shot injury to the middle cerebral artery caused occlusion to the vessel by thrombosis and emboly of the missile. The projectil had been removed, but a thrombus formed in the a. cerebri media as a postoperative complication or by progression of a thrombosis in the internal carotid artery and after 19 days the patient died. A focal emollition of the left cerebral hemisphere was found at autopsy.

2892. Kosaka, S. (2015). "[Tracheobronchial Injury]." Kyobu geka. The Japanese journal of thoracic surgery **68**(8): 660-664.

Tracheobronchial injuries (TBIs) are uncommon but potentially life-threatening. TBIs are mainly classified in 2 category, traumatic and iatrogenic. Most common symptoms are dyspnea, subcutaneous emphysema and pneumomediastinum. Pneumothorax is often found in lower tracheal or bronchial injury. Fiberoptic bronchoscopy is most important examination for TBI to detect injured site and its depth. Iatrogenic TBIs are caused by tracheal intubation, tracheostomy and airway intervention. Injury of iatrogenic TBIs are commonly laceration of membranous part. Surgical repair was performed for treatment of iatrogenic TBI. However, recently there has been reported many successful cases of non-operative treatment. Conservative treatment is a considerable choice of treatment. Approach of surgical repair depends on site of tracheal laceration. For laceration of cervical or upper mediastinal trachea, cervical approach is chosen. Recently transcervical-transtracheal repair were reported. Right posterolateral thoracotomy is suitable for repair of carina or main bronchus. Most of TBI caused by blunt trauma occur around carina. Operative treatment is mandatory in many cases. However morbidity and mortality are considerably high in emergent operation for traumatic TBI. It is necessary to make an appropriate strategy for treatment in an experienced trauma center.

2893. Kose, T. E. and A. B. Cankaya (2015). "Foreign objects: Rubber damn!" British dental journal **218**(2): 44.

2894. Koso-Thomas, A. K. and E. H. Harley (1995). "Traumatic cerebrospinal fluid fistula presenting as recurrent meningitis." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **112**(3): 469-472.

2895. Kossmann, T., et al. (1996). "Penetration of cefuroxime into the cerebrospinal fluid of patients with traumatic brain injury." The Journal of antimicrobial chemotherapy **37**(1): 161-167.

Cefuroxime levels were measured in cerebrospinal fluid (CSF) and serum of four patients with traumatic brain injury following the implantation of intraventricular catheters. The levels ranged from 0.15 to 2.03 micrograms/mL in CSF and from 1.8 to 66.9 micrograms/mL in serum. No ventriculostomy related infections were detected.

2896. Koszyca, B., et al. (1998). "Widespread axonal injury in gunshot wounds to the head using amyloid precursor protein as a marker." Journal of neurotrauma **15**(9): 675-683.

In order to determine whether axonal injury (AI) is a factor in cases of penetrating head injury, the brains of 14 patients who died shortly after sustaining a fatal gunshot wound (GSW) to the head were examined, and the presence of AI determined using immunohistochemical staining for amyloid precursor protein (APP). The distribution of AI was mapped throughout the cerebral hemispheres and brain stem. AI was present in all cases in a diffuse distribution distant to the missle track with severe involvement of the brain stem in all cases. There was no axonal APP immunoreactivity in the direct region of the missle track at the point of primary axotomy. The APP-positive AI in these cases is likely to be a mixture of primary and secondary AI as APP immunostaining is unable to distinguish primary AI due to mechanical deformation from AI secondary to hypoxic-ischemic damage.

2897. Kotecha, N., et al. (2016). "Key in Brain: An Interesting Case of Civilian Penetrating Head Injury." Indian Journal of Neurotrauma **13**(1): 46-49.

Civilian penetrating head injuries are not common, and the occurrence of such injuries in the pediatric population is rare. Pediatric penetrating head injuries are low-velocity injuries, resulting from household objects. Presentation entirely depends on the area of the brain involved. There are several management dilemmas related to the nature, size, shape, and location of the object, but always warrants removal of the foreign body into the operation theater. The outcome depends on the presenting neurological status of the patient, which reflects underlying parenchymal injury. We are reporting an interesting case of civilian penetrating head injury in a 5-year-old female child with a key in the brain. Computed tomographic scan of the brain revealed a household key penetrated through the right temporal bone. The patient underwent a surgical procedure for the removal of the key. She recovered well without any neurological deficit.

2898. Kotlus, B. S. and M. W. Lo (2007). "Subarachnoid hemorrhage and vasospastic stroke after self-enucleation." Ophthalmic plastic and reconstructive surgery **23**(5): 425-427.

A 31-year-old intoxicated woman self-enucleated her left eye during an acute psychotic episode. CT revealed avulsion of the intracranial optic nerve, chiasmal edema, and adjacent subarachnoid hemorrhage. Exploration via transconjunctival orbitotomy was performed, and the globe and 4.8 cm of contiguous optic nerve were removed. The patient developed postoperative contralateral visual loss followed by middle cerebral artery vasospasm and bilateral cortical infarcts.

2899. Kountakis, S. E., et al. (1996). "Pediatric gunshot wounds to the head and neck." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **114**(6): 756-760.

Gunshot wounds to the head and neck in the pediatric population have become alarmingly common. They often result in death of the victim, devastate families, and inflict a considerable financial burden to hospitals and society. We present a retrospective study of cases treated at a level I trauma center in Houston, Texas, from July 1990 to July 1993. We identified 115 cases of gunshot wounds in children, 32 of which were exclusively confined to the head and neck region. There were 26 male and 6 female patients. Ages ranged from 3 to 17 years. The cranial cavity was involved in 13 cases, leading to 9 deaths and 1 institutionalization. The shootings took place at home in 11 cases, and they involved play in 12 cases. The shooter was known to 14 of the victims, and the wounds were self-inflicted in 7 cases. The most common type of weapon was the .22 caliber pistol, which caused four of the deaths. Two of our cases involved BB air rifles, one of which mandated a craniotomy for the evacuation of an epidural hematoma. Our findings indicate that gunshot wounds to head and neck in children are in most instances preventable and result in high fatality rates because of common intracranial involvement, even when low-energy missiles are used.

2900. Koutsouras, G. W., et al. (2020). "An Analysis of Pediatric Cerebral Vascular Injury Following Blunt and Penetrating Trauma in a Single Level 1 Trauma Center." Clinical neurosurgery **67**(SUPPL 1): 203.

INTRODUCTION: Cerebral vascular injury (CVI) in the pediatric trauma population carries a significant risk of devastating neurologic sequelae and mortality. There is a paucity of literature that reports the incidence of

cerebrovascular injury following blunt or penetrating trauma. The incidence of injury are between 0.03%-1.3%. METHODS: We performed a retrospective analysis at a level one adult and pediatric trauma center between 2004-2018 and performed population-based observational analyses to describe our cohort. RESULTS: Of 5,105 patients presenting after trauma evaluation, 631 patients (12%) were screened with cranial vessel imaging. Of those patients, only six patients (0.09%) were found to have cerebrovascular injuries. The average age was 10.5 years (range 2-15). All patients of blunt cerebrovascular injury (n = 5) also sustained injuries to alternative areas, while the one patient after penetrating injury was isolated to the head. All patients that received a CT angiogram, yet three patients required a diagnostic cerebral angiogram, in which two received endovascular intervention. Vascular injuries included dissection, pseudoaneurysm and direct cavernous-carotid fistula (CCF). Two patients died while inpatient, with one whom died secondary to the vascular injury, which was the patient who had a CCF. CONCLUSION:We aimed to shed light on the incidence of pediatric vascular injury from a level one trauma center that serves an urban and rural community in the northeast. Further research to characterize this on a national level are warranted to better define patients who meet criteria for vascular imaging and subsequent treatment.

2901. Kouzminova, N., et al. (2009). "The efficacy of a two-tiered trauma activation system at a level I trauma center." The Journal of trauma **67**(4): 829-833.

BACKGROUND: By using current American College of Surgeons trauma center triage criteria, 52% of patients transported to our level I trauma center are discharged home from the emergency department (ED). Because the majority of our trauma transports were based solely on mechanism of injury, we instituted, in 1990, a two-tiered trauma team activation system. Patients are triaged into major and minor trauma alert categories based on prehospital provider information. For minor trauma patients, respiratory therapy, operating room staff, and blood bank do not respond. The current study evaluated this triage system., METHODS: Trauma registry data on all trauma activations from 1998 to 2007 were analyzed., RESULTS: There were 20,332 trauma activations: 5,881 were major trauma, 14,451 minor trauma. The mean Injury Severity Score in major versus minor patients was significantly different (11.7 vs. 3.6, $p < 0.0001$). Significant differences ($p < 0.0001$) were also noted for all other markers of serious injury: Injury Severity Score >16, ED blood pressure <90, Glasgow Coma Score <or=12, ED intubation, disposition directly to the operating room or the intensive care unit, and death. There were 19 deaths (0.13%) in the minor trauma group, all occurring after hospital admission. All these patients were seen in the ED by the attending trauma surgeon. Two patients were mistriaged. The remaining 17 deaths were due to progression of brain injury in 10 patients, preexisting medical conditions in 4, delayed diagnosis of blunt intestinal injury in 1, delayed aortic rupture in 1, and papillary muscle rupture in 1., CONCLUSION: A two-tiered trauma activation system identifies patients who require a full trauma team response and may result in a more effective use of trauma center resources.

2902. Kovacevic, I., et al. (2013). "[Pars plana vitrectomy with extraction of intraocular foreign body in patients with siderosis of the eye: report of two cases]." Srpski arhiv za celokupno lekarstvo **141**(5-6): 371-374.

INTRODUCTION: Penetrating injury is characterized by the existence of entry wound only, and it can be with or without an intraocular foreign body (IOFB). IOFB can lead to a mechanical injury of the eye and to cause infection or to manifest other toxic effects on intraocular structures. Iron and copper can dissolve and cause siderosis, i.e. chalcosis of the eye. Ocular siderosis is diagnosed by clinical and electroretinogram (ERG) findings., OUTLINE OF CASES: The first patient was a 37-year-old male who was injured by a metal foreign body. He presented at the Clinic two years after the injury. Visual acuity of the right eye (VOD) on admission was VOD=L+P+ (light projection). Pars plana phaco-vitrectomy with IOFB extraction was done. Visual acuity on discharge was VOD=3/60 cc + 7.50 Dsph=0.2. The second patient was a 55-year-old male who presented at the clinic 18 months after injury. On admission visual acuity in his left eye was VOS 1/60. Pars plana phacovitrectomy with IOFB extraction was done.Visual acuity on discharge was VOS=0.7 through the stenopeic slit., CONCLUSION: In penetrating injuries caused by a metal IOFB pars plana vitrectomy with IOFB extraction is indicated. In cases with IOFB, when visual acuity is preserved, the lens is transparent, while the eye is without signs of infection, urgent pars plana vitrectomy is not necessary. Such patients need regular followup with obligatory ERG findings.

2903. Kovacs, A. F. (2000). "Clinical analysis of implant losses in oral tumor and defect patients." Clinical oral implants research **11**(5): 494-504.

In the period between 1990 and 1996, 279 endosteal dental Bone-Lock implants were placed in 79 patients. Of them 63 have been treated with ablative tumor and reconstructive surgery in the oral cavity, the rest presented with maxillo-mandibular defects of different origin. The circumstances of implant loss were noted down for descriptive analysis concerning age, sex, topography, implant dimensions, loading, time in place and type of superstructure. Failure analysis was done concerning the implants and the patients. Five causes for implant loss could be detected: lacking primary osseointegration, acute inflammation, bone loss, biomechanical overloading and tumor recurrence. No predictive factors for implant loss and no age influence on implant loss could be detected, no specific local implant site and no specific superstructure had an identifiable higher risk. Survival rate of all placed implants in oral tumor and defect patients was 83.5% after 6 years observation. Male tumor patients were found to have a higher risk to lose implants than females. Free iliac bone grafts impaired osseointegration of implants. The mandible offered a better prognosis for the implants than the maxilla. Shorter and thinner implants had a higher risk of being lost. A quarter of all patients (26.3%) had to face implant loss. Clustering of implant loss in several patients was caused by free iliac bone grafting and by prosthetic faults. Chemotherapy had no negative influence on implant survival. Most implants were lost early (76%) before fabrication of the prosthesis. After restoration there was a nearly 100% probability of function. It is concluded that implant treatment can be equally effective for tumor and defect patients as it is known for healthy subjects.

2904. Kovbasin, V. F. (1981). "[Diagnosis of mechanical injuries similar to bullet wounds]." K diagnostike mekhanicheskikh povrezhdenii, skhodnykh s pulevymi ranami. **24**(4): 20-21.

2905. Koyama, J., et al. (2020). "Microsurgical confirmation of parenchymal contamination of hair in a pediatric patient with a penetrating head injury." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **36**(4): 857-860.

Penetrating head injuries are rare, but can cause severe morbidity in children. In particular, penetrating head trauma with a wooden foreign body is considered to be likely to cause central nervous system infections because of its porosity and softness. However, actually confirming minute contaminations, such as skin debris or hair, in the brain parenchyma is rare. We report the case of a 2-year-old boy who presented with a penetrating head injury by a chopstick. During surgical removal of the chopstick, intraparenchymal hair contamination was confirmed under a surgical microscope. The postoperative course of the patient was uneventful. After 13 months of follow-up without any infectious events, the patient remains well and asymptomatic. The findings in the present case demonstrate that in the case of a penetrating head trauma with a wooden foreign body, surgical removal and active debridement should be the treatment of first choice.

2906. Koyanagi, M., et al. (2011). "Penetrating brain injury caused by retained plastic tip of ballpoint pen." Pediatric neurosurgery **47**(6): 462-463.

2907. Kozai, T. D. Y., et al. (2016). "Dexamethasone retrodialysis attenuates microglial response to implanted probes in vivo." Biomaterials **87**: 157-169.

Intracortical neural probes enable researchers to measure electrical and chemical signals in the brain. However, penetration injury from probe insertion into living brain tissue leads to an inflammatory tissue response. In turn, microglia are activated, which leads to encapsulation of the probe and release of pro-inflammatory cytokines. This inflammatory tissue response alters the electrical and chemical microenvironment surrounding the implanted probe, which may in turn interfere with signal acquisition. Dexamethasone (Dex), a potent anti-inflammatory steroid, can be used to prevent and diminish tissue disruptions caused by probe implantation. Herein, we report retrodialysis administration of dexamethasone while using in vivo two-photon microscopy to observe real-time microglial reaction to the implanted probe. Microdialysis probes under artificial cerebrospinal fluid (aCSF) perfusion with or without Dex were implanted into the cortex of transgenic mice that express GFP in microglia under the CX3CR1 promoter and imaged for 6 h. Acute morphological changes in microglia were evident around the microdialysis probe. The radius of microglia activation was 177.1 mum with aCSF control compared to 93.0 mum with Dex perfusion. T-stage morphology and microglia directionality indices were also used to quantify the microglial response to implanted probes as a function of

distance. Dexamethasone had a profound effect on the microglia morphology and reduced the acute activation of these cells. Copyright © 2016 Elsevier Ltd. All rights reserved.

2908. Kozak, J., et al. (1997). "Contemporary state of surgical treatment of facial nerve paresis. Preliminary experience with new procedures." Acta chirurgiae plasticae **39**(4): 125-131.

Treatment of paresis of the facial nerve is a serious problem which has advanced greatly during the past three decades. The possibilities of surgical treatment are very extensive--from excisions, implantations of springs and weights, to passive and active supports, muscle transposition, transposition and suture of regional nerves to nervous and muscular transplants. The authors demonstrate their experience with transposition of the temporal muscle and methods of transplants of nervous grafts taken from the sural nerve and in the second stage transplants of a portion of the m. latissimus dorsi or m. serratus ant. in five patients. According to the authors the problem is that patients come for reconstruction operations after long time intervals and sometimes already after several operations. The most suitable surgical procedure must be selected on a strictly individual basis with regard to various mentioned criteria.

2909. Kozic, Z. and L. H. Zingesser (1978). "Traumatic cerebrospinal fluid-lymphatic fistula. Case report." Journal of neurosurgery **49**(4): 607-609.

2910. Kramer, A. H., et al. (2013). "Incidence of neurologic death among patients with brain injury: a cohort study in a Canadian health region." CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne **185**(18): E838-845.

BACKGROUND: Hospital mortality has decreased over time for critically ill patients with various forms of brain injury. We hypothesized that the proportion of patients who progress to neurologic death may have also decreased., METHODS: We performed a prospective cohort study involving consecutive adult patients with traumatic brain injury, subarachnoid hemorrhage, intracerebral hemorrhage or anoxic brain injury admitted to regional intensive care units in southern Alberta over a 10.5-year period. We used multivariable logistic regression to adjust for patient age and score on the Glasgow Coma Scale at admission, and to assess whether the proportion of patients who progress to neurologic death has changed over time., RESULTS: The cohort consisted of 2788 patients. The proportion of patients who progressed to neurologic death was 8.1% at the start of the study period, and the adjusted odds of progressing to neurologic death decreased over the study period (odds ratio [OR] per yr 0.92, 95% confidence interval [CI] 0.87-0.98, p = 0.006). This change was most pronounced among patients with traumatic brain injury (OR per yr 0.87, 95% CI 0.78-0.96, p = 0.005); there was no change among patients with anoxic injury (OR per yr 0.96, 95% CI 0.85-1.09, p = 0.6). A review of the medical records suggests that missed cases of neurologic death were rare (<= 0.5% of deaths)., INTERPRETATION: The proportion of patients with brain injury who progress to neurologic death has decreased over time, especially among those with head trauma. This finding may reflect positive developments in the prevention and care of brain injury. However, organ donation after neurologic death represents the major source of organs for transplantation. Thus, these findings may help explain the relatively stagnant rates of deceased organ donation in some regions of Canada, which in turn has important implications for the care of patients with end-stage organ failure.

2911. Kramer, L., et al. (2016). "A patterned abrasion caused by the impact of a cartridge case may simulate an atypical muzzle imprint mark." International journal of legal medicine **130**(3): 751-757.

In contact shots, the muzzle imprint is an informative finding associated with the entrance wound. It typically mirrors the constructional components being in line with the muzzle or just behind. Under special conditions, other patterned skin marks located near a gunshot entrance wound may give the impression to be part of the muzzle imprint. A potential mechanism causing a patterned pressure abrasion in close proximity to the bullet entrance site is demonstrated on the basis of a suicidal shot to the temple. The skin lesion in question appeared as a ring-shaped excoriation with a diameter corresponding to that of the cartridge case. Two hypotheses concerning the causative mechanism were investigated by test shots: - After being ejected, the cartridge case ricocheted inside a confined space (car cabin in the particular case) and secondarily hit the skin near the gunshot entrance wound. - The ejection of the cartridge case failed so that the case became stuck in the ejection port and its mouth contacted the skin when the body collapsed after being hit.

2912. Krane, N. A., et al. (2021). "Simultaneous maxillary and mandibular reconstruction with a single Osteocutaneous fibula free flap: A description of three cases." Microsurgery **41**(1): 79-83.

Large defects that comprise both the maxilla and mandible prove to be difficult reconstructive endeavors and commonly require two free tissue transfers. Three cases are presented to discuss an option for simultaneous reconstruction of maxillary and mandibular defects using a single osteocutaneous fibula free flap. The first case describes a 16-year-old male with a history of extensive facial trauma sustained in a boat propeller accident resulting in a class IId maxillary and 5 cm mandibular defect status post three failed reconstructive surgeries; the second, a 33-year-old male with recurrent rhabdomyosarcoma of the muscles of mastication with resultant hemi-mandibulectomy and class IId maxillary defects; and lastly, a 48-year-old male presenting after a failed scapular free flap to reconstruct defects resulting from a self-inflicted gunshot wound, which included a 5 cm defect of the right mandibular body and 4.5 cm defect of the inferior maxillary bone. In all cases, a single osteocutaneous fibula free flap was used in two bone segments; one to obturate the maxillary defect and restore alveolar bone and the other to reconstruct the mandibular defect. The most recent patient was able to undergo implantable dental rehabilitation. Postoperatively, the free flaps were viable and masticatory function was restored in all patients during a follow-up range of 2-4 years.

2913. Kranioti, E. F., et al. (2021). "Virtual Trauma Analysis of the Nineteenth-Century Severed Head of the Greek Outlaw Stavrou." Advances in experimental medicine and biology **1317**: 35-51.

Human remains have been displayed in museums in Europe since many centuries for historical, cultural, and educational reasons. Of particular interest are skeletal remains and body parts that have suffered violent deaths and such remains often feature in Criminology Museums. Despite the well-acknowledged value of human remains in medical education, bioarchaeology, and research, the display of human remains still raises ethical considerations ranging in severity depending on the cultural substrate and legal framework of each country. Recent developments in medical imaging and visualisation are offering an alternative way. Taking into account the emerging issues regarding exhibition and handling of human remains, this research project aims to use virtual methods to reconstruct the circumstances of the death of a nineteenth-century outlaw comprising one of the human exhibits at the Criminology Museum of Athens in Greece.For the purpose of the project, the severed head of the outlaw Stavrou was CT scanned, and the data were used to reconstruct and to evaluate the ballistic trauma sustained at the time of his death. From the scans, it was possible to determine the minimum number of shots, entrance and exit wounds, approximate calibre of the bullets, approximate distance from which they were fired, and general velocity of the round.Shots are fired from the lateral left and backside of the head and bullets exited from the right frontal and temporal area causing extensive damage to the right craniofacial region. The direction of the shots coming from the back and left suggests that Stavrou was more likely ambushed by gendarmerie squads and not shot in a fair fight which would have caused entry wounds in the anterior surface of the body. This is in agreement with historical evidence that placed him in gunfire with his fellow gang member Karapanos against a government squad. On the other hand, the possibility of being captured alive and executed cannot be rejected based only on wound ballistics. This work would be excellent supplementary material to the actual human exhibit for the accurate presentation of Stavrou's history at the Criminology Museum. In addition, it would allow the virtual exhibition of the material for historical and teaching purposes to museums and universities anywhere in Greece and along the globe, thus overcoming the obstacles of moving the actual remains.

2914. Krasna, D., et al. (2019). "Emerging intention tremor after TBI: Case report and literature review." PM and R **11**: S79.

Case Description: TBI patient who developed a tremor in his right upper extremity during rehabilitation after propranolol was tapered off. Setting: 21 days after initial hospital admission patient was transferred to an inpatient rehabilitation center. Patient: 22-year-old male presented to the ED following gunshot wound to the right temporal region. Initial GCS 11. CT head showed multiple traumatic subarachnoid hemorrhages, cerebral edema and minimal midline shift. The patient was taken for right craniectomy. He became febrile and experienced tachycardia. Blood cultures returned with no growth and patient was placed on 7 days of intravenous antibiotics. Fevers and tachycardia persisted so patient was started on propranolol 40 mg Q6H for sympathetic storming. Assessment/Results: One week after rehabilitation admission patient made gains in FIM scores. He had no symptoms of central storming, so propranolol

was weaned off. Over the next 3 days an intention tremor was noted for the first time. Physical therapy noted the tremor affected his balance. Occupational therapy noted that he displayed deficits in speed and dexterity. Propranolol was resumed at a dose of 10 mg Q12H and tremor subsided. Discussion:Weaning propranolol is generally done during the rehabilitation phase of recovery, however no protocol exists for timing or dosing. Aggravation of the cerebellar pathways can go undetected on initial conventional MRI and may present as a delayed onset movement disorder after TBI. When tremor does arise, no protocol exists for treatment. For this particular case, the least effective dose was 10 mg Q12H PO. Conclusion: This case highlights need for Physical Medicine and Rehabilitation physicians to be on alert for tremor and other sequelae of traumatic brain injury throughout recovery, especially as medications are adjusted. In addition, the patient's tremor was resolved with lower than recommended doses of propranolol, illustrating the need for further research of least effective dose of medications used to treat tremor.

2915. Krasznai, L., et al. (1999). "Intracranial traumatic aneurysm: Rare but life threatening complication in severe head injury." Acta Chirurgica Austriaca **31**(SUPPL. 156): 167-169.

Background: Traumatic aneurysm formation is a rare complication of head injury. As with developmental saccular aneurysm, the primary goal in the management of patients harboring this lesion is early identification and intervention. Since computed tomography has replaced cerebral angiography as the neuroradiologic procedure of choice in the setting of acute head injury, the early diagnosis of this entity has become less common. Methods: We present a well documented case of a young lady with a true traumatic aneurysm of the right calloso-marginal artery. Results: Traumatic aneurysms are rare, found in less than 1% of intracranial aneurysms most frequently associated with penetrating trauma. Cases in the setting of closed head injury without associated skull fracture are less common. Blunt trauma produces vascular damage secondary to the acceleration and deceleration of the brain within the skull during impact. Vessels are damaged when compressed against neighboring bony structures or rigid dural edges. Most of traumatic aneurysms are so called false aneurysms with complete laceration of the arterial wall with local hemorrhage. True traumatic aneurysms consist of a localized dilatation of an artery, resulting from partial disruption of the vessel wall. Angiographic criteria for traumatic aneurysm are location at longitudinal wall without bifurcation distally or at skull base, irregular shape, changing size in repeated angiography and slowlyness of cavity filling. 90% of traumatic aneurysms are bleeding within the first 3 weeks after trauma with a mortality of 50% and with a high morbidity because of associated severe injury patterns. Early intervention is a main goal of therapy. In the majority of cases the aneurysm does not have a discrete neck and will not be amenable to surgical clipping with preservation of the parent vessel. Trapping or surgical excision will be necessary to treat these lesions. Conclusions: The described case meets the conditions of a true traumatic aneurysm. Beside of other intensive care monitoring modalities, ICP-monitoring and repeated TCD-investigations were inevitable in detecting and controlling such a lifethreatening condition of a patient in deep coma after severe blunt head injury.

2916. Krauland, W. (1984). "[Evaluation of fatal gunshot injuries (the weapon in the hand)]." Zur Beurteilung von todlichen Schussverletzungen (Die Waffe in der Hand). **174**(1-2): 1-22.

The evidential value of the finding "gun in the hand" has been rated differently in the course of time. While Casper (1857) considered it to be infallible proof of suicide, investigators in later years tended to see it more as a manipulation for the purpose of faking a suicide. In 71 cases of proven suicide by a shot in the head on which autopsies were performed by the Institute of Forensic Medicine (1956-1983), 20 (= 28%) were found with the gun in their hands according to police reports. No case was reported in which the gun was placed in the hand after the fact. The problem is discussed from various points of view (decerebrate rigidity, cataleptic rigidity, multiple shots, capacity to act). In the literature, on the other hand, there were 3 cases in which a gun was placed in the hand of a dead person to provide substantiation of a suicide; three more cases were found in a poll.

2917. Kraus, J. F., et al. (1986). "Incidence, severity, and external causes of pediatric brain injury." American journal of diseases of children (1960) **140**(7): 687-693.

The number of fatal brain injuries and hospital admissions for brain injuries in children up to 15 years old in San Diego County, California, were ascertained from emergency room and hospital records, coroners' reports, death certificates, and nursing home and extended-care records for 1981. The annual brain-injury rate per 100 000 children was 185 (235 for boys and 132 for girls). The major causes of pediatric brain injury were falls (35%), recreational

activities (29%), and motor vehicle crashes (24%). The case-fatality ratio was six deaths per 100 injured children. Of those children admitted to a hospital alive, 88% had a mild brain injury and 44% had no evidence of loss of consciousness. Two thirds of children with mild brain injuries and one third of those with serious brain injuries were transported to a hospital in private nonemergency vehicles.

2918. Kraus, J. F., et al. (1990). "Brain injuries among infants, children, adolescents, and young adults." American journal of diseases of children (1960) **144**(6): 684-691.

Blunt and penetrating force injuries to the brain constitute an enormous public health problem. If a child or young adult survives a moderate or severe brain injury, there is a strong likelihood of a lifetime of physical and mental impairment as well as tremendous economic and social impact on the family. The magnitude of this problem has only been recently appreciated, yet many questions on the causes and short- or long-term outcomes remain unanswered. One conclusion is clear: prevention is the best solution, but information on the nature of the brain injury, exposure factors, and effectiveness of countermeasures is incomplete. We sought to summarize certain basic epidemiological data on brain injuries in infants, children, adolescents, and young adults as well as findings on incidence of brain injury and current data on demographics and risk factors. We also estimated disability and person-years of life lost from brain injuries and highlight the value of helmets as a countermeasure for several exposures to head injury.

2919. Kreitzman, D. and J. Knorr (2003). "Cerebral foreign body." Archives of neurology **60**(11): 1640.

2920. Kretschmer, H. (1980). "[Cerebral missile injuries in civilian practice (author's transl)]." Hirnschussverletzungen in Friedenszeiten. **350**(3): 175-183.

Over a 10 year period we have treated 63 cases of cerebral gunshot injuries, most of them attempted suicides. Following the presentation of ballistic data, and the classification and pathophysiology of the clinical symptoms, early and late complications are reported in detail and recommendations for therapy given. The mortality rate of all admitted patients in our material was 60.9%; a direct relation between the severity of primary brain damage (recognizable in the degree of initial unconsciousness) and the chance of survival was found.

2921. Kriet, J. D., et al. (2005). "Self-inflicted submental and transoral gunshot wounds that produce nonfatal brain injuries: management and prognosis." Journal of neurosurgery **102**(6): 1029-1032.

OBJECT: Penetrating brain injuries caused by self-inflicted gunshot wounds are very often fatal and survivors suffer serious disabilities. Recognition of a possibly more favorable prognosis for a specific type of injury, the submental or transoral handgun or low-energy rifle wound, prompted the authors to review their experience with patients who had attempted suicide in this manner., METHODS: The records of 11 consecutive patients seen over a 10-year period (1992-2001) were retrospectively reviewed. Handguns were used by eight patients and .22 caliber rifles by the others. The patients presented with predominantly unilateral frontal brain injuries that required urgent attention. One elderly patient who had made an advance directive concerning care died. All other patients underwent craniotomy and repair of associated ophthalmological and maxillofacial injuries. Follow-up review ranged from 9 months to 3 years, during which time there were no repeated suicide attempts. All but one patient expressed satisfaction with their appearance and returned to a self-sufficient lifestyle., CONCLUSIONS: Self-inflicted submental and transoral handgun and low-energy rifle wounds may produce serious but survivable brain injuries if the path of the bullet is limited to the frontal area. Early aggressive management of brain, dural, and craniomaxillofacial injuries should return the patient to a highly functional neurological status and restore an acceptable outward appearance. Outcomes, therefore, appear to be much better for these patients than for most patients with a penetrating brain injury due to a self-inflicted gunshot wound.

2922. Kroehne, V., et al. (2011). "Regeneration of the adult zebrafish brain from neurogenic radial glia-type progenitors." Development (Cambridge, England) **138**(22): 4831-4841.

Severe traumatic injury to the adult mammalian CNS leads to life-long loss of function. By contrast, several non-mammalian vertebrate species, including adult zebrafish, have a remarkable ability to regenerate injured organs, including the CNS. However, the cellular and molecular mechanisms that enable or prevent CNS regeneration are largely

unknown. To study brain regeneration mechanisms in adult zebrafish, we developed a traumatic lesion assay, analyzed cellular reactions to injury and show that adult zebrafish can efficiently regenerate brain lesions and lack permanent glial scarring. Using Cre-loxP-based genetic lineage-tracing, we demonstrate that her4.1-positive ventricular radial glia progenitor cells react to injury, proliferate and generate neuroblasts that migrate to the lesion site. The newly generated neurons survive for more than 3 months, are decorated with synaptic contacts and express mature neuronal markers. Thus, regeneration after traumatic lesion of the adult zebrafish brain occurs efficiently from radial glia-type stem/progenitor cells.

2923. Kruchten, E. (2019). "Reevaluation of penetrating midface injury after removal of metallic foreign body." Folia neuropathologica **57**(3): 305.

Traumatic injuries of the midface can be life-threatening. Due to close anatomic proximity of vital structures and sensory systems, penetrating injuries of the skull base, the eye ball or the olfactory region can result in grave consequences. A timely diagnosis and treatment of such injuries is of the utmost importance. I report the case of a 64-year-old man presenting in the emergency room with a saucepan protruding from his right orbit. An initial CT-Scan was performed and showed multiple fractures of the midface. However, due to the presence of stainless steel and the resulting artefacts the assessability of soft tissues was greatly compromised and an intracranial bleeding or laceration of the ocular globe could not be confidently ruled out. After surgical removal of the saucepan a second CT-scan revealed neither apparent damage to the ocular globe nor intracranial bleeding. Three days after admission a surgical reconstruction of the orbital floor and a neurolysis of the infraorbital nerve were performed. The patient suffered no loss in eyesight or motility and was discharged on the 8th day.

2924. Krueger, E., et al. (2022). "SIMPLE WOUND CLOSURE COMPARED TO SURGERY FOR CIVILIAN CRANIAL GUNSHOT WOUNDS." Journal of neurotrauma **39**(11-12): A39.

The appropriate clinical scenario for utilizing simple wound closure (SWC) for civilian cranial gunshot wounds (CGSW) is not well described. We compared SWC and surgery patients in terms of their neurologic outcomes and incidence of infections, seizures, and additional operations. This was a single-center, retrospective review of adult patients. Excluded were patients with non-firearm penetrating injuries, initial Glasgow coma scale (GCS) 3, initial GCS 4 and nonreactive pupils, or mortality within 48 hours. Seventeen patients (25.4%) were treated with SWC and 50 (74.6%) were treated with surgery. The SWC group had a lower incidence of radiographic mass effect (3/17, 17.6% SWC versus 31/50, 62.0% surgery; p = .002) and lower incidence of involvement of the frontal sinus (0/0, 0.0% SWC versus 14/50, 28.0% surgery; p = .01). There were no differences in the frequency of Glasgow outcome scale extended scores ≥5 between the SWC and surgery groups at 30- (4/11, 36.4% SWC versus 12/35, 34.3% surgery), 60- (2/7, 28.6% SWC versus 8/26, 30.8% surgery), and 90-days (3/8, 37.5% SWC versus 12/26, 46.2% surgery). There were no differences in the incidence of infections (1/17, 5.9% SWC versus 6/50, 12.0% surgery; p = .67), cerebrospinal fluid fistulas (2/11, 11.6% SWC versus 3/50, 6.0% surgery; p = .60), seizures (3/17, 17.6% SWC versus 9/50, 18.0% surgery; p = 1), and reoperations (3/17, 17.6% SWC versus 4/50, 8.0% surgery; p = .36) between the SWC and surgery groups. There were clinically relevant differences between the two groups. SWC is a safe and efficacious alternative therapy in a carefully selected subset of civilian CGSW patients.

2925. Krueger, E. M., et al. (2022). "Simple Wound Closure for Civilian Cranial Gunshot Wounds: A Systematic Literature Review." Cureus **14**(5): e25187.

Civilian cranial gunshot wounds are common injuries associated with significant morbidity and mortality. Simple wound closure has been previously proposed as an alternative treatment option for a small subset of patients, but the exact outcomes of this strategy are not well-defined. The objective of this paper was to describe the scientific literature reporting simple wound closure of civilian cranial gunshot wounds, its effect on short-term and long-term neurologic outcomes, and rates of seizures and infections. A systematic literature review was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines. The strength of evidence was assessed using the Grading of Recommendation, Assessment, Development, and Evaluation (GRADE) criteria. Seventeen studies were found that met inclusion criteria. There was very low strength of evidence that patients treated with simple wound closure can achieve good short and long-term neurologic outcomes. There was very low strength of evidence that simple wound closure has a higher incidence of mortality compared to operative intervention, especially in patients

with initial low Glasgow Coma Scale (GCS) scores. There was very low strength of evidence that patients treated with simple wound closure have a small risk of subsequently developing infections or seizures. In conclusion, under most circumstances, neurosurgical operative intervention should be viewed as the optimal treatment for salvageable civilian cranial gunshot wound patients. However, our literature review showed that simple wound closure is safe and viable. More data are needed to determine the appropriate clinical scenario for using this alternative option. Copyright © 2022, Krueger et al.

2926. Krueger, F., et al. (2009). "The neural bases of key competencies of emotional intelligence." Proceedings of the National Academy of Sciences of the United States of America **106**(52): 22486-22491.

Emotional intelligence (EI) refers to a set of competencies that are essential features of human social life. Although the neural substrates of EI are virtually unknown, it is well established that the prefrontal cortex (PFC) plays a crucial role in human social-emotional behavior. We studied a unique sample of combat veterans from the Vietnam Head Injury Study, which is a prospective, long-term follow-up study of veterans with focal penetrating head injuries. We administered the Mayer-Salovey-Caruso Emotional Intelligence Test as a valid standardized psychometric measure of EI behavior to examine two key competencies of EI: (i) Strategic EI as the competency to understand emotional information and to apply it for the management of the self and of others and (ii) Experiential EI as the competency to perceive emotional information and to apply it for the integration into thinking. The results revealed that key competencies underlying EI depend on distinct neural PFC substrates. First, ventromedial PFC damage diminishes Strategic EI, and therefore, hinders the understanding and managing of emotional information. Second, dorsolateral PFC damage diminishes Experiential EI, and therefore, hinders the perception and integration of emotional information. In conclusion, EI should be viewed as complementary to cognitive intelligence and, when considered together, provide a more complete understanding of human intelligence.

2927. Krueger, F., et al. (2011). "The role of the Met66 brain-derived neurotrophic factor allele in the recovery of executive functioning after combat-related traumatic brain injury." The Journal of neuroscience : the official journal of the Society for Neuroscience **31**(2): 598-606.

Brain-derived neurotrophic factor (BDNF), a member of the neurotrophin family, promotes survival and synaptic plasticity in the human brain. The Val66Met polymorphism of the BDNF gene interferes with intracellular trafficking, packaging, and regulated secretion of this neurotrophin. The human prefrontal cortex (PFC) shows lifelong neuroplastic adaption implicating the Val66Met BDNF polymorphism in the recovery of higher-order executive functions after traumatic brain injury (TBI). In this study, we examined the effect of this BDNF polymorphism on the recovery of executive functioning after TBI. We genotyped a sample of male Vietnam combat veterans consisting of a frontal lobe lesion group with focal penetrating head injuries and a non-head-injured control group for the Val66Met BDNF polymorphism. The Delis-Kaplan Executive Function System as a standardized psychometric battery was administrated to examine key domains of executive functions. The results revealed that the Met allele but not the hypothesized Val allele promotes recovery of executive functioning. Overall, the Met66 carriers in the lesion group performed as well as the Met66 carriers in the control group. The Met66 allele accounted for 6.2% of variance for executive functioning independently of other significant predictors including preinjury intelligence, left hemisphere volume loss, and dorsolateral PFC volume loss. The findings point to different mechanisms of the Val66Met BDNF gene in complex phenotypes under normal and pathological conditions. A better understanding of these mechanisms could be instrumental in the development and application of effective therapeutic strategies to facilitate recovery from TBI.

2928. Krukemeyer, M. G., et al. (2006). "Survived crossbow injuries." The American journal of forensic medicine and pathology **27**(3): 274-276.

The Hamburg University Institute of Legal Medicine presents 2 cases of injuries of crossbow arrows where the patients survived. Crossbows are used nowadays as sports and hunting weapons. They are freely obtainable, and since people without practice can shoot them, there are constant injuries and fatal cases. Crossbow arrows have a high penetration force and can even pierce bone. Depending on the tip of the arrow used, they bore or cut through tissue, here damage to the tissue being restricted to the direct surroundings. Due to the elasticity of the tissue, the arrow shaft in the wound track may have the effect of an incomplete tamponade so that major hemorrhaging is prevented. In this condition, the injured person may be conscious and capacitated. From the medical viewpoint, crossbow arrows should

therefore be invariably left in the wound, secured against displacement during transport, and only removed in the hospital.

2929. Krukemeyer, M. G. and K. Püschel (2008). "Transcranial crossbow injury - An unusual case of skull penetrating." Medizinische Welt **59**(9): 343-344.

We present the case of a man in whom a crossbow arrow penetrated through the right orbit into the brain and emerged again at the back of the head. Apart from the loss of the right eye, the patient survived without permanent damage. Crossbows are used nowadays as sports and hunting weapons. They are freely obtainable, and since people without practice can shoot them there are constantly injuries and fatal cases. Crossbow arrows have a high penetration force and can even pierce bone. Depending on the tip of the arrow used, they bore or cut through tissue, here damage to the tissue being restricted to the direct surroundings. Due to the elasticity of the tissue, the arrow shaft in the wound tract may have the effect of an incomplete tamponade, so that major haemorrhaging is prevented. From the medical viewpoint, crossbow arrows should therefore be invariably left in the wound, secured against displacement during transport and only removed in the hospital. © 2008 Schattauer GmbH.

2930. Krul, W. and T. Depczyk (1993). "[Craniocerebral injury with foreign body penetration complicated with rhinorrhea, intracranial pneumatocele and early epilepsy]." Uraz czaszkowo-mozgowy przez cialo obce powiklany: plynotokiem, odma mozgowa i wczesna padaczka. **27**(6): 919-923.

The presented patient was injured while repairing a car. When the motor was running a metal blade of the fan broke off and struck him on the right side of his forehead. The blade sticking in the bone was removed surgically, and after 17 days he was discharged home without neurological deficit. After 60 days paresis of the left upper extremity and rhinorrhoea developed, and the patient had a second operation. Four months after the injury the first seizure appeared, provoked by discontinuation of anticonvulsants.

2931. Krum, J. M., et al. (1991). "Brain angiogenesis: variations in vascular basement membrane glycoprotein immunoreactivity." Experimental neurology **111**(2): 152-165.

Changes in the distribution and quantity of laminin and fibronectin within the basement membranes of developing or regenerating CNS blood vessels were investigated using two immunocytochemical techniques. Three models of angiogenesis were studied: normal pre- and postnatal development, wound healing, and vascularization of fetal neocortical transplants placed in the adult rat brain. Although all brain vessels were stained in enzymatically pretreated immunoreacted paraffin sections, those associated with wound and transplant sites were the most intensely reactive with both antisera during the first postoperative week. When 40-microns vibratome sections of normal adult brains were immunoprocessed, only the meninges and vessels of the circumventricular organs were stained. The remainder of the brain vasculature was immunoreactive only if sections were enzymatically treated prior to immunoprocessing. In contrast, the nascent vasculature in developing brain and the regenerating vessels at wound and transplant sites were reactive to both antisera without enzymatic pretreatment of the sections. This immunoreactivity decreased by 11 days postnatal in normal animals and 4 weeks postoperative in experimental animals, coinciding with the period of astrocytic contact and complete vascular basement membrane formation in both cases. The variations in staining pattern and intensity may be reflections of differences in the quantity of laminin and fibronectin within the basement membranes of proliferating and/or non-blood-brain barrier vasculature. However, the results of the different experimental protocols suggest that immature vascular basement membranes may have a molecular configuration that does not require an enzymatic unmasking step to react with the antisera. Alternatively, the looseness of the surrounding neuropil inherent in developing and injured CNS could allow the antisera greater access to basement membrane antigens.

2932. Krylov, V. V. and I. S. Ioffe (1995). "[The diagnostic and treatment characteristics of the peacetime craniofacial gunshot wound]." Osobennosti diagnostiki i lecheniia cherepno-litsevogo ognestrel'nogo raneniia mirnogo vremeni.(1): 42-43.

2933. Krzych, L. J., et al. (2015). "Serum S100B protein concentration in brain-dead organ donors: a pilot study." Anaesthesiology intensive therapy **47**(4): 320-323.

BACKGROUND: Protein S100B is considered to be a marker of brain damage, but there is a paucity of data regarding the utility of its assessment in brain-dead organ donors. The aim of the study was to compare serum protein S100B concentrations between brain-dead organ donors and patients with a confirmed permanent neurological deficit but without signs of brain death., METHODS: The concentration of serum S100B protein was measured in 12 brain-dead organ donors (including 7 males with a median age of 40 years). All measurements were taken when brain death was confirmed by the commission. Twenty-nine patients (including 13 males with a median age of 63 years) who died in the medical ICU with confirmed permanent brain injury without signs of brain death acted as controls. In these patients, S-100B protein measurements were performed upon ICU admission., RESULTS: In brain-dead organ donors, the median values of serum S100B protein were much higher in comparison to the control group (median and IQR, respectively: 5.04 mug L-1; 1.775-6.765 vs 0.897 mug L-1; 0.324-1.880, P < 0.001). S100B serum values > 1.81 mug L-1 predicted brain death with the highest accuracy (AUROC = 0.83; 95% CI 0.68-0.93; P < 0.001)., CONCLUSION: Concentrations of serum S100B protein in brain-dead organ donors are extremely high and may support the diagnosis of brain death. This fact may be of value when the presence of reflex movements (frequently reported despite brain death) might delay determination of brain death and result in the failure of organ donation.

2934. Kuckelkorn, R., et al. (2001). "[Long-term results of large diameter keratoplasties in the treatment of severe chemical and thermal eye burns]." Langzeitergebnisse der Keratoplastik mit grossem Durchmesser von 11 - 12 mm bei schwerstveratzten und verbrannten Augen1. **218**(8): 542-552.

BACKGROUND: In severe chemical and thermal eye burns the limbal stem cells, which are important for the regeneration of the corneal epithelium, are lost. In our retrospective study two questions were investigated: 1) is it possible to restore the limbal region by transplantation of large diameter keratoplasties 2) has the time of transplantation an influence on the clinical outcome., PATIENTS AND METHOD: In a retrospective study the outcome of 48 eyes (43 patients) with severe chemical and thermal burns were analysed. Large diameter (11 - 12 mm) penetrating keratoplasties were performed between 1987 and 1996. Complete limbal deficiency was present in 17 eyes, while 31 eyes had developed sterile corneal ulceration. According to the time of transplantation three different groups were distinguished. Group I (early keratoplasty, n=24): transplantation within 3 months after the accident (mean: 26 days). Group II (intermediate keratoplasty, n=13): transplantation between 4 - 18 months after the burn (mean: 190 days). Group III (late keratoplasty, n=11): surgery more than 18 months after the injury (mean: 36.6 months)., RESULTS: Follow-up time was 28.4 months in early keratoplasty, 26.4 months after intermediate keratoplasty, and 34.3 months in late keratoplasty. Long-term results of the keratoplasties were poor. 60.4 % of the transplants failed due to surface problems, 18.8 % due to endothelial rejection episodes. Late keratoplasties were significantly more successful than intermediate keratoplasties. 25 % of the early keratoplasties and 36.4 % of the late keratoplasties showed an intact limbal region at the end of the follow-up time, but none of intermediate keratoplasties., CONCLUSION: The prognosis for large diameter keratoplasties depends on the time of transplantation. Late and early keratoplasties had the best results. However, survival of heterologous stem cells is limited.

2935. Küçük, E., et al. (2018). "A rare cause of foot drop: Tired bullet." World journal of emergency medicine **9**(4): 294-296.

2936. Kucuker, I., et al. (2016). "Our Treatment Approaches in Severe Maxillofacial Injuries Occurring After Failed Suicide Attempts Using Long-Barreled Guns." The Journal of craniofacial surgery **27**(2): e133-138.

Maxillofacial traumas with long-barreled guns may sometimes cause catastrophic results by means of smashing in facial structures. In these patients, reconstruction strategies of both fragmented/lost soft and hard tissues still remain controversial. In their clinic, the authors treated 5 patients with severely injured face after failed suicide attempt between 2008 and 2013. In this study, the authors aimed to present their clinical experiences on these severely injured maxillofacial gunshot traumas and offer a treatment algorithm to gain a result as possible as satisfactory in terms of functionality and appearance.

2937. Kugoeva, E. E., et al. (2002). "[Characteristics of the clinical picture of combined injuries of the organ of vision and eye appendages under conditions of peace-time and war injuries]." Osobennosti klinicheskoi kartiny sochetannykh povrezhdenii organa zreniia i pridatochnogo apparata glaza v usloviiakh mirnoi i boevoi travm. **118**(4): 11-13.

A total of 100 patients with combined injuries of the organ of vision and eye appendages, inflicted in peacetime and under war conditions, were examined. The clinical picture of combined injuries in the wounds inflicted at the battlefield (gunshot and resultant from mine explosions) and of traffic, communal, criminal, and occupational injuries was studied using traditional ophthalmological and common clinical instrumental methods of examination. Common regularities of the traumatic process were revealed in combined injuries: mutual aggravation of injuries to the eye and its appendages, a considerable incidence of bilateral injuries, and simultaneous impacts of several damaging factors. The most unfavorable prognosis as regards visual functions in the group observed was for patients with war injuries, particularly those caused by mine explosions.

2938. Kuhl, D. A., et al. (1990). "Prophylaxis of posttraumatic seizures." DICP : the annals of pharmacotherapy **24**(3): 277-285.

The issue of routine anticonvulsant prophylaxis for early and late posttraumatic epilepsy (PTE) has received much attention in the medical literature. Such problems as lack of standard definitions for early and late PTE, the retrospective design of most studies, the wide variability of inclusion and exclusion criteria, and the varied duration of follow-up make this body of literature extremely difficult to evaluate. Severe head trauma appears to cause injured neurons to become hyperexcitable; this in turn brings about the formation of an epileptogenic focus during the time between trauma and seizure occurrence. Both military and civilian head injury populations have been used to evaluate the incidence of PTE. Early seizures (i.e., less than 7 days) occur in approximately 3-5 percent of the head injury patients in both the military and civilian groups. Factors increasing this incidence include intracranial hematoma, focal neurologic deficits, posttraumatic amnesia (PTA) lasting greater than 24 hours, depressed skull fracture, and age less than 5 years. The incidence of late seizures is directly related to the extent of brain damage. The military population, composed primarily of cases with penetrating head injury, is associated with a late PTE incidence of approximately 30-50 percent. Closed head injuries in the military population involve a 5-15 percent seizure incidence. Late PTE incidence after head injuries in the civilian population is less than 5 percent. Risk factors associated with late PTE include loss of consciousness or PTA lasting greater than 24 hours, dural lacerations, depressed skull fractures, and various computerized tomography deficits. These factors vary slightly between the military and civilian populations.(ABSTRACT TRUNCATED AT 250 WORDS)

2939. Kuhne, C. A., et al. (2007). "[Penetrating gunshot injuries to the head and brain. Diagnosis, management and prognosis]." Penetrierende Schadel-Hirn-Verletzungen durch Schusswaffen. Diagnostik, Behandlungsmanagement und Prognose. **110**(4): 341-350.

Gunshot injuries to the head and brain are rare in Germany and the rest of western Europe. With the relatively low number of these injuries here, there are no standard methods of diagnosis and management, and there is some controversy over both. Quite a high proportion of such injuries result from suicide attempts and accidents. The main diagnostic procedure available is computed tomography of the head with contrast medium; in certain cases MRI is indicated. The operative management depends on the extent and prognosis of the injury; a ventricular drain is probably indicated in most cases. Debridement of the bullet's path and removal of the projectile are more controversial. Mortality is extremely high after such injuries; if the victim does survive the prognosis is comparable to that following closed cranial injuries.

2940. Kuhse, H. and P. Singer (1990). "From the editors." Bioethics **4**(3): iii.

2941. Kukner, A. S., et al. (2009). "Characteristics of pellet injuries to the orbit." Ophthalmologica. Journal international d'ophtalmologie. International journal of ophthalmology. Zeitschrift fur Augenheilkunde **223**(6): 390-395.

PURPOSE: To investigate the features of orbital injuries by pellets fired from the front., DESIGN: Retrospective, 4 cases of pellet injuries., METHODS: Five orbits of 4 patients who sustained pellet injuries received from the front were reviewed retrospectively. The course of injury and results were assessed. Radiological examinations were reviewed. The

patients were evaluated between December 1996 and June 2004., RESULTS: Five orbits of 4 patients sustained injuries caused by pellets fired from an anterior direction. The globe in the injured orbit was intact in 2 cases. Severe loss of vision was also present in these 2 globes due to optic nerve involvement. Final visual acuity was down to no light perception in 4 eyes and limited to light perception in 1 eye., CONCLUSIONS: The prognosis of orbital pellet injuries is, unfortunately, poor. A pellet passing through the floor of the orbit often causes double perforation of the globe and, once in the orbital aperture, it travels towards the apex as a result of the conical shape of the orbit and lodges in the optic canal or its entrance, severely damaging the optic nerve. Surgery or other treatments are usually unsuccessful. Even if the globe is intact, vision is usually severely impaired. Copyright 2009 S. Karger AG, Basel.

2942. Kukuev, L. A. and G. N. Krivitskaia (1972). "[Morphological changes in the brain a long time after brain injury]." Morfologicheskie izmeneniia mozga v otdalennom periode mozgovoi travmy. **72**(6): 808-812.

2943. Kulkarni, A. (2019). "Panga'ED: 10 year overview of maxillofacial trauma associated with witchcraft in east- central Africa." International journal of oral and maxillofacial surgery **48**: 37.

Background: The intriguing antiquarian belief in witchcraft is an accepted part of social reality and an established folk tradition, a component of indigenous belief systems and ritual practices that transcends in local and regional culture on continental Africa more so than other Low and Middle Income countries (LMIC). Objectives: To highlight the patterns of witchcraft related cranio-maxillofacial trauma and treatment strategies encountered over a 10 year period in East and Central Africa. Methods: Patients with assault related Cranio-Maxillofacial injuries inflicted by traditional weapons were identified out of the recorded cases of cranio-maxillofacial fractures consulted and treated in 3 tertiary referral hospitals in Tanzania and Rwanda. Inclusion: Withcraft related cranio-maxillofacial fractures Exclusion: Incomplete clinical data, other reasons of assaults, Gunshot wounds. Findings: Out of XXX cases of cranio-maxillofacial fractures associated with assault and interpersonal violence XXX cases were associated with witchcraft with XXX males and XXX females in the age group of XXX to XXX. Assaults involving elderly women were directly related to witch hunts and most of the fractures were compound - contaminated resultant from sharp machete wounds, though post-operative wound infection were not a common. Conclusion: Managing Cranio-maxillofacial trauma with ATLS protocol primarily and a multidisciplinary team in definitive management phase is recommended. Basic principles of fracture fixation with prompt resuscitation can result in good outcomes in these cases thus reducing the stress on the fragile medical system in rural settings in LMICs.

2944. Kulkarni, A., et al. (2016). "An interesting case of penetrating craniofacial trauma involving a wooden stick." Journal of Clinical and Diagnostic Research **10**(4): ZD01-ZD03.

Penetrating craniofacial trauma, although uncommon, has a high potential for death or catastrophic consequences from head injury or vital neurovascular injuries. The foreign body may cause significant challenge, especially when it is a large one. Airway obstruction, vascular injuries, intracranial communication, ocular injury and injuries to any other adjacent vital structures when involved may change the treatment objectives from simple foreign body retrieval to a comprehensive multidisciplinary approach to stabilize the patient. Retrieval of foreign bodies may be challenging because of many factors including the size of the object, its site, and the surrounding anatomical structures. Accurate localization of the foreign body before removal is essential in craniofacial region. We present a case of penetrating craniofacial trauma from a wooden stick, with an in situ foreign body, that was managed by emergency surgical exploration in general anaesthesia and retrieval of foreign body in Toto under antibiotic coverage and tetanus prophylaxis.

2945. Kulwin, C. G., et al. (2018). "Neurosurgical Management of Self-Inflicted Cranial Crossbow Injury." World neurosurgery **116**: 69-71.

BACKGROUND: Although gun-related penetrating traumatic brain injuries make up the majority of cranial missile injuries, low-velocity penetrating injuries present significant clinical difficulties that cannot necessarily be identically managed. Bow hunting is an increasingly popular pastime, and a crossbow allows a unique mechanism to cause a self-inflicted cranial injury with a large, low-velocity projectile. Historically, arrow removal is described in an operating room setting, which provides limited knowledge of the location of vascular injury in the setting of postremoval hemorrhage,

and may represent an inefficient use of operating room availability., CASE DESCRIPTION: Two patients presented after self-inflicted cranial crossbow injuries. Both were neurologically salvageable. Initial assessment with computed tomography angiography allowed triage into likely or unlikely vascular injury. Arrow removal was performed in a radiology setting rather than in the operating room to allow immediate postremoval imaging to localize hemorrhage. While an operating room was on standby, neither patient required neurosurgical operative intervention. Both patients made a good recovery with no further injury caused by arrow removal., CONCLUSIONS: We describe a novel approach to retained cranial arrow removal in a radiologic, rather than operative, setting and describe its relative benefits over traditional removal in the operating room.

2946. Kum, C., et al. (2018). "Nonsurgical Management of Retained Needlefish Jaw." Journal of neuro-ophthalmology : the official journal of the North American Neuro-Ophthalmology Society **38**(2): 190-191.

While scuba diving, the left medial canthus of a 53-year-old man was pierced by a needlefish. He immediately lost vision in his left eye. An orbital computed tomographic scan showed the needlefish jaw in the left optic canal. The left medial orbit was explored surgically but no foreign object was removed. One month later, MRI confirmed the presence of the retained needlefish jaw. A conservative approach was taken and the patient remained stable over 3 months of follow-up.

2947. Kumar, A., et al. (2010). "Effects of continuous sedation and, analgesia on cerebral metabolism using microdialysis monitoring." Neurocritical care **13**: S182.

Introduction Continuous sedation is frequently used in patients with severe traumatic brain injury and cessation of sedation for daily exams is often performed. There is concern that this may cause tissue distress or secondary injury due to increased metabolic demand in patients with severe traumatic brain injury. Cerebral microdialysis can demonstrate tissue injury or distress by low extracellular glucose (<2mmol/l) and elevated Lactate/Pyruvate ratios (L/P>40), which are biomarkers of cellular brain metabolism. Methods A retrospective chart review was performed on patients who were monitored with cerebral microdialysis, admitted to the neuroscience intensive care unit at Jackson Memorial Hospital with the diagnosis of traumatic brain injury. Hourly sampling of microdialysis fluid was performed and extracellular lactate, pyruvate (L/P) ratios, and glucose concentrations were recorded. Charts were then analyzed looking for changes of these biomarkers with cessation of continuous sedation and analgesia. Analyte measurements were compared for the hour of sedation/ analgesia change and the two subsequent hours. Results Four patient's data were reviewed. Three males (ages 21,57, 60) and one female age 21. One patient had a penetrating injury and three had blunt traumatic injury. Patient 1 glucose concentrations were .35 mmol/ L, .33 mmol/ L, .88 mmol/ L, L/P ratios were 44.7, 39, 42.6. Patient 2 glucose concentration was 2.03 mmol/ L, 1.94, mmol/ L and 2.06 mmol/ L L/P ratios were 20.2, 20.08, and 19.49. Patient 3 glucose concentration was 2.11 mmol/ L, 2.15 mmol/ L, and 1.7 mmol/ L and L/P ratios were 19.8, 22.2, and 20.65. Patient 4 glucose concentration was 1.9 mmol/ L, 0.41 mmol/ L, and 0.52 mmol/ L and L/P ratios were 18.2, 49. 9, 144.9 Conclusion We did not identify a significant decrease in extracellular glucose or elevation of L/P ratios with daily cessation of sedation in 3 patients. However, our last patient had markedly elevated L/P ratios and decreased glucose with cessation of sedation, indicating cellular distress and tissue vulnerability. This patient's brain neurochemistry appeared to be more volatile as there were also fluctuations in the glucose and L/P ratio with fever. More patients need to be studied to determine if there are specific patient characteristics which distinguish patients with volatile brain chemistry. These patients might have a higher risk for secondary injury and may benefit more from tissue monitoring.

2948. Kumar, A., et al. (2011). "Scissors in brain: an unusual presentation of tribal culture in India." Turkish neurosurgery **21**(3): 413-417.

AIM: To observe the neurological complications arising from various tribal practices and their management. Penetrating head injuries comprise only a small number of total head injuries. A penetrating head injury by deliberate attempt to treat an ailment is almost unheard of., MATERIAL AND METHODS: We present here a case of penetrating head injury caused by stabbing a scissor in head by a local witch doctor in order to treat a psychiatric ailment., RESULTS: The patient was taken up for for surgery and managed accordingly. Relevant literature was reviewed regarding various foreign bodies in traumatic missile and non missile brain injuries and their surgical management.

2949. Kumar, A., et al. (2010). "Five years' experience at a single centre of craniocerebral injury from winnowing fan blades." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **17**(2): 178-181.

India, an agriculture-based country, relies heavily on indigenous farm machinery. In our study we present 31 patients with winnowing fan blade head injury, operated on at our centre between 2004 and 2008. The mechanism and nature of the injuries, operative methods, outcome and methods of prevention are discussed with special reference to the occurrence of this type of injury in the pediatric population. Copyright 2009 Elsevier Ltd. All rights reserved.

2950. Kumar, A., et al. (2006). "Penetrating head injury from a pedestal fan rotor blade in a child - an unusual case." Pediatric neurosurgery **42**(6): 391-394.

Penetrating head injuries in children constitute only a small part of the total number of traumatic head injuries seen in casualty. A number of household articles have been described to cause penetrating injuries, apart from gunshot and pellet injuries. We describe, for the first time, an unusual case of penetrating injury due to the rotor blade of pedestal fan used very commonly in the Indian subcontinent. Copyright 2006 S. Karger AG, Basel.

2951. Kumar, M. and N. D. Kitchen (1998). "Infective and traumatic aneurysms." Neurosurgery clinics of North America **9**(3): 577-586.

Traumatic intracranial aneurysms are rare lesions but should be considered in penetrating head injury, particularly in cases of low-velocity gunshot wounds or stab wounds to the head. Because most of these aneurysms are false aneurysms, treatment may require excision or trapping procedures.

2952. Kumar, M., et al. (2022). "Retrograde Intubation for Airway Management of Firearm Injury in the Maxillofacial Region." Journal of Clinical and Diagnostic Research **16**(3): UD04-UD05.

Endotracheal intubation is one of the most important anaesthetic skills. Trauma to the maxillofacial region is challenging in terms of airway management. Airway management in such patients is difficult and decides the survival of the patient. Endotracheal intubation in patients with difficult ventilation and difficult intubation always remains a challenge, especially in the absence of a flexible fibreoptic bronchoscope. The retrograde catheter technique is an acceptable option for airway management in cases where oral intubation is not possible because of difficult airway or is not recommended because of fear of dislodgement of fractured segments of facial bones. The author here reports a case of a 30-year-old male with firearm injury in maxillofacial region posted for emergency surgery with anticipated difficult airway. Emergency retrograde intubation was done for the management of airway with successful outcome.

2953. Kumar, P., et al. (2018). "Bull horn head injury with retained horn in brain: A rare case report." Journal of pediatric neurosciences **13**(2): 229-233.

Pediatric head injuries are a commonly seen emergency in trauma centers worldwide. There are various modes of injury such as fall from height, road traffic accidents, objects hitting the head, assault, and battered baby. We report here a child who presented to us with a history of sustaining head injury by a stray bull on the road and a retained broken bull horn inside the brain and its subsequent management.

2954. Kumar, R., et al. (2016). "Response." Journal of Neurosurgery: Pediatrics **18**(4): 508-509.

2955. Kumar, V., et al. (2016). "Penetrating injury of orbital roof and brain sparing the eye ball in a pediatric patient: A rare occurrence." Journal of pediatric neurosciences **11**(2): 134-136.

Blowout fractures are a common occurrence in traumatic brain injury patients. In pediatric age group, orbital floor fracture is a common occurrence. We report a case of 2-year-old male admitted to trauma center, with penetrating injury to the left eye by the clutch of motorbike which fell on the child. Noncontrast computed tomography scan revealed fracture of the roof of left orbit with left frontal contusion sparing the left eyeball. There was also the

continuous leak of brain matter from the left eye which suggested tear of dura mater. Urgent left frontal craniotomy was done with the evacuation of contusion, reconstruction of orbital roof, and duroplasty under general anesthesia.

2956. Kumar, V., et al. (2016). "Penetrating injury of orbital roof and brain sparing the eye ball in a pediatric patient: A rare occurrence." Journal of pediatric neurosciences **11**(2): 134-136.

Blowout fractures are a common occurrence in traumatic brain injury patients. In pediatric age group, orbital floor fracture is a common occurrence. We report a case of 2-year-old male admitted to trauma center, with penetrating injury to the left eye by the clutch of motorbike which fell on the child. Noncontrast computed tomography scan revealed fracture of the roof of left orbit with left frontal contusion sparing the left eyeball. There was also the continuous leak of brain matter from the left eye which suggested tear of dura mater. Urgent left frontal craniotomy was done with the evacuation of contusion, reconstruction of orbital roof, and duroplasty under general anesthesia.

2957. Kummoona, R. (2008). "Posttraumatic missile injuries of the orofacial region." The Journal of craniofacial surgery **19**(2): 300-305.

Iraq became the world's battlefield for terrorist attack to the victims by different types of weapons of missile including explosive cars, explosive belt, fragments, rifle bullets, and handgun bullets. This situation in Iraq has been present for the last 3 years. As surgeons, we cannot influence the surge of this violence, but we are surely called upon to care for its victims. Missile injuries to the orofacial region have special features that provide the surgeon with multiple medical and surgical challenges when dealing with these injuries. This study include 140 patients who were treated in the maxillofacial unit, hospital of specialized surgery, in Medical City, Baghdad, during a period of 2 years; we had 28 women and 112 men, with ages ranging from 9 to 60 years (mean, 34.5 years), suffering from posttraumatic orofacial deformities. Deformities of the face as a complication of missile injuries were classified as bone loss, soft tissue loss, combined bone and soft tissue loss, and others (sinus tracts and poor scars); 62 patients (44%) had bone loss, 45 (32%) had soft tissue loss, 9 (6.4%) had combined bone and soft tissue loss, and 22 (15.7%) had other deformities.

2958. Kunjukunju, N., et al. (2010). "Bilateral macular hole formation secondary to sclopetaria caused by shockwaves transmitted by a posterior vector: case report." BMC ophthalmology **10**: 6.

BACKGROUND: Sclopetaria is a rare ophthalmic finding in trauma, CASE PRESENTATION: This is a report of a patient who developed macular holes from sclopetaria induced by indirect trauma. A 22-year-old male, suffered a gunshot wound that passed behind his eyes, resulting in bilateral macular hole formation, CONCLUSION: To our knowledge, this is the first reported case in which trauma posterior to the globes caused bilateral macular hole formation.

2959. Kunz, S. N. (2017). "An unusual exit wound as a result of a shotgun suicide to the head." Forensic science international **275**: e1-e5.

The location of a gunshot entrance wound as well as the wound path trajectory are the main findings that help to determine the position from which a weapon was fired and thus distinguish firearm suicides from homicides and accidents. We present a case of a 28-year old man, who was found dead in his car. Because of an unusual position of the firearm, which was clamped into the steering wheel, and an unclear entrance/exit wound, an autopsy was performed. The deceased showed typical signs of a contact shotgun wound to the head with an entrance wound in the right temporal region and an exit wound in the midface. With the help of gunpowder attachments and a muzzle imprint at the entrance site, a wound channel from the right lower posterior part of the temporal region to the left anterior part of the mid-facial region could be reconstructed. The stellate wound in the midface was assessed as an atypical exit wound. The cause of death was a contact shotgun shot to the right temple with a consequent central regulatory failure due to extensive brain injury. The manner of death was concluded to be a suicide.

2960. Kunz, S. N., et al. (2013). "Unusual blood spatter patterns on the firearm and hand: a backspatter analysis to reconstruct the position and orientation of a firearm." Forensic science international **228**(1-3): e54-57.

When it comes to firearm fatalities, the main goal of forensic analysis is to distinguish firearm suicides from homicides and accidents. Apart from the location of the entrance wound, wound path trajectory and gunshot residue, blood stain pattern analysis of gunshot-related backspatter on the hands of the victim can be an essential tool not only to determine which hand was holding the firearm, but also to reconstruct the position from which a weapon was fired. We present a case of a 90-year-old man, who was found dead in his house. Because of unclear circumstances and an unusual position of the deceased with a gunshot entrance wound to the right temporal region and a firearm found on the left side of his body, an autopsy was performed. Due to the unusual bloodspatter stains on the hands and the firearm, it was possible to deduce the position and orientation of the hands and the firearm of the deceased. We could reconstruct that the man held the weapon in his right hand, using the left hand to stabilise the firearm and the right thumb to pull the trigger. A contact shot to the right temple led to central regulatory failure due to extensive brain injury. The manner of death was concluded to be a suicide.

2961. Kunz, S. N., et al. (2020). "Beer stein blast to the head a rare case of combined blunt and sharp force trauma." International journal of legal medicine **134**(5): 1791-1796.

Cases of combined blunt and sharp force trauma to the head caused by one striking tool are rare. When beer steins are used as an assault weapon, they can cause blunt traumas upon initial contact phase. If the impact force exceeds the mechanical stability of the beer stein, it breaks into several sharp-edged pieces, which then can cause sharp force trauma injuries due to the interaction between the head and the stein fragments. We present a case of a 43-year old man, who suffered from blunt and sharp force head traumas due to one single blow with a 1-l beer stein. A forensic-biomechanical analysis of the event, together with witness testimony evaluation and experimental comparison helped to reconstruct the most probable chain of events. Based on these findings as well as on the medical diagnoses and treatment, the assault was assessed as a nonacute life-threatening, but potentially fatal offence. The case was indicted as grievous bodily harm.

2962. Kunz, U., et al. (1985). "[Gunshot wounds of the skull during peacetime]." Schussverletzungen des Schadels im Frieden. **28**(3): 134-142.

66 patients with gunshot wounds were treated at the Department of Neurosurgery of Hanover University up to May 1982. These included wounds inflicted by bolt guns of the type used in slaughter houses, and by bolt-setting or nail-setting tools used in building construction work. The total mortality was 50%. Seventeen patients died directly after admission or within the first 24 hours. Operation was not indicated in cases which appeared hopeless. In patients with mild neurological deficits, only the superficial skin wounds were treated to avoid additional damage to the brain. CT scans performed in approximately one-half of the patients yielded valuable information on the path of the bullet and on haematomas. Postoperatively, there were several complications, mainly pneumonia and cerebrospinal fluid fistulas; in fact, pneumonia was responsible for the death of some patients. The mortality is compared with the findings by other authors. No patients remained in need of care after rehabilitation.

2963. Kural, A., et al. (2020). "Evaluation of rat major celluler prion protein for early diagnosis in experimental rat brain trauma model." Deneysel beyin travmasi olusturulan sicanlarda erken tani icin selluler prion protein(PrPC)'nin degerlendirilmesi. **26**(1): 1-8.

BACKGROUND: Although traumatic brain injury (TBI) is an important problem, there has been no widespread utilization of neuro-biomarkers to aid the diagnosis of TBI. This study was conducted to evaluate serum S100B and prion protein (PrPC) levels in rats with TBI., METHODS: In this study, 15 albino rats were categorized into three groups as follows: sham-operated (1), control (6) and trauma (8) groups. The TBI model was based on the modified free falling model. S100B, PrPC levels were measured using ELISA. Brain specimens were obtained for the pathological examination., RESULTS: Serum S100B and PrPC levels were found to increase in T group at both 2h and 24h after trauma ($p<0.002$, $p<0.002$, respectively). We also found higher histopathological injury scores of brain tissues in the T group. Only a positive correlation was found between serum PrPC levels and the extent of brain injury ($p=0.039$, $r=0.731$). Using ROC analysis, among the two serum markers investigated, both of them revealed the same sensitivity and specificity for diagnosing TBI., CONCLUSION: The changes in serum S100B and PrPC levels showed good sensitivity in our experimental model. Therefore, PrPC could be helpful in the early prognostic prediction in patients with TBI. Further studies are

needed to test our findings in humans following TBI (penetrating bodies, blunt trauma) to definitively acknowledge it as a reliable biomarker and its subsequent diagnostic utility.

2964. Kurdi, S., et al. (2019). "Maxillofacial gunshot injuries management in tripoli from 2011–2018." International journal of oral and maxillofacial surgery **48**: 42.

Background: Management of facial gunshot wounds poses a challenge not only for the oral and maxillofacial surgeons but also for the reconstructive surgeons. Objectives: To determine pattern and presentation in terms of site of injury, airway, associated injuries; and early management of facial gunshot wounds occurred in Tripoli-Libya from 2011–2018. Methods: A total of 510 patients were treated during 1st January 2011 to 31st December 2018 have been included. Findings: Age ranged from 15 to 42 years with mean of 28 + 4.98 years. There were 695 bullet different calibers (7.62x39 mm, 9 mm, 12.5 mm, and 14.5 mm)& 20 land mine. All patients are males. 290 (56.8%)patients required airway management. The most frequent site involved was mandible in 335 (65.7%)patients while midface was involved in 175 (34.3%)patients. Open reduction and internal fixation (ORIF)was performed in 315 (61.7%). 75 (14.7%)patients had some complications; trismus, sinusitis and infection. Conclusion: All patient in this series required surgical intervention for treatment of their facial gunshot wounds. Primary treatment of soft and skeletal facial structures at the time of surgical debridement was possible in the majority of our patients. Early management and operative intervention for repair of the soft and skeletal facial structures leads to satisfactory results. Facial gunshot wounds frequently involve mandible with more likely requirement of establishment of emergency airway and (ORIF).

2965. Kureshi, N., et al. (2016). "Alcohol-related major traumatic brain injury: A province-wide retrospective analysis." Intensive Care Medicine Experimental **4**.

Introduction: Traumatic brain injury (TBI) is a leading cause of death and disability. In the Canadian province of Nova Scotia, TBI occurs in approximately 50 % of major trauma seen annually. Although alcohol use increases the risk of experiencing TBI, it remains unclear whether outcomes in alcohol-impaired TBI patients are different from those of unimpaired patients. Objectives: The objective of this study was to describe the characteristics and patterns of major TBI seen over a 14-year period at the provincial level in Canada. We evaluated the effect of alcohol on length of stay (LOS) and mortality in patients with major TBI. Methods: This was a retrospective case series. Data were obtained from the Nova Scotia Trauma Registry for all patients presenting with major TBI (abbreviated injury score [AIS] head α3) in Nova Scotia hospitals between 2002 and 2015. Injury rates were calculated on the basis of 100,000 population using population estimates from Statistics Canada. Patients were compared by blood alcohol concentration (BAC) at time of injury: Negative (0-1.9 mmol/L), low (2-21 mmol/L), and moderate/high (≥22 mmol/L). A logistic regression model was constructed to test for outcomes and adjusted for the effects of age, gender, location, injury severity score (ISS), maximum AIS head, and BAC level. Results: Overall, 4518 major TBI patients were seen in provincial hospitals during the study period. The mean age of TBI patients was 51 ± 25 years; 72 % were male. The majority of injuries were the result of blunt trauma (93 %), with relatively few major TBIs resulting from penetrating trauma (7 %). The most common mechanisms of injury were falls (46 %) and motor vehicle crashes (27 %). Analysis of census-based subpopulations demonstrated that injury rates varied significantly by geography (from 25 to 65 TBIs per 100,000 population). Testing for alcohol was performed in 43 % of cases. Patients who were tested for alcohol tended to be male (79 %) and middle-aged (mean age 44 ± 20 years). A positive BAC (i.e., ge;2 mmol/L) was found in 47 % of patients who were tested. Mean acute LOS was similar for all three BAC groups. Mortality was independently predicted by increasing age (odds ratio [OR] = 1.01; $p < 0.001$), male gender (OR = 1.30; $p = 0.049$), an ISS between 16 and 75 (OR = 2.67; $p < 0.001$), a maximum AIS head of 5 or 6 (OR = 3.21; $p < 0.001$), injuries occurring outside of the capital city of Halifax (OR = 1.70; $p < 0.001$), and having a lower BAC level (OR = 0.99; $p < 0.001$). Conclusions: The results of this study show significant regional variation in major TBI rates in the province of Nova Scotia. Our findings suggest that low BAC levels are associated with increased mortality in major TBI patients. There are ongoing needs for prevention and intervention efforts that focus on unintentional falls and motor vehicle crashes, especially in older adults. Further study is warranted to elucidate the mechanisms underlying the effects of alcohol on outcomes in patients with major TBI.

2966. Kurien, N., et al. (2020). "Spectrum of ocular injuries and visual outcome following firework injury to the eye." Journal of Emergencies, Trauma and Shock **13**(1): 39-44.

Background: Ocular injury due to fireworks requires urgent ophthalmic assessment and management to preserve vision. Methods: Spectrum of injury, type of intervention, visual outcome, and reasons for visual loss were assessed in consecutive patients presenting over 2 years with firework-related eye injury. The final visual outcome was recorded as best-corrected visual acuity. Results: In the 96 patients (75 males) enrolled, 122 eyes were involved. Twenty-six patients had bilateral eye injury. The median (interquartile) age was 14 (8, 28.5) years. Injuries occurred during Diwali festival (59.4%) and funeral processions (20.8%); over half (53.8%) were bystanders. Injury was due to negligence (78%), device malfunction (12.5%), and attempts to reignite (5.2%) or recover failed device (4.2%). Presenting symptoms were redness (100%), pain (97%), watering (86%), and reduced vision (77%). Facial laceration, contusion, or hematoma occurred in 13 patients. The most frequent adnexal and ocular surface injuries were lid burns (57.3%), edema (44.2%), charred eyelashes (24.6%), and laceration (13.9%). Open-globe injury occurred in 8 eyes. Common anterior segment injuries were corneal epithelial defect (51.6%) and hyphema (20.5%). Posterior segment injuries included commotio retinae (13.1%) and Berlin's edema (7.4%). Surgical treatment was required in 15 eyes; 107 (88%) were managed conservatively. At study completion, of the 99 eyes evaluated, 21 had reduced visual acuity (<6/6) including 7 with monocular blindness. Factors associated with poor vision were open-globe injury ($P < 0.001$) and poor initial visual acuity ($P = 0.05$). Conclusions: Open-globe injury and poor visual acuity at presentation predict the final visual outcome. Monocular blindness following firecracker injury is common.

2967. Kuroiwa, T., et al. (1994). "Traumatic intracranial foreign body embolization--case report." Neurologia medico-chirurgica **34**(12): 810-813.

A 27-year-old male presented with intracranial embolization due to accidental penetration of his neck by an iron fragment at work. Cerebral angiography revealed foreign body embolization of the left middle cerebral artery. The foreign body was successfully removed via craniotomy and arteriotomy. The extended period from onset to surgical treatment prevented acute hemodynamic reconstruction. However, he had good collateral circulation and was discharged with mild hemiparesis and moderate motor aphasia. The possibility of intracranial embolization should be considered in patients presenting with penetrating injury of the neck.

2968. Kurosaki, K., et al. (2005). "Identification of a bronze weapon based on an embedded fragment in a 3000-year-old skull." Forensic science international **151**(1): 105-108.

2969. Kurt, A., et al. (2006). "A challenging problem. Vertebral pseudoaneurysm and arteriovenous fistula involving vertebral artery and ipsilateral internal jugular vein due to craniocervical penetrating trauma." Interventional Neuroradiology **12**(2): 171-175.

Vertebral pseudoaneurysm and arteriovenous fistulas are very rare and are commonly due to penetrating trauma to craniocervical region. A 20-year-old man was presented with progressive swelling and pulsatile mass on the left side of his face. He had been stabbed two weeks ago on the left side of his face. Doppler Ultrasound revealed large left vertebral pseudoaneursym and arteriovenous fistulisation with the ipsilateral internal jugulat vein. MR Angiography and conventional angiography confirmed arteriovenous fistula between left vertebral artery and ipsilateral internal jugular vein and large pseudoaneurysm formation on vertebral artery. Arteriovenous fistula was closed surgically and embolized with surgicell. But the pseudoaneurysm was treated with endovascular covered stent placement.

2970. Kurt, G., et al. (2007). "Transcranial arrow injury: a case report." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES **13**(3): 241-243.

As demonstrated in various studies, with mortality and morbidity rates reaching 90%-100%, penetrating brain injuries are among the most devastating subjects of neurosurgery. Shell and sharapnell fragments are the most common cause of this type injuries; although rarely reported in "modern times", transcranial arrow injuries may also be the cause. In this report, a 37 year-old male patient, who was shot by an "arrow" accidentally, was evaluated regarding clinical presentation, treatment and clinical progress.

2971. Kusanagi, H., et al. (2000). "Pituitary insufficiency after penetrating injury to the sella turcica." Journal of Nippon Medical School = Nippon Ika Daigaku zasshi **67**(2): 130-133.

We report a 28-year-old male patient with a pituitary insufficiency after a simple fracture of the sella turcica. He was injured by a long nail that punctured the lower jaw. No fracture other than that of the sella turcica was detected. An endocrinological examination revealed both anterior and pituitary dysfunction and diabetes insipidus that continued for about two months.

2972. Kutcher, M. E., et al. (2013). "A principal component analysis of coagulation after trauma." The journal of trauma and acute care surgery **74**(5): 1223-1230.

BACKGROUND: Clotting factor abnormalities underlying acute traumatic coagulopathy are poorly understood, with application of traditional regression techniques confounded by colinearity. We hypothesized that principal components analysis (PCA), a pattern-finding and data reduction technique, would identify clinically predictive patterns in the complex clotting factor milieu after trauma., METHODS: Plasma was prospectively collected from 163 critically injured trauma patients. Prothrombin; factors V, VII, VIII, IX, X; D-dimer; activated and native protein C; and antithrombin III levels were assayed and subjected to nonlinear PCA to identify principal components (PCs)., RESULTS: Of 163 patients, 19.0% were coagulopathic on admission. PCA identified 3 significant PCs, accounting for 67.5% of overall variance. PC1 identified global clotting factor depletion; PC2 the activation of protein C and fibrinolysis; and PC3 factor VII elevation and VIII depletion. PC1 score correlated with penetrating injury and injury severity, predicting coagulopathy (odds ratio [OR], 4.67; $p < 0.001$) and mortality (OR, 1.47; $p = 0.032$). PC2 score correlated with injury severity, acidosis, and shock, and significantly predicted ventilator-associated pneumonia (OR, 1.59; $p = 0.008$), acute lung injury (OR, 2.24; $p < 0.001$), multiorgan failure (OR, 1.83; $p = 0.002$), and mortality (OR, 1.62; $p = 0.006$) but was not associated with international normalized ratio (INR)-based or partial thromboplastin time (PTT)-based coagulopathy ($p > 0.200$). PC3 did not significantly predict outcomes., CONCLUSION: PCA identifies distinct patterns of coagulopathy: depletion coagulopathy predicts mortality and INR/PTT elevation, while fibrinolytic coagulopathy predicts infection, end-organ failure, and mortality, without detectable differences in INR or PTT. While depletion coagulopathy is intuitive, fibrinolytic coagulopathy may be a distinct but often overlapping entity with differential effects on outcomes.

2973. Kute, V. B., et al. (2013). "Successful renal transplantation from a brain-dead deceased donor who died from snakebite: a case report." Transplantation proceedings **45**(7): 2801-2803.

Even though India is the country with the highest annual number of deaths (50,000) from snakebite, there is contradictory evidence regarding acceptance of deceased donors (DD) who died from this cause. We present 2 successful renal transplantations (RTx) from a brain-dead DD who died from a neurotoxic snakebite without manifestations of a viper bite. We accepted the donor as he exhibited no evidence of hematoxic snakebite. Rather the findings were consistent with a neurotoxic bite (probably krait), which can cause hypoxic brain injury. Both recipients established good diuresis intraoperatively and did not require hemodialysis. The patients were discharged with good diuresis and normal serum creatinines. After 3-month follow-up, both recipients show normal graft function. According to our experience of favorable RTx outcomes from a brain-dead DD who died from neurotoxic snakebite may expand the donor pool.

2974. Kutlay, M., et al. (2010). "A rare case of occipital neuralgia secondary to ball bullet gunshot wound." Central European neurosurgery **71**(4): 224-226.

2975. Kutlay, M., et al. (1997). "Intracranial sewing needle associated with epilepsy." Turkish neurosurgery **7**(3-4): 103-106.

A case of unusual intracranial foreign body associated with epilepsy is presented. A young man had been admitted to our unit for investigation of epileptic attacks. On radiological examination, a sewing needle in the left posterior frontal region was detected. There was no specific focal epileptogenic activity in the electroencephalogram, and it was surgically removed. Two years after operation, the patient was free of epileptic attacks. Review of the literature revealed only two reports of 4 similar cases. In this report, delayed onset of neurological symptoms is

emphasized, and removal of the retained intracranial foreign bodies in accessible areas by early surgical intervention is suggested.

2976. Kutscha-Lissberg, E. and O. Thetter (1970). "[Prognosis of suicidal cranial gunshot wounds]." Die Prognose selbstmorderischer Schadelschussverletzungen. **120**(47): 871-872.

2977. Kuvat, S. V., et al. (2011). "Our treatment approaches in head-neck injuries caused by animal bites." The Journal of craniofacial surgery **22**(4): 1507-1510.

Several approaches exist for the treatment of animal attacks targeting the head and neck region. The treatment options and timing vary depending on the animal species, the nature of the defect, and the experience of the surgeon. In this study, early surgical treatment options used in head-neck injuries caused by domesticated or wild animal attacks are presented. We consider 12 patients who were admitted to our clinic between June 2006 and May 2010 with head-neck injuries caused by animal attacks. Tissue defect had developed in 10 patients due to half-wild dog bite and in 2 patients due to wolf bite. The ages of the patients ranged from 3 to 45 years (mean, 21.3 years). Among the patients included in the study, 4 had facial injury, 3 had ear, 3 had scalp, 1 had eye, and 2 had nose injuries. In all patients, early surgical reconstruction was performed after irrigation, antisepsis, and debridement. Concurrent rabies and tetanus prophylactic antibiotherapy program was started. Infection or surgical complications were not observed in any of the patients. Rabies symptoms were determined in one of the quarantined dogs under surveillance. There were no positive findings in the patient bitten by the dog. The surgical treatment results from all patients were at satisfactory levels.As a result, it is observed that, in the treatment of head and neck injuries resulting from animal bites, early acute approach has replaced the traditional long-term treatment. We believe that debridement and early surgical reconstruction used in combination with medical support and prophylactic treatment are the best treatment method.

2978. Kuvat, S. V., et al. (2011). "Bimaxillary reconstruction with a single free fibular osteoseptocutaneous flap." The Journal of craniofacial surgery **22**(3): 1102-1104.

Flap combinations including free fibula have been commonly used to reconstruct composite maxillomandibular defects. On the other hand, a single free osteoseptocutaneous may be rarely used to reconstruct the bimaxilla. In this article, we report a bimaxillary reconstruction in a 63-year-old man with a single fibular osteoseptocutaneous free flap.

2979. Kuzeyli, K., et al. (2001). "Diabetes insipidus secondary to penetrating spinal cord trauma: case report and literature review." Spine **26**(21): E510-511.

STUDY DESIGN: Case report., OBJECTIVE: To present a case of central diabetes insipidus (CDI) that developed after a gunshot injury to the thorax and thoracic spinal cord and to discuss the disease process in light of the relevant literature., SUMMARY OF BACKGROUND DATA: Antidiuretic hormone (ADH) abnormalities may develop after spinal trauma and/or surgery. Although there are published reports of inappropriate ADH syndrome arising in this clinical picture, CDI is rare., METHODS: A 33-year-old woman with hemopneumothorax and a gunshot wound to her thoracic spine was treated with chest tube drainage. No surgery was performed for the spinal injury. The patient was paraplegic on admission and rapidly developed excessive urine output. Testing revealed that her serum ADH level was low, consistent with CDI. Desmopressin acetate nasal spray was the prescribed treatment., RESULTS: The patient responded well to the desmopressin acetate spray., CONCLUSIONS: CDI is a complicated hormonal disorder characterized by excessive urine output. It is typically linked to an abnormality in the hypothalamohypophyseal axis that markedly reduces ADH production. The most common inciting causes are craniocerebral trauma, brain tumor and/or surgery, and central nervous system infection. Although uncommon, CDI should be considered when a spinal trauma patient develops excessive urine output.

2980. Kuzon, W. M., Jr., et al. (1998). "Double free-flap reconstruction of massive defects involving the lip, chin, and mandible." Microsurgery **18**(6): 372-378.

Two patients with massive, composite defects of the total lower lip, chin, and anterior mandible underwent double free-flap reconstruction. A fibular osteoseptocutaneous flap was used to reconstruct the mandible and floor of

the mouth and a radial forearm fasciocutaneous composite flap, including the palmaris longus tendon, was used for total lower lip and chin reconstruction. Postoperatively, both patients had acceptable cosmesis, were orally competent, and recovered adequate mandibular function. Double free-flap reconstruction is indicated only in those circumstances in which composite tissue requirements or massive tissue defects preclude reconstruction with a single free-tissue transfer.

2981. Kveton, J. F. (1987). "Obliteration of mastoid and middle ear for severe trauma to the temporal bone." The Laryngoscope **97**(12): 1385-1387.

A review of four cases of severe trauma to the temporal bone involving fracture of the external auditory canal indicates that adipose obliteration of the mastoid and middle-ear cleft with closure of the external auditory canal is the optimal method of repair. In two of four patients, one-stage repair was successful using this technique, and in the other two patients, obliteration was required as a revision operation after cholesteatoma developed from previous procedures.

2982. Kwon, C.-S., et al. (2016). "Globus Pallidus Internus Deep Brain Stimulation for Traumatic Hemidystonia Following Penetrating Head Injury." World neurosurgery **92**: 586.e581-586.e584.

BACKGROUND: Deep brain stimulation (DBS) has been a major advance in the treatment of dystonias. Outcomes are, however, less predictable for secondary dystonias, predominantly due to progression of disease or specific brain lesions. There are few cases reported of globus pallidus internus (GPi)-DBS for posttraumatic dystonia. We describe the successful use of unilateral GPi-DBS in a patient with hemidystonia following penetrating head injury. To our knowledge, this is the first description of the use of DBS following penetrating head injury., CASE DESCRIPTION: We present the case of a 47-year-old man with phasic hemidystonia. At the age of 3 years he suffered a penetrating head injury from a welding needle. The patient developed dystonic and phasic right-sided movements. Preoperative Burke-Fahn-Marsden score was 26. Magnetic resonance imaging showed a linear encephalomalacic track extending from the cortex in the left parieto-occipital region, traversing just superolateral to the left trigone into the left thalamus and ending in the region of left cerebral peduncle and subthalamic nucleus. There was no left GPi lesion. A left GPi-DBS electrode was inserted. At 6 months' follow-up, the patient's arm was more relaxed and his spasms lessened in their severity and frequency. Although the Burke-Fahn-Marsden score of 21 had improved modestly by 20%, pain and comfort levels had significantly improved with 50% improvement in visual analog scale score, translating in better quality of life. There were no complications. The clinical benefit persists at 5 years post surgery., CONCLUSION: Selected patients with posttraumatic hemidystonia, including following penetrating head injury, represent one group of secondary dystonias that might benefit from DBS surgery.

2983. Kytta, J., et al. (1999). "Extracranial contribution to cerebral oximetry in brain dead patients: a report of six cases." Journal of neurosurgical anesthesiology **11**(4): 252-254.

The near infrared spectroscopy offers a noninvasive method to monitor regional brain oxygenation. The problem with the technique appears to be possible extacranial contribution to the measurements. As a part of another study, we monitored regional saturation (rSO2) in six brain dead patients either during the test for spontaneous respiration or in those not eligible for organ donation, after discontinuation of mechanical ventilation. Relatively normal rSO2 values were obtained after brain death, and the values decreased concomitantly with the hemoglobin saturation of oxygen (SpO2) after the discontinuation of mechanical ventilation. A corresponding decrease in SpO2 and rSO2 suggests extracranial contribution to the measured rSO2. The diagnosis of brain death cannot be made based on this technology; furthermore the presence of extracranial contribution may limit its potential value even in other applications.

2984. La Harpe, R., et al. (2013). "Gunshot deaths in Geneva, Switzerland: 2001 to 2010." The American journal of forensic medicine and pathology **34**(3): 248-252.

We have conducted a retrospective study of all gunshot deaths that occurred in Geneva, Switzerland, over a 10-year period (2001-2010). The 133 cases reviewed were classified according to the manner of death, that is, suicide (106 cases), homicide (25 cases), and accident (2 cases). Various data from police authorities and the medicolegal examinations of the bodies were studied, including the age and sex of the victims, location of the event, type of firearm

used, concomitant use or nonuse of alcohol and/or other drugs, seasonality, and entry site. These various elements were compared with data found in the literature.

2985. La Rosa, A. J., et al. (2015). "Get the lead out: potential progressive localized neural injury from retained cerebral bullet fragments without systemic toxicity." Psychosomatics **56**(2): 202-205.

2986. Laacke, H. L. (1972). "[Civilian gunshot injuries of the head and their treatment]." Zivile Schussverletzungen des Kopfes und ihre Behandlung. **51**(12): 830-837.

2987. Laaribi, N., et al. (2019). "[The comet-tail artifact: A useful ultrasound sign]." Une queue de comete : une aide au diagnostic echographique. **42**(3): 322-324.

2988. Labbe, D., et al. (2005). "Gunshot wounds: reconstruction of the lower face by osteogenic distraction." Plastic and reconstructive surgery **116**(6): 1596-1603.

BACKGROUND: Although osteogenic distraction is a well-established technique, the distraction device still needs to be improved, miniaturized, and made lighter, more flexible, and more adaptable for mandibular reconstruction in adults with gunshot wounds. The authors successively used unidirectional and bidirectional devices, followed by a bone transporter with a horseshoe-shaped trammel. The trammel system was then replaced by an endless screw, and finally by a customized endless screw., METHODS: Eleven adult patients with gunshot injuries underwent mandibular reconstruction using osteogenic distraction with an external device., RESULTS: An average bone gain of 79 mm was achieved. No infectious complications were observed. The authors encountered equipment problems during the study, requiring a change of material. The mean duration of mandibular distraction was 3.5 months., CONCLUSIONS: Distraction of bone fragments facilitates the simultaneous expansion of soft tissues, avoiding free or pedicled myocutaneous flaps, for soft-tissue reconstruction. The alveolar ridge with the attached gum is also recreated by distraction, allowing dental reconstruction by osseointegrated implants.

2989. L'Abbe, E. N. (2005). "A case of commingled remains from rural South Africa." Forensic science international **151**(2-3): 201-206.

In the spring of 2003, bush cutters discovered a large grain bag filled with human skeletal remains in a forest in South Africa. Differential taphonomic processes observed on the bones suggested that the individuals had not died at the same time or had decomposed under different circumstances. The remains were sorted using gross morphological techniques which included assessing the number of skeletal elements present, visual pair matching, articulation, process of elimination and taphonomy. Standard techniques were used to estimate age, sex, racial affinity and stature. A minimum number of individuals (MNI) of 10 was established, which included 7 adult males, 1 adult female and 2 juveniles. Trauma was observed on only one individual. Approximately, 80% of the skeletal remains were missing. These various skeletal elements may have been lost by accident, normal taphonomic processes or taken by scavengers. Possible origins for these skeletal remains include removal from a formal grave, found in the veldt or murdered.

2990. Lachard, J., et al. (1981). "[Intracranial penetration of the mandibular condyle: report on three cases (author's transl)]." Penetration intracranienne du condyle mandibulaire. A propos de trois cas. **98**(10-11): 543-546.

Three cases of intracranial penetrations of the mandibular condyle condyle are reported, the published literature reviewed, and therapy discussed. Often unrecognized during initial examinations, they are diagnosed when the patient is seen several months later with permanent constriction of the jaws. Frontal and sagittal tomographic examinations should therefore be performed in the articular region in all cases when it is involved in injuries. Orthopedic reduction gives good results in recent injuries, long-standing cases with temporomandibular ankylosis requiring sub-condylar resection by the pre-auricular approach.

2991. Lacqua, A. J., et al. (2021). "Diagnostic findings and successful management of central diabetes insipidus following a self-inflicted penetrating brain injury in a dog." Revista Brasileira de Medicina Veterinaria **43**(1).

A 6-year-old 12 kg male neutered mixed breed dog presented in lateral recumbency with dysphoria and vocalization following a self-inflicted fork impalement injury. Computed tomography (CT) was performed which showed a penetrating wound through the right orbit, into the calvarium, and through the brain parenchyma. The dog was hospitalized with supportive care, sedatives, analgesia, antiepileptics, anti-inflammatories, antibiotics, and desmopressin acetate (DDAVP) to control post-traumatic central diabetes insipidus (PTCDI) which developed during recovery. Magnetic resonance imaging (MRI) findings 16 days later revealed resolving ventricular hemorrhage and mild perilesional edema and inflammation. Normal mentation and ambulation slowly returned and 3 months later the dog was clinically normal. To the author's knowledge, this is the first report of a self-inflicted penetrating brain injury in a dog. This case demonstrates successful medical management of a dog with a traumatic brain injury (TBI) and PTCDI which is an uncommon occurrence in veterinary medicine.

2992. Lacqua, M. J. and P. Sahdev (1992). "Effective management of penetrating head injury." Hospital practice (Office ed.) **27**(9): 30-passim.

Although head injuries are usually easily recognized, other, less obvious lesions should also be promptly investigated. In either case, outcome is often determined in the first few minutes and hours of management.

2993. Ladenheim, J. C. and R. Rabinovici (2004). "Letter to the editor (multiple letters)." Journal of Trauma - Injury, Infection and Critical Care **57**(1): 199.

2994. Laffers, Z. and H. Brehm (1980). "[Intraorbital extrabulbar gunshot wounds]." Intraorbitale, extrabulbar gelegene Projektilverletzungen. **176**(3): 413-417.

Report on two similar cases of intraorbital, extrabulbar injuries caused by lead bullets. Indication, risk, and final success of treatment after early surgery to remove the foreign bodies are discussed with reference to the literature.

2995. Lagalla, R., et al. (2000). "Plain film, CT and MRI sensibility in the evaluation of intraorbital foreign bodies in an in vitro model of the orbit and in pig eyes." European radiology **10**(8): 1338-1341.

Detection and characterization of intraorbital foreign bodies (IFB) is fundamental in acute trauma setting, preventing inflammatory sequelae or complications related to IFB movements when a MRI study is planned. Papers concerning plain film and CT sensibility in IFB detection show controversial results. For this reason we investigated plain film, CT and MRI sensibility in the evaluation of IFB. For an in vitro model, specimens of dry and fresh wood, glass, iron, plastic and graphite were immersed in animal lard and in a 0.9% sodium chloride plus 3.5 g/dl human serum albumin solution. Specimens of different size and nature where also implanted into enucleated pig eyes. Air bubbles were introduced also. Plain film, CT and MRI investigation were performed. Plain films underestimated intraocular IFB as plastic, fresh or dry wooden IFB were not demonstrated. The CT study was always able to depict and differentiate IFB according to the attenuation values. Severe artefacts prevented demonstration of iron, glass and graphite IFB on MRI, whereas plastic or wooden IFB were always detected. Despite radiographs have been suggested as a prerequisite for MR imaging, because our results showed plain film to underestimate radiolucent IFB, we suggest CT as the modality of choice when IFB has to be ruled out.

2996. Lahirish, I. A. M., et al. (2021). "Cerebellar mutism following head trauma: A case report and literature review." Surgical neurology international **12**: 446.

BACKGROUND: Cerebellar mutism (CM) is defined as the lack of speech production, despite an intact state of consciousness and cognitive function, that happens secondary to a cerebellar insult. To the best of our knowledge, only five cases have thus far been described in the English literature. In this paper, we report the sixth incidence overall, which is also the first case of a CM associated with penetrating head injury. The relevant literature is reviewed and analyzed, our current knowledge of the neuroanatomical and functional relations is summarized, and potential future research endeavors are indicated., CASE DESCRIPTION: An 8-year-old girl was transferred to our hospital having had

fallen on a rod that penetrated her neck behind the ear. An urgent computed tomography scan of the head revealed a right cerebellar contusion with surrounding edema. Three days later, she became mute but was still obeying commands. Repeat imaging showed a resolving cerebellar contusion with increased edema and mass effect. By day 9, she had uttered a few words. At 1-month follow-up, the child had regained normal speech., CONCLUSION: Posttraumatic CM is a rare and probably underreported condition with only six documented cases to date. Although it may well be on the same spectrum as postoperative CM, further understanding of the exact mechanism, clinical course, and prognosis of this entity is bound to significantly improve the recovery and quality of life of head trauma patients. Copyright: © 2021 Surgical Neurology International.

2997. Lake, D., et al. (2003). "Intraorbital foreign bodies." Ophthalmology **110**(6): 1269-1269.

2998. Lakits, A., et al. (1999). "Orbital helical computed tomography in the diagnosis and management of eye trauma." Ophthalmology **106**(12): 2330-2335.

OBJECTIVE: To prospectively determine the accuracy of helical computed tomography (CT) and multiplanar reconstruction and its value in surgical planning for the management of ocular trauma with suspected intraocular and orbital foreign bodies using surgical and clinical follow-up findings as the gold standard., DESIGN: Prospective, observational case series., PARTICIPANTS: Thirty-six patients with ocular trauma and suspected foreign bodies were studied., INTERVENTION: All patients were examined using a standardized scanning protocol with helical CT direct scanning in the axial plane and multiplanar reconstruction of coronal and sagittal planes., MAIN OUTCOME MEASURES: The images were analyzed for the presence and number of intraocular and orbital foreign bodies, anatomic location, and foreign body size. The surgical and clinical follow-up findings (contact lens examination, gonioscopy, indirect ophthalmoscopy and scleral depression, perimetry, color testing, measurement of size) were used as the gold standard to which the image results were compared., RESULTS: Helical CT showed a single intraocular foreign body in 14 patients, a single orbital foreign body in 9 patients, and multiple orbital foreign bodies in 2 patients. Intraocular or orbital foreign bodies were excluded in 11 patients. Twenty foreign bodies were correlated with surgical results. Surgical and clinical follow-up findings were in agreement with helical CT results regarding the detection and determination of the number of presumed foreign bodies. Localization to intraocular versus orbital compartment and proximity to the optic nerve was accurate in all patients. Determination of size of the foreign bodies on the helical CT images was reliable and repeatable., CONCLUSIONS: Helical CT axial scanning with multiplanar reconstruction is accurate at detecting and localizing intraocular and orbital metallic, glass, and stone foreign bodies. This imaging method aids the surgeon in choosing the surgical approach to retained intraocular and orbital foreign bodies.

2999. Lakouichmi, M., et al. (2014). "An unusual intracranial metallic foreign bodies and panhypopituitarism." The Pan African medical journal **19**: 33.

A 49 years old man, with a history of aggression at the age of 18 years by a pair of scissors, who consulted for unilateral migraine headaches look straight. Paraclinical explorations concluded that trauma to anterior pituitary by a metallic foreign body from the right nostril to the sella, responsible for panhypopituitarism and sinusitis. The headaches are frequent causes of consultation, often treated symptomatically but rarely explored. The direct trauma to the pituitary gland, by a metallic foreign body, is exceptional. We report the case of neglected panhypopituitarism, discovered 31 years after injury with a pair of scissors.

3000. Lam, A. L. A., et al. (2022). "POS-982 A CASE REPORT OF THE FIRST DECEASED ORGAN DONOR IN THE PHILIPPINES DURING THE COVID-19 PANDEMIC." Kidney International Reports **7**(2): S430.

Introduction: The world was faced with a new pandemic that affected different societies, economies, normal work and daily living, and has significantly affected hospital functions and resources. It took an even bigger blow to the practice of organ donation and transplantation causing a decline in the pool of potential donors to meet the rising number of transplant candidates. We report a case of the first deceased organ donor reported in the Philippines during the COVID-19 pandemic. CASE A 19-year-old male was brought to our institution due to a self-inflicted gunshot wound to the head. A severe, irreversible, traumatic brain injury was documented. Maximal resuscitative efforts were done to keep his over-all neurovital status stable however the patient still remained unresponsive. A diagnosis of brain death

was done by two physicians with four hours interval. Knowing the patient's condition, the family's altruism led them to decide for the patient to become an organ donor. Written and informed consents were secured and the patient was then placed in a multidisciplinary team of medical and surgical intensivists for deceased donor management and organ procurement. The management was geared towards towards the preservation of the viable organs for donation. The transplant procurement teams and organizations were informed from local to national setting. Assessment of donor eligibility was done. After the patient was cleared as non-COVID, the organ procurement was facilitated at our institution. [Formula presented] Methods: DIAGNOSIS OF BRAIN DEATH An evaluation of brain death was considered in our patient who have suffered a massive, irreversible brain injury with an identifiable cause. Our patient was able to meet the 3 cardinal signs of brain death on top of the clinical prerequisites needed to consider brain death. A careful neurologic examination was performed. This was done by two physicians independent of the transplant team to make sure there is no conflict of interest. MANAGEMENT OF THE DECEASED ORGAN DONOR Optimum donor care was observed from the time of diagnosis of brain death up to the time of the organ procurement to avoid the inevitable changes that can result in graft dysfunction and increased chances of rejection. The organ donor management should be aggressive and requires an ICU setting. Anwar A et al, 2019 presented management protocol for brain-dead organ donors. The goal is to help other medical health facilities to prepare their own management protocols for proper management of potential organ donors and increased chances of successful transplantation in the future. Results: There is a rising number of FIlipinos nationwide who develop end-stage renal disease (ESRD) that need organ transplantation annually. In 2020 alone there are a total of 118 transplant candidates in the waiting list and only 18 eligible deceased donors, 11 from our local city, and of the 11, only 1 consented to be an actual donor - the case presented. [Formula presented] Conclusions: The practice of organ procurement and transplantation already faced a lot of challenges and was further aggravated by the pandemic. A thorough and precise diagnosis of brain death, aggressive deceased donor management with clear treatment goals, and adherence to protocols for organ procurement adjusted to the COVID-19 pandemic made this deceased organ procurement successful and possible despite this difficult time. No conflict of interest

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3001. Lam, D. C., et al. (1999). "Intraorbital needle fragment: a rare complication of retrobulbar injection." Archives of ophthalmology (Chicago, Ill. : 1960) **117**(8): 1089-1090.

3002. Lam, D. S., et al. (2000). "Combined cataract extraction and submacular blood clot evacuation for globe perforation caused by retrobulbar injection." Journal of cataract and refractive surgery **26**(7): 1089-1091.

A 45-year-old woman, originally scheduled for cataract surgery in the left eye, was referred for management of a globe perforation noticed after the retrobulbar injection of an anesthetic solution. There was a moderate degree of vitreous hemorrhage, and initial visual acuity was hand movement. A submacular blood clot of about 4-disc diameter was detected when the vitreous hemorrhage gradually cleared. One week after the incident, combined phacoemulsification, intraocular lens implantation, pars plana vitrectomy, and submacular clot removal using tissue plasminogen activator (tPA) as an adjunct were performed. Recovery was uneventful. At the last follow-up 6 months after surgery, best corrected visual acuity was 20/30.

3003. Lam, L., et al. (2012). "The impact of early hormonal therapy in catastrophic brain-injured patients and its effect on organ procurement." The American surgeon **78**(3): 318-324.

The purpose of this study was to evaluate the impact of early hormonal therapy on organ procurement from catastrophic brain-injured patients. All catastrophic brain-injured patients admitted to a high-volume academic Level I trauma center who underwent successful organ procurement over a 3-year period (2006 to 2008) were reviewed. Patients were divided into two groups, those who received hormone therapy (HT) before brain death (BD) declaration and those who received HT after BD declaration. Thirty-two (60.4%) received HT before BD and 21 (39.6%) HT after BD. Trauma was the most common cause of brain injury in both groups (before BD 96.9 vs after BD 90.5%, P = 0.324). There were no significant differences in demographics and clinical data. Patients receiving HT before BD were more hypotensive on admission (28.2 vs 9.5%, P = 0.048); however, they required vasopressors less frequently (62.5 vs 100.0%, P = 0.001), for a shorter duration (17.2 +/- 16.3 hours vs 33.1 +/- 34.9 hours, P = 0.043), and at a lower dosage. Time from admission to procurement did not differ between the two groups (109.8 +/- 83.1 hours vs 125.0 +/- 79.9 hours, P = 0.505). Patients receiving HT before BD had significantly more organs procured (4.5 +/- 1.5 vs 3.5 +/- 1.3, P =

0.023). Although catastrophic brain-injured patients receiving early hormonal therapy were more hypotensive, they required less vasopressors and had higher procurement rates. The early use of hormonal therapy may decrease the need for vasopressors and increase the salvage of potentially transplantable organs.

3004. Lamb, T., et al. (2012). "Craniocerebral gunshot wounds: A current analysis armed with new technology." Emergency radiology **19**(5): 365-366.

Purpose: We analyzed multidetector head CT exams of civilian patients who suffered cranial gunshot wounds and correlated imaging findings with clinical outcome. Materials and Methods: Institutional review board approved, retrospective review of our database identified 34 patients who had intracranial gunshot injuries between January 2009 and March 2012 and had initial multidetector CT at our hospital. The patients' hospital course and operative history were reviewed; discharge condition was assigned a score based on the modified Rankin scale (MRS). Twenty of the 34 patients died (MRS of 6) and 1 was discharged in a vegetative state (MRS of 5). The remaining 13 patients were given MRS scores based on their level of disability (MRS of 0-4). Each patient's initial head CT was evaluated for entrance and exit wounds, ventricular involvement, and trajectory of the missile. Transcranial injury was defined by the presence of both entrance and exit wounds. Two and three dimensional reformatted images were utilized for precise identification of entrance and exit wounds and plotting missile trajectory. Fisher's exact test was applied to the data. Results: Twenty of 34 patients suffered bihemispheric injury, of which 17 patients had MRS >4 and 3 patients had MRS ≤4 confirming that multihemispheric involvement portends a poorer outcome (p-value = 0.001). 18/34 patients suffered transcranial injury, of which 15 patients had MRS >4 and 3 patients had MRS ≤4 confirming that transcranial injury correlates with a poorer outcome (p-value = 0.012). 14/34 patients suffered ventricular injury, of which 12 patients had MRS >4 and 2 patients had MRS ≤4 confirming that ventricular injury portends a poorer outcome (p-value = 0.030). 12/ 34 patients died within the first day of hospitalization. Among the 22 survivors, 12 patients underwent surgery, of which 2 had MRS >4 and 10 had an MRS ≤4 confirming that surgical intervention in patients that survive 24 hours correlates with improved outcome (p-value = 0.0274). We will illustrate several severe complications such as catastrophic delayed venous hemorrhage and venous sinus thrombosis. Conclusion: Our study identified several statistically significant predictors of poor clinical outcome (MRS >4) including bihemispheric involvement, ventricular injury, and transcranial missile injury.

3005. Lambert, A. O., et al. (2020). "Difficult Intubation due to Penetrating Trauma from a Crossbow Bolt." Air medical journal **39**(4): 300-302.

We present the case of a patient with penetrating neck and craniofacial trauma from a self-inflicted crossbow bolt injury. This case highlights the challenges involved in prehospital airway management related to an in situ foreign object penetrating the oral cavity. We review the complications associated with such injuries and considerations for effective prehospital airway management.

3006. Lambert, G. A., et al. (1999). "Effect of cortical spreading depression on activity of trigeminovascular sensory neurons." Cephalalgia : an international journal of headache **19**(7): 631-638.

The effect of cortical spreading depression, a proposed initiating event for migraine pain, on cortical blood flow (laser Doppler method) and on the spontaneous firing rate and stimulus-evoked responses of trigemino-cervical neurons with craniovascular input was studied in 17 neurons in 8 cats anesthetized with chloralose. Cortical spreading depression, induced via cortical pinprick injury, produced an initial wave of cortical hyperemia (243+/-57% of control) and a later and smaller phase of oligemia (96+/-4% of control). Neither the basal discharge rate (6.7+/-1.7 sec(-1)) nor the evoked responses to electrical stimulation of the superior sagittal sinus (4.1+/-0.8 discharges per stimulus) of upper cervical spinal cord neurons was altered over periods of up to 2 h following one, two, or three waves of spreading cortical depression. We conclude that a small number of episodes of cortical spreading depression is not capable of activating C2 cervical spinal cord craniovascular sensory neurons in the cat.

3007. Lamm, K., et al. (1986). "Long-term study after perforation of the round window. Animal experiments using electric response audiometry." Acta oto-laryngologica **102**(1-2): 27-30.

The round-window membrane of the inner ear of the guinea pig was perforated with a platinum wire under ketamine-xylazine anaesthesia. The latency times of waves I and V (Jewett) increased to 0.6 ms at 100 dB click HL stimulus loudness. The interpeak latencies did not change (4.0-4.2 ms). At 60 dB CHL stimulus loudness, no responses were discernible. Closure of the membrane damage by adhesive fibrin tissue had no effect on the auditory nerve potentials or the brain-stem responses. Normal latency times of waves I-V were seen 7 days after perforation. There was no difference between the animals with repaired and unrepaired membrane damage. We observed spontaneous healing of the round-window membrane 7 days after perforation, and a normal organ of Corti.

3008. Lamminmaki, S., et al. (2018). "Multiple cranial nerve injuries and neck abscesses caused by a transorally penetrating organic stick." BMJ case reports **2018**.

Foreign bodies cause a remarkable number of otolaryngological emergency visits and occasionally result in life-threatening conditions and later-emerging complications. Patient recovery depends on the detection and proper extraction of all foreign materials. Despite various obtainable diagnostic tools, adequate anamnesis forms the basis of clinical reasoning and should direct later examinations and radiological imaging. This case report describes a challenging patient with a unique trauma mechanism: many pieces of a fragmented organic foreign body emerged within 1 year of the initial injury, leading to repeated operations, a long period in an intensive care unit and a long-term swallowing and speech dysfunction.

3009. Lan, Z., et al. (2018). "Nonmissile Anterior Skull-Base Penetrating Brain Injury: Experience with 22 Patients." Asian journal of neurosurgery **13**(3): 742-748.

BACKGROUND: Nonmissile anterior skull-base penetrating brain injuries (NASBPBIs) have specific characteristic features that are different from missile injuries. Our study presents our experiences on the characteristic features as well as management of NASBPBI., MATERIALS AND METHODS: We retrospectively reviewed 22 consecutive patients with NASBPBI managed at our institute during a 13-year period. The mechanism of injury, clinical investigations, and complications were analyzed, with more emphasis on diagnostic and treatment regimen., RESULTS: The 22 cases included in our study comprise of 20 males and 2 females. Majority (72.7%) of the patients were adults with a mean age of 27.5 years. The mechanisms of injury often include accidental fall, either onto a small-diameter sharp object (10 cases) or while carrying such an object in the hand (4 cases). The other common mechanisms were stabbing, accident, or during an altercation (8 cases). Clinical manifestations included periorbital hematoma (10 cases, 45.5%) and cerebrospinal fluid rhinorrhea or orbitorrhea (4 cases, 18.2%) as well as signs of embedded foreign object (8 cases, 36.4%). We performed emergency craniotomy in 21 cases and skin debridement in one case. Postoperative complications were abscess (1 case), epilepsy (1 case), and traumatic carotid-cavernous fistula (1 case)., CONCLUSION: Nonmissile injuries are generally on the rise and therefore deserve more attention. We observed that clinical outcomes were excellent in 14 (Glasgow Outcome Scale [GOS] score of 5) and good in the remaining 8 patients (GOS of 4) during 6-month-10-year (mean 4.6 years) follow-ups.

3010. Lan, Z. G., et al. (2018). "Nonprojectile penetrating iron rod from the oral cavity to the posterior cranial fossa: a case report and review of literature." International medical case reports journal **11**: 41-45.

INTRODUCTION: Nonprojectile penetrating skull base injuries as a result of falls have rarely been confronted in normal neurosurgery although a few nonmissile injuries have been reported. These kinds of injuries represent a life-threatening emergency., CASE PRESENTATION: We present an unusual case of a 25-year-old male construction worker who suffered an accidental penetrating skull base injury when he fell on a metal rod while he was walking on a 2-meter-high platform. He was clinically stable at presentation. Skull radiograph showed a solid metallic bar, 30 cm long, that penetrated through the right anguli oris eminence and was lodged low in the right occipital bone., CONCLUSION: Penetrating injury to the head is considered a form of severe traumatic brain injury. Although case of penetrating head injuries as a result of fall from heights are very rare, we anticipate the construction works on high-rise buildings are at maximum risk. We advise that removal of this kind of foreign bodies be done in the theater and not outside because of risk of involvement of larger vessels leading to fatal hemorrhage. We further suggest that patients with nonprojectile injuries should undergo a preoperative computed tomography-angiography to rule out any vascular injury.

3011. Lancia, M., et al. (2014). "An unusual case of unintentional firearm death of a 3-year-old child." The American journal of forensic medicine and pathology **35**(3): 178-180.

The authors report the case of an accidental death of a 3-year-old child who unintentionally shot himself while he was handling his father's handgun. The peculiarity of the observed injury makes the case particularly interesting, along with the fact that, in Italy, unintentional firearm-related deaths are rather uncommon among children and adolescents.Because of the presence of only 1 bullet hole on the parietal-occipital region, radiological cranial examinations were performed before proceeding with the autopsy.Computed tomographic scans were useful to confirm the entrance site of the bullet and, especially, to establish the trajectory with the whole spectrum of fractures. The case shows that the unusual entrance site of the bullet through the nose led to a fatal cranial injury, as a result of curiosity of a 3-year-old child in the presence of an unsupervised handgun.

3012. Lane, P. L., et al. (2000). "Intracranial pressure monitoring and outcomes after traumatic brain injury." Canadian journal of surgery. Journal canadien de chirurgie **43**(6): 442-448.

OBJECTIVE: Uncontrolled intracranial hypertension after traumatic brain injury (TBI) contributes significantly to the death rate and to poor functional outcome. There is no evidence that intracranial pressure (ICP) monitoring alters the outcome of TBI. The objective of this study was to test the hypothesis that insertion of ICP monitors in patients who have TBI is not associated with a decrease in the death rate., DESIGN: Study of case records., METHODS: The data files from the Ontario Trauma Registry from 1989 to 1995 were examined. Included were all cases with an Injury Severity Score (ISS) greater than 12 from the 14 trauma centres in Ontario. Cases identifying a Maximum Abbreviated Injury Scale score in the head region (MAIS head) greater than 3 were selected for further analysis. Logistic regression analyses were conducted to investigate the relationship between ICP and death., RESULTS: Of 9001 registered cases of TBI, an MAIS head greater than 3 was recorded in 5507. Of these patients, 541 (66.8% male, mean age 34.1 years) had an ICP monitor inserted. Their average ISS was 33.4 and 71.7% survived. There was wide variation among the institutions in the rate of insertion of ICP monitors in these patients (ranging from 0.4% to over 20%). Univariate logistic regression indicated that increased MAIS head, ISS, penetrating trauma and the insertion of an ICP monitor were each associated with an increased death rate. However, multivariate analyses controlling for MAIS head, ISS and injury mechanism indicated that ICP monitoring was associated with significantly improved survival ($p < 0.015$)., CONCLUSIONS: ICP monitor insertion rates vary widely in Ontario's trauma hospitals. The insertion of an ICP monitor is associated with a statistically significant decrease in death rate among patients with severe TBI. This finding strongly supports the need for a prospective randomized trial of management protocols, including ICP monitoring, in patients with severe TBI.

3013. Lange, J., et al. (2012). "Maggots! An unusual complication of head trauma in the rockies." Journal of Hospital Medicine **7**: S210-S211.

Case Presentation: A 52-year-old female with end-stage liver disease and no recent travel history sustained head trauma 3 weeks prior to presentation that required laceration repair. She was transferred to our medicine service from an outside hospital Emergency Department after being found down with evident maggot infestation. Exam was significant for presence of larvae in her right ear canal and in her scalp wounds as well as grade I hepatic encephalopathy, ascites, and lower extremity edema. Her CBC displayed mild leukocytosis (11.2) and tissue culture grew MRSA and polymicrobial flora. Computed Tomography of the head demonstrated scalp wounds penetrating to bone, intact and thickened tympanic membranes, and no evidence of brain involvement. ENT and Plastic Surgery performed multiple procedures involving maggot removal and debridement of scalp wounds. The patient completed a 2- week course of antibiotics and was discharged. Discussion: Semi-specific myiasis results from deposition of fly eggs in decaying animal matter or in a living host if open wounds are present. Myiasis infestation occurs commonly in tropical areas but is rare in the US and rarer in arid climates, such as Colorado. Myiasis can no longer be considered a disease restricted to the tropics. Immigration, global commerce, eco-tourism, and global warming have contributed to an increased number of US cases involving these nonnative species. Larvae found in wounds should not be considered therapeutic. Therapeutic larvae spare vital tissue whereas acquired larvae invade necrotic and healthy tissue. Treatment for myiasis involves larvae removal, devitalized tissue debridement, and occasionally larvacides. Early treatment is curative and crucial to prevent invasion of healthy tissue. Conclusions: We present an unusual case of acquired cutaneous and cavitary myiasis following head trauma. Patients with poor personal hygiene and environmental exposure are at risk for developing myiasis, even in developed countries and arid climates.

3014. Lange, R., et al. (2017). "Factors affecting burden in family caregivers of military service members with traumatic brain injury." Brain injury **31**(6-7): 893-894.

Background: Family members often assume the role of 'caregiver' for a service member (SM) following a traumatic brain injury (TBI) to help with rehabilitation and community reintegration. Caregivers often experience significant burden from the demands placed on them. This study aimed to identify factors that increase caregiver burden. Methods: Participants were 214 caregivers [95.8% female; 92.5% Caucasian; Age: M = 38.6 years (SD = 10.4)] of US military SMs who sustained a penetrating, severe, moderate or mild TBI. The majority of the sample was caring for a spouse/ partner (86%) and had been caregiving for 4.1 years (SD = 2.9). Caregivers were recruited from medical treatment facilities nationwide and via community outreach. Participants completed the Caregiver Appraisal Scale (CAS), Mayo- Portland Adaptability Inventory (MPAI; significant other ratings), and a structured interviewed designed to evaluate a variety of caregiving issues (e.g. time spent caregiving, caregiving responsibilities). Only select variables were included that were hypothesized (a priori) to have an impact on caregiver burden. Using the CAS Caregiver Burden subscale, the sample was divided into two groups: High Burden (n = 138) and Low Burden (n = 76). Results: There were no significant group differences for age, gender, household income, number of dependents living in the household or the number of years caregiving (p >.05). However, there were significant group differences on the majority of remaining measures. High caregiver burden was significantly associated with a decrease in the SMs (i) sensorymotor and cognitive abilities; (ii) mood and interpersonal interactions; and (iii) initiation and social contact/activities [MPAI Ability, Adjustment, and Participation scales (all ps <.001; d=.77 to d = 1.30)]. In particular, high caregiver burden was associated with a SMs symptoms of anxiety, post-traumatic stress, depression, inappropriate behaviour in social situations, and verbal and physical expressions of irritability, anger, and aggression (all ps<.001; OR = 4.81 to 15.36). High caregiver burden was further associated with the caregiver's: [1] lack of mastery in their role (CAS Caregiver Mastery, p <.001; d=.77) and need for instruction/coaching to provide care (p <.001, OR = 3.79); [2] loss of income due to lack of employment or inability to work or find work (all ps <.006, OR = 2.78 to 14.57); [3] need for help managing medical appointments, navigating the medical health system, and finding information about available services/programmes (all ps<.001; OR = 3.70 to 10.32); and [4] providing care 7 days per week for more than 80 hours p/week; and a lack of time to devote to themselves (all ps<.001, OR = 3.74 to 10.36). Conclusion: These results suggest that caregiver burden among family caregivers providing care to SMs following TBI is very high. There is a significant need for increased focus on this population. In order to reduce burden, caregivers would benefit from (a) education programmes, (b) assistance with caregiving duties, (c) respite, (d) support groups, and (e) increased financial support.

3015. Lange, R. T., et al. (2015). "Clinical utility of the Neurobehavioral Symptom Inventory validity scales to screen for symptom exaggeration following traumatic brain injury." Journal of clinical and experimental neuropsychology **37**(8): 853-862.

The purpose of this study was to examine the clinical utility of three recently developed validity scales (Validity-10, NIM5, and LOW6) designed to screen for symptom exaggeration using the Neurobehavioral Symptom Inventory (NSI). Participants were 272 U.S. military service members who sustained a mild, moderate, severe, or penetrating traumatic brain injury (TBI) and who were evaluated by the neuropsychology service at Walter Reed Army Medical Center within 199 weeks post injury. Participants were divided into two groups based on the Negative Impression Management scale of the Personality Assessment Inventory: (a) those who failed symptom validity testing (SVT-fail; n = 27) and (b) those who passed symptom validity testing (SVT-pass; n = 245). Participants in the SVT-fail group had significantly higher scores (p<.001) on the Validity-10, NIM5, LOW6, NSI total, and Personality Assessment Inventory (PAI) clinical scales (range: d = 0.76 to 2.34). Similarly high sensitivity, specificity, positive predictive power (PPP), and negative predictive (NPP) values were found when using all three validity scales to differentiate SVT-fail versus SVT-pass groups. However, the Validity-10 scale consistently had the highest overall values. The optimal cutoff score for the Validity-10 scale to identify possible symptom exaggeration was >=19 (sensitivity = .59, specificity = .89, PPP = .74, NPP = .80). For the majority of people, these findings provide support for the use of the Validity-10 scale as a screening tool for possible symptom exaggeration. When scores on the Validity-10 exceed the cutoff score, it is recommended that (a) researchers and clinicians do not interpret responses on the NSI, and (b) clinicians follow up with a more detailed evaluation, using well-validated symptom validity measures (e.g., Minnesota Multiphasic Personality Inventory-2 Restructured Form, MMPI-2-RF, validity scales), to seek confirmatory evidence to support an hypothesis of symptom exaggeration.

3016. Langenegger, E. and C. Lanz (2005). "[Postmortem injury--an impressive postmortem phenomenon that can lead to diagnostic errors]." Treibverletzung--ein eindruckliches postmortales phanomen, das zu Fehldiagnosen fuhren kann. **63**(1): 103-106.

A single skull from a 6-year-old child was sent to the Anthropological Institute of the University of Zurich. It bore a considerable bone lesion in the frontal area. Closer inspection revealed that it was a postmortal lesion, resulting from the skull chafing on the river bottom whilst drifting in running water. The postmortal change, the so-called "Treibverletzung" (drift injury), is characteristic for bodies that are recovered from rivers or stillwater. A recent case from the Medical Examiners' Office from the same geographic area as the child, showed the same features of the "Treibverletzung". Since it is known from the recent case where it was found, it becomes clear that even small rivers can cause characteristic postmortal injuries.

3017. Langerman, A., et al. (2011). "Skull base approach to carotid artery lesions: Technique, indications, and outcomes." Skull Base **21**.

Operative approaches to lesions of the carotid artery at the skull base are challenging and place multiple cranial nerves at risk. Endovascular approaches have enhanced the accessibility of this area, but some lesions are not amenable to endovascular management. Herein we describe a preauricular approach utilizing anterior dislocation of the temporomandibular joint with microscopic drillout of the medial glenoid and eustachian tube to identify and skeletonize the carotid artery in the foramen lacerum. Reviewing our experience with a direct open approach to the distal carotid artery revealed 10 patients from our institution. Nine of the patients presented with aneurysm, six spontaneous and three following blunt trauma, and one patient presented with carotid artery rupture after penetrating trauma. Eight patients underwent reverse saphenous vein grafting and two had resection with primary reanastomosis. Two of the patients presented with cranial nerve (CN) X deficits, and these persisted following surgery. Three of the eight patients without CN deficits preoperatively experienced postoperative deficits. One patient also suffered a mild CVA but had no permanent sequelae. Thus overall 5 (50%) of the 10 patients suffered no neurologic deficits and 7 (70%) suffered no new neurologic deficits as a result of surgery. One patient had persistent temporomandibular joint dysfunction. All patients had long-term patency of the graft or anastomosis, and no new neurologic symptoms were reported with a mean follow-up of 55 months. Open approaches to the carotid artery at the skull base are feasible and with careful anatomic dissection can be carried out with minimal morbidity in most cases. We present full details and images of the operative approach.

3018. Langerman, A., et al. (2012). "Skull base approach to carotid artery lesions: Technique, indications, and outcomes." Journal of Neurological Surgery, Part B: Skull Base **73**(3): 163-167.

Operative approaches to lesions of the carotid artery at the skull base are challenging and place multiple cranial nerves at risk. Herein, we describe a preauricular approach utilizing anterior dislocation of the temporomandibular joint with microscopic drill-out of the medial glenoid and Eustachian tube to identify and skeletonize the carotid artery in the foramen lacerum. The facial nerve remains undissected during this approach. Nine of 10 patients presented with aneurysm, six spontaneous and three following blunt trauma, and one patient presented with carotid artery rupture after penetrating trauma. Three of the patients presented with cranial nerve (CN) deficits that persisted. One patient was unevaluable preoperatively due to trauma but awoke with multiple CN deficits. Only one of nine evaluable patients suffered a new long-term CN deficit (XI). One patient had persistent temporomandibular joint dysfunction. All patients had long-term patency of the graft or anastamosis and no new neurologic symptoms were reported with amean follow-up of 55months. Open approaches to the carotid artery at the skull base are feasible and with careful anatomic dissection can be performed with minimal morbidity in most cases. We present full details and images of the operative approach.

3019. Lanigan, A., et al. (2017). "The Joint Facial and Invasive Neck Trauma (J-FAINT) Project, Iraq and Afghanistan: 2011-2016." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **157**(4): 602-607.

Objective Define the number and type of facial and penetrating neck injuries sustained in combat operations in Iraq and Afghanistan from 2011 to 2016. Compare recent injury trends to prior years of modern conflict. Study Design Case series with chart review. Setting Tertiary care hospital. Methods The Joint Theater Trauma Registry (JTTR) was queried for facial and neck injuries from Iraq and Afghanistan from June 2011 to May 2016. Injury patterns, severity, and patient demographics were analyzed and compared to previously published data from combat operations during January 2003 to May 2011. Results A total of 5312 discrete facial and neck injuries among 922 service members were identified. There were 3842 soft tissue injuries (72.3%) of the head/neck and 1469 (27.7%) facial fractures. Soft tissue injuries of the face/cheek (31.4%) and neck/larynx/trachea (18.8%) were most common. The most common facial fractures were of the orbit (26.3%) and maxilla/zygoma (25.1%). Injuries per month were highest in 2011 to 2012 and steadily declined through 2016. The percentage of nonbattle injuries trended up over time, ranging from 14.7% to 65%. Concurrent facial/neck soft tissue trauma or fracture was associated with an overall mortality rate of 2.44%. Comparison of our data to that previously published revealed no statistical difference in concurrent mortality (3.5%-2.2%, P = .053); an increase in orbital fractures (P < .005), facial nerve injury (P < .0005), and ear/tympanic membrane perforations (P < .0005); and a decrease in mandible fractures (P < .005). Conclusion Penetrating neck and facial injuries remain common in modern warfare. Assessing injury characteristics and trends supports continued improvements in battlefield protection and identifies areas requiring further intervention.

3020. Lanner, G. (1974). "[Internal ricocheted gunshot]." Der innere Prellschuss **35**(2): 137-143.

3021. Lannon, M. M., et al. (2022). "Pediatric craniocerebral gunshot injuries: A National Trauma Database study." The journal of trauma and acute care surgery **92**(2): 428-435.

BACKGROUND: We aimed to determine the outcomes and prognostic factors in pediatric craniocerebral gunshot injury (CGI) patients. Pediatric patients may have significantly different physiology, neuroplasticity, and clinical outcomes in CGI than adults. There is limited literature on this topic, mainly case reports and small case series., METHODS: We queried the National Trauma Data Bank for all pediatric CGI between 2014 and 2017. Patients were identified using International Classification of Diseases, Ninth Revision, codes. Demographic, emergency department, and clinical data were analyzed. Subgroup analysis was attempted for groups with Glasgow Coma Scale (GCS) scores of 9 to 15 and ages 0 to 8 years., RESULTS: In a 3-year period, there were 209 pediatric patients (aged 0-18 years) presenting to American hospitals with signs of life. The overall mortality rate was 53.11%. A linear relationship was demonstrated showing a mortality rate of 79% by initial GCS in GCS score of 3, 56% in GCS scores of 4 to 8, 22% in GCS scores of 9 to 12, and 5% in GCS scores of 13 to 15. The youngest patients, aged 0 to 8 years, had dramatically better initial GCS and subsequently lower mortality rates. Regression analysis showed mortality benefit in the total population for intracranial pressure monitoring (odds ratio, 0.267) and craniotomy (odds ratio, 0.232)., CONCLUSION: This study uses the National Trauma Data Bank to quantify the prevalence of pediatric intracranial gunshot wounds, with the goal to determine risk factors for prognosis in this patient population. Significant effects on mortality for invasive interventions including intracranial pressure monitoring and craniotomy for all patients suggest low threshold for use of these procedures if there is any clinical concern. The presence of a 79% mortality rate in patients with GCS score of 3 on presentation suggests that as long as there is not a declared neurologic death, intracranial pressure monitoring and treatment measures including craniotomy should be considered by the consulting clinician., LEVEL OF EVIDENCE: Prognostic and epidemiological, level III.

3022. Lanoix, R., et al. (2000). "C-spine injury associated with gunshot wounds to the head: retrospective study and literature review." The Journal of trauma **49**(5): 860-863.

OBJECTIVE: To determine the incidence of C-spine injury (CSI) associated with gunshot wounds (GSWs) to the head., METHODS: A retrospective chart review including patients with GSWs to the head and excluding those with penetrating facial/neck trauma was performed. Cervical clearance was by clinical/radiologic criteria in survivors, and autopsy in nonsurvivors. A MEDLINE literature search was performed and relevant articles reviewed., RESULTS: One hundred seventy-four charts were available for review; 90 had C-spine radiographs (complete series [49], lateral [33], and computed tomographic scan [8]). Of 84 with no radiographs, 29 were clinically cleared, and 55 died (32 cleared at autopsy). Twenty-three died without evaluation. None of the remaining 151 (87%) had CSI. Literature search yielded only three relevant articles. Combining the data from these articles yielded 534 patients, and CSI was excluded in 507

(95%)., CONCLUSION: C-spine immobilization and diagnostic radiography are probably not necessary in patients with isolated GSWs to the head and may complicate and delay emergency airway management.

3023. Lanska, D. J. (2009). "Historical perspective: neurological advances from studies of war injuries and illnesses." Annals of neurology **66**(4): 444-459.

Early in the 20th century during the Russo-Japanese War and World War I (WWI), some of the most important, lasting contributions to clinical neurology were descriptive clinical studies, especially those concerning war-related peripheral nerve disorders (eg, Hoffmann-Tinel sign, Guillain-Barre-Strohl syndrome [GBS]) and occipital bullet wounds (eg, the retinal projection on the cortex by Inouye and later by Holmes and Lister, and the functional partitioning of visual processes in the occipital cortex by Riddoch), but there were also other important descriptive studies concerning war-related aphasia, cerebellar injuries, and spinal cord injuries (eg, cerebellar injuries by Holmes, and autonomic dysreflexia by Head and Riddoch). Later progress, during and shortly after World War II (WWII), included major progress in understanding the pathophysiology of traumatic brain injuries by Denny-Brown, Russell, and Holbourn, pioneering accident injury studies by Cairns and Holbourn, promulgation of helmets to prevent motorcycle injuries by Cairns, development of comprehensive multidisciplinary neurorehabilitation by Rusk, and development of spinal cord injury care by Munro, Guttman, and Bors. These studies and developments were possible only because of the large number of cases that allowed individual physicians the opportunity to collect, collate, and synthesize observations of numerous cases in a short span of time. Such studies also required dedicated, disciplined, and knowledgeable investigators who made the most out of their opportunities to systematically assess large numbers of seriously ill and injured soldiers under stressful and often overtly dangerous situations.

3024. Lanter, P., et al. (2019). "4 Minor Traumatic Head Bleeds, Emergency Department Observation Versus Inpatient Admission: Shorter Stays, Less Expensive, No Increased Risk." Annals of emergency medicine **74**(4): S2-S3.

Study Objectives: Patients with mild traumatic head injury with intracranial hemorrhage (mTBI) have low neurosurgical intervention rates. Inpatient admission for monitoring is common; this practice is costly and may be unnecessary. We developed and implemented a protocol to co-manage mTBI in our ED observation unit (OU) with Neurosurgery. The objective of this study is to review the safety and efficacy of an observation protocol for patients with mTBI Methods: This is a retrospective analysis of the mTBI protocol which was implemented on May 1, 2015. Admission criteria were: adult patients (> 17yo) with cerebral contusions < 1cm, convexity subarachnoid hemorrhage (SAH), or closed/nondisplaced skull fractures. Patients with epidural or subdural hematoma, open or displaced skull fractures, persistent neurological deficits, thrombocytopenia, coagulopathy, anticoagulant or antiplatelet use (except aspirin), or other trauma were not eligible for admission to the OU. After patients were scanned and evaluated by the Neurosurgical team, then were admitted to the OU with q 4 hour neuro checks and a scheduled interval head CT. If there was interval worsening in either exam or the CT, the patient was admitted to the inpatient ward. A sequential cohort of inpatient mTBI patients over the preceding three years was used as a control group. Categorical outcomes were analyzed with students T-test and Chi-square. A logistic regression was performed to identify possible risk factors for worsening and delayed subdural hematoma. Results: 60 mTBI patients were observed in the OU, and 85 were in the inpatient control cohort. Among co-morbidities, hypertension was the most common (36.67%). 20 patients (33.3%) used a daily aspirin. The most common mechanism of injury was a ground-level fall (53.3%), followed by fall from height (21.7%), motor vehicle collision (6.7%), altercation (5.0%), vehicle versus pedestrian (1.67%), and other/unspecified (11.7%). There was a lower incidence of fracture injury type in the OU group (3.33% vs 15.29%, p=.020); otherwise the groups were well matched. There were no differences in rates of radiographic progression, neurological deterioration, surgical intervention, delayed chronic subdural formation, or mortality. The OU group had significantly lower length of stay (1.0d vs. 1.59d, p=.001), shorter time to interval scanning (12.99h vs. 16.95h, p=.001) and lower encounter charges ($11,430 vs. $14,858, p=.008). Pooled univariate logistic regression analysis for age, sex, co-morbidities, mechanism of injury, aspirin usage, recent surgery, acute alcohol intoxication, and transient LOC did not identify any statistically significant predictor of either interval radiographic changes or delayed chronic subdural formation. [Figure presented] Conclusion: Admitting patients to an OU with mTBI is more efficient with shorter length of stays and charges. There was no statistical difference in adverse outcomes. Managing mTBI in the ED using a protocol can safely avoid inpatient admission, thereby improving resource allocation, alleviating capacity restraints, and lowering costs to the patient.

3025. Lanteri-Minet, M., et al. (1992). "[Metal-induced brain embolism after gunshot wound of the heart]." Emboles cerebraux metalliques apres plaie du coeur par arme a feu. **21**(1): 39.

3026. Lantieri, L. A., et al. (2010). "Face transplantation outcomes: Feasibility reproducibility and efficacy." Transplantation **90**: 168.

Background While the conventional use of autologous transfer allows to reconstruct faces in most cases in some cases conventional surgery fails to restore normal appearance and function leading to indications for facial composite tissue allograft. We report here our series of patients showing the reproducibility, the difficulties, serious adverse events and the outcomes in term of quality of life. Patients and Methods Five patients were included in a registered clinical research protocol after a thorough clinical, and biological screening, assessed by an independant expert committee. Alternative procedures were discussed for each patient. One patient suffered from bilateral plexiform neurofibromas, two from extensive third degree burns and two from gunshot injuries. As any transplant they were included national waiting list with a dedicated face procurement procedure. All face transplants were harvested from heart beating brain-dead donors before other tissues and organs procurements after an alginate molding of the donor's face to allow reconstitution. The induction immunosuppressive regimens included anti-thymocyte globulins, steroids, mycophenolate mophetil and tacrolimus, the maintenance therapy was based on the last three ones. Extracorporeal photopheresis was used as adjuvant immunomodulatory therapy. Results Four patients were transplanted with a maximum follow up of 36 months and minimal of12 months. One patient which was on waiting list for 18 months could not be transplanted due to his panel reactive antibodies . Three patients experimented biopsy proven acute cellular rejection episodes easily controlled by conventional treatment. Voluntary facial activity appeared from 3 to 5 month. All patient experienced various infections which could be life threatening. These infections were either local or general One of our patient died two month after transplantation due to multi resistant bacterial infection. The dramatic changes obtained in the facial aesthetic and function and the improvement in patients quality of life had the same extent. Conclusion Face transplantation have been feasible, reproducible and has allowed major improvement. It represents a change in paradigm in facial reconstruction so as in transplantation.. Infections were always life threatening and were the main pitfall. The need for civilian and military reconstruction allowing social lives, might led the society to accept these new type of harvested organs and tissues.

3027. Lantz, E. J., et al. (1980). "Radiology of cerebrospinal fluid rhinorrhea." AJR. American journal of roentgenology **135**(5): 1023-1030.

Fifty-one patients with cerebrospinal fluid rhinorrhea were evaluated at the Mayo Clinic from 1974 to 1977. The causes of the leak were fairly even distributed among postoperative, traumatic unrelated to previous surgery, and nontraumatic. The slightly fewer patients with a traumatic cause compared with those reported in most series reflects the referral patterns and surgical nature of the practice at the institution. Three-fourths of the patients had plain films of the skull, although the site of the leak was identified in only 21% of them. Two-thirds of the patients had tomography, which was helpful in 53%, especially in 10 of the 13 patients with traumatic nonpostoperative cerebrospinal fluid rhinorrhea. Posteroanterior tomography generally was more helpful than lateral tomography, except in leaks around the frontal sinuses. Radioisotope cisternography with intranasal pledgets helped localize the site of leak in 50% of patients and suggested the site of the leak in 25%. Radioisotope cisternography with pledgets often gave helpful positive results when the plain films and tomography were not helpful.

3028. Lanzetta, M., et al. (2004). "Early use of artificial sensibility in hand transplantation." Scandinavian journal of plastic and reconstructive surgery and hand surgery **38**(2): 106-111.

Hands were transplanted from brain-dead donors for the treatment of two male unilateral amputees, aged 35 years and 32 years, involved in the Italian Hand Transplantation Programme. Each had lost his right dominant hand, in a farming accident and an explosion, respectively. In one case artificial sensibility was applied postoperatively using a Sensor Glove that transformed vibrotactile stimuli induced by touch, to stereophonic vibroacoustic stimuli perceived through earphones. The principle is based on the brain's capacity for multimodal plasticity, implying that deprivation of one sense (somatosensory) can be compensated for by another sense (auditory). Functional magnetic resonance images (fMRI) taken at regular intervals showed that cortical remodelling of the transplanted hand within the sensory-motor maps occurred early in the patient who used the artificial sensibility regimen compared with the one who did not. We

conclude that postoperative use of a device using hearing as a substitution for sensation in hand transplantation may have considerable potential value for speeding up cortical integration of a transplanted hand.

3029. Lapchenko, A. S., et al. (2018). "[Antimicrobial anti-inflammatory photodynamic and light-emitting-diode phototherapy of the consequences of the gunshot and mine-blast injury to the face, head, and neck including damage to the ENT organs]." Antimikrobnaia protivovospalitel'naia fotodinamicheskaia i svetodiodnaia fototerapiia posledstvii ognestrel'noi i minno-vzryvnoi travmy golovy i shei. **83**(1): 62-64.

The objective of the present study was the enhancement of the effectiveness of the treatment of the consequences of the gunshot wounds and mine-blast injuries inflicted to the face, head, and neck encountered in the otolaryngological practice as well as the prevention of the formation of the large demarcation areas in the injured tissues and the preparation of these tissues for the further restorative treatment. Anti-microbial and anti-inflammatory photodynamic therapy (PDT) as well as light-emitting-diode (LED) phototherapy were carried out in 20 patients who suffered gunshot wounds and mine-blast injuries to the face, head, and neck. The photodynamic therapy was performed with the use of an aqueous solution of methylene blue at a concentration of 0.1%, the 'Alod-1' infrared laser ('Granat' modification, Russia), and the 'AFS-Solaris' light-emitting diode-based phototherapeutic apparatus (Russia). The analysis of the results of the study has demonstrated the high efficiency of the proposed approach that made it possible to prevent the development of severe septic complications, reduce the amount of drug therapy, significantly shorten duration of the treatment, and create the conditions for the earlier rehabilitation and further plastic and cosmetic restoration of the tissue structures.

3030. Laraque, D., et al. (1995). "Children who are shot: a 30-year experience." Journal of pediatric surgery **30**(7): 1072-1076.

Three data sets describe the pattern of gunshot injuries to children from 1960 to 1993: The Harlem Hospital pediatric trauma registry (HHPTR), the northern Manhattan injury surveillance system (NMISS) a population-based study, and the National Pediatric Trauma Registry (NPTR). A small case-control study compares the characteristics of injured children with a control group. Before 1970 gunshot injuries to Harlem children were rare. In 1971 an initial rise in pediatric gunshot admissions occurred, and by 1988 pediatric gunshot injuries at Harlem Hospital had peaked at 33. Population-based data through NMISS showed that the gunshot rate for Central Harlem children 10 to 16 years of age rose from 64.6 per 100,000 in 1986 to 267.6 per 100,000 in 1987, a 400% increase. The case fatality for children admitted to Harlem Hospital (1960 to 1993) was 3%, usually because of brain injury, but the majority of deaths occurred before hospitalization. During the same period, felony drug arrests in Harlem increased by 163%. The neighboring South Bronx experienced the same increase in gunshot wound admissions and felony arrests from 1986 to 1993. The NPTR showed a similar injury pattern for other communities in the United States. In a case-control analysis. Harlem adolescents who had sustained gunshot wounds were more likely to have dropped out of school, to have lived in a household without a biological parent, to have experienced parental death, and to have known of a relative or friend who had been shot than community adolescents treated for other medical or surgical problems.(ABSTRACT TRUNCATED AT 250 WORDS)

3031. Large, M., et al. (2012). "Nails in the brain." The American journal of forensic medicine and pathology **33**(4): e16.

3032. Larkin, M. B., et al. (2018). "Two-year mortality and functional outcomes in combat-related penetrating brain injury: battlefield through rehabilitation." Neurosurgical focus **45**(6): E4.

OBJECTIVE There are limited data concerning the long-term functional outcomes of patients with penetrating brain injury. Reports from civilian cohorts are small because of the high reported mortality rates (as high as 90%). Data from military populations suggest a better prognosis for penetrating brain injury, but previous reports are hampered by analyses that exclude the point of injury. The purpose of this study was to provide a description of the long-term functional outcomes of those who sustain a combat-related penetrating brain injury (from the initial point of injury to 24 months afterward). METHODS This study is a retrospective review of cases of penetrating brain injury in patients who presented to the Role 3 Multinational Medical Unit at Kandahar Airfield, Afghanistan, from January 2010 to March 2013. The primary outcome of interest was Glasgow Outcome Scale (GOS) score at 6, 12, and 24 months from date of injury.

RESULTS A total of 908 cases required neurosurgical consultation during the study period, and 80 of these cases involved US service members with penetrating brain injury. The mean admission Glasgow Coma Scale (GCS) score was 8.5 (SD 5.56), and the mean admission Injury Severity Score (ISS) was 26.6 (SD 10.2). The GOS score for the cohort trended toward improvement at each time point (3.6 at 6 months, 3.96 at 24 months, p > 0.05). In subgroup analysis, admission GCS score <= 5, gunshot wound as the injury mechanism, admission ISS >= 26, and brain herniation on admission CT head were all associated with worse GOS scores at all time points. Excluding those who died, functional improvement occurred regardless of admission GCS score (p < 0.05). The overall mortality rate for the cohort was 21%. CONCLUSIONS Good functional outcomes were achieved in this population of severe penetrating brain injury in those who survived their initial resuscitation. The mortality rate was lower than observed in civilian cohorts.

3033. LaRoche, G. R., et al. (1988). "Epidemiology of severe eye injuries in childhood." Ophthalmology **95**(12): 1603-1607.

The authors conducted a cross-sectional study of all ocular injury cases admitted to a children's hospital between January 1978 and December 1984. Of 222 injuries reviewed, 77 (35%) resulted in some visual deficit. Males were significantly overrepresented in all age groups with an average male:female ratio of 3.5:1. The distribution of injuries was: contusions, 114 (51%); penetrating lacerations, 62 (28%); foreign bodies and burns, 11 (5%); and nonpenetrating lacerations, 35 (16%). Sixteen (7%) ocular injuries were associated with BB gun pellets and six of these children (42%) were blinded in the injured eye as a result. Two other cases of blindness resulted from ocular penetration by homemade "Jinsang Stars," underscoring the adverse influence of media on children's games. Adult supervision could have potentially prevented most cases of permanent visual deficit. The authors suggest that legislation restricting the use of BB guns be passed and that a program of adult and child eye safety education including "eye watch" warnings on potentially hazardous toys be developed.

3034. Larque-Daza, A. B., et al. (2010). "Epidemiology of open-globe trauma in the southeast of Spain." European journal of ophthalmology **20**(3): 578-583.

PURPOSE: To describe epidemiologic and clinical findings of open-globe trauma (OGT) in the southeast area of Spain., METHODS: A retrospective descriptive study of 94 eyes with OGT evaluated between 1999 and 2007, in a primary referral hospital., RESULTS: The incidence of OGT in our area was 6.76 per 100,000 inhabitants/year. The majority of patients were male (89%) and young (80% of patients < 50 years old), with an average age of 37 +/- 20 years (mean +/- SD). The most common causes and location of injury were wire-induced trauma (50%) and accidents at work (56%), respectively. The types of injury encountered were ruptures, intraocular foreign bodies, perforating injury, penetrating injury, and mixed injury. Sixty-six percent of these injuries were penetrating in zone I (55%). The injuries found were vitreous hemorrhage (33%), cataracts (47%), vitreous prolapse (30%), retinal detachment (8%), endophthalmitis (2%), and associated with a facial trauma (7%). Eighty percent of surgery was carried out under general anesthesia. Fifty-one percent of the eyes underwent one operation only (5% were enucleated). Sixty-one percent of the eyes resulted in visual acuity of less than 50%., CONCLUSIONS: The incidence of OGT in the southeast of Spain is very high, being in most cases produced by accidents while using wire in greenhouses. This provokes severe monocular visual loss among the young population.

3035. Larsen, A. R. and J. V. Lewis (1998). "BB gun injuries: two case reports." Tennessee medicine : journal of the Tennessee Medical Association **91**(11): 436-437.

3036. Larsen, D. W. (2002). "Traumatic vascular injuries and their management." Neuroimaging clinics of North America **12**(2): 249-269.

Traumatic vascular injury to the intracranial and extracranial circulation can be sequelae of blunt, penetrating, or iatrogenic insults to the head, face, or neck. Treatment options include conservative medical management, or more invasive surgical or endovascular therapy. The appropriate treatment depends on the risk-benefit ratio of each option considering the natural history of each. Injuries include mild intimal irregularities, intimal flaps, pseudoaneurysms, fistulas, and occlusions. Need for treatment is partly determined by the collateral circulation to the brain, and the degree to which the lesion is thrombogenic. Advances in endovascular devices and techniques provide us with less

invasive alternatives to surgery intervention or allow the interventionalist to treat lesions not treatable by any other modality.

3037. Larsen, E. A., et al. (2022). "Case report: Use of penicillin G potassium in poloxamer 407 gel to aid in healing of an equine sublingual abscess." Frontiers in Veterinary Science **9**.

The use of poloxamer 407 gels have been reported in several studies to prolong the release of drugs at the injection site. Oral lesions unrelated to dental disease are rare but may result in ulceration and sequestration of bone. To date, there have been no reports on the use of penicillin G potassium poloxamer 407 gel and its effect on wound healing. The present case report describes the use of a penicillin G potassium poloxamer 407 gel for the treatment of a sublingual abscess involving the mandible in a 20 year old Arabian mare who initially presented with acute onset of dysphagia, hypersalivation, and a mass under the tongue. A presumptive diagnosis of lingual cellulitis was made, and a sublingual abscess ruptured on day 7 of hospitalization. In this case, poloxamer 407 gel was used to decrease wound contamination, protect the exposed mandible, and potentially prolong the release of penicillin G potassium into the wound.

3038. Larson, O. and P. Heden (1988). "Tubed free flap combined with split-rib-graft for reconstruction of multiple oral cavity defects. A case report." Scandinavian journal of plastic and reconstructive surgery and hand surgery **22**(2): 187-191.

The successful use of a conventional bone graft for mandibular reconstruction in combination with a free forearm flap is described. Two separate intraoral mucosal defects, one in the mandible and one in the palate, were covered, using the same flap and partial tubing of the flap. Three weeks post-flap-transfer the flap was successfully divided. A safe reliable and versatile technique combining nonvascularized bone graft and free flap for simultaneous reconstruction of mandibular and intraoral mucosal defects is described. Simultaneous coverage of multiple intraoral defects with tubing of the flap is found to be possible.

3039. Larson, P. S., et al. (2000). "Traumatic intracranial aneurysms." Neurosurgical focus **8**(1): e4.

Traumatic intracranial aneurysms are rare, occurring in fewer than 1% of patients with cerebral aneurysms. They can occur following blunt or penetrating head trauma and are more common in the pediatric population. Traumatic aneurysms can be categorized histologically as true, false, or mixed, with false aneurysms being the most common. These aneurysms can present in a variety of ways, but are typically associated with an acute episode of delayed intracranial hemorrhage with an average time from initial trauma to aneurysm hemorrhage of approximately 21 days. The mortality rate for patients harboring these aneurysms may be as high as 50%. Prompt diagnosis based on arteriography and aggressive surgical management are associated with better outcome than conservative treatment. The authors describe a classification scheme for traumatic aneurysms based on their anatomical location and conclude that 1) posttraumatic aneurysm must be considered in patients with acute neurological deterioration following closed head injury; 2) they can occur following mild closed head injury; 3) they occur more commonly in children than in adults; and 4) surgical clipping and/or endovascular occlusion is the definitive treatment.

3040. Larson, S. J., et al. (1976). "Lateral extracavitary approach to traumatic lesions of the thoracic and lumbar spine." Journal of neurosurgery **45**(6): 628-637.

The lateral extracavitary approach to the spine was used for resection of displaced bpne and disc located anterior to the dura in 62 patients with traumatic lesions of the thoracic and lumbar spine. Fifty-two patients had closed vertebral fractures and 10 had gunshot wounds. The spinal cord was involved in 44 patients, and the cauda equina in 18. A spinal subarachnoid block was demonstrated in 17 of 57 preoperative gas myelograms. Evoked potential recordings, although related to preception of joint rotation, tended to reflect the overall neurological condition and had some prognostic value. Significant improvement followed surgery in 46 patients with incomplete neurological lesions, and one was transiently worse. Before operation 18 patients were able to walk; nine with assistance and nine without. After operation 47 patients were able to walk; 12 with assistance and 35 without. Adequate bladder function was present in 17 patients before surgery, and in 44 after surgery. A laminectomy had been done previously in 16 patients, 11 of whom improved significantly after anterior resection. Spine fusions were required in 26 patients, five of whom had a prior

laminectomy. The major factor in the pathogenesis of the incomplete neurological deficit appeared to be distortion of the cord and roots by displaced bone and disc. Consequently, the primary object of treatment was the restoration and maintenance of normal anatomical relationships between the spinal cord or cauda equina and the spinal canal.

3041. Lasisi, O. A., et al. (2006). "An unusual faciocerebellar arrow injury: successful surgical removal in a peasant Nigerian: a case report." The Nigerian postgraduate medical journal **13**(4): 370-372.

INTRODUCTION: Reports of penetrating injuries of the cranium have been mainly craniocerebral or faciocerebral, craniocerebellar projectiles are few., CASE: We present a case of a 23 year old Nigerian with a craniofacial penetrating injury by a hunting arrow. The trajectory of the arrow through the facial skeleton across the craniocervical junction into the posterior fossa makes this unique in the literature. Successful operative retrieval by a joint team of neurosurgeons and otorhinolaryngologists, problems of delayed presentation and inadequate diagnostic facilities are highlighted., CONCLUSION: The morbidity-free outcome of surgical removal despite the delay in presentation and management in our practice setting with limited facilities are the salient points of this presentation.

3042. Laske, A., et al. (1990). "[Injuries of the large brain-feeding arteries]." Verletzungen der grossen hirnversorgenden Arterien. **120**(29): 1050-1055.

Among 2923 severely injured patients in the period 1980-1988, 17 had injuries or large supraaortic arteries. The incidence was 0.58%, with an overall mortality of 53%. In 75% of survivors there was a persistent neurological deficit. We treated 5 penetrating (A. carotis 4, A. vertebralis 1) and 12 nonpenetrating (A. carotis 11, A. vertebralis 1) injuries. In all penetrating carotid injuries (4) repair was performed on admission and mortality was 50%; 1 of 2 survivors has postoperative hemiparesis. Localization of nonpenetrating carotid injuries (11) was intrathoracic (2), in the neck (7) and intracranial (2). Main complication of nonpenetrating extracranial carotid injuries is neurological deficit (7/9) due to thrombosis (3) or stenosis (4) with embolism (2). Surgery was performed in 3 cases comprising pseudoaneurysm in 2 and concomitant aortic rupture in 1. Mortality was 44%, and 80% of survivors had persistent neurological deficits. Extracranial carotid injuries (n = 13) carried a mortality rate of 83% in occluded and 29% in nonoccluded vessels (p less than 0.05). Location of carotid injury in the neck (n = 11) carried a mortality of 55%, and intracranial (n = 2) of 100% respectively. Duplex-Doppler scanning of carotid arteries is a safe, noninvasive method which is essential in blunt carotid artery trauma. Prognosis is dependent upon the size of cerebral infarction. Once neurologic deficit has been established for more than 24 hours, reconstruction of the artery should be postponed and performed only for complications (pseudoaneurysm or embolization). Clamping of arteries without hypothermic circulatory arrest or shunt should be avoided. The danger of rupture in dissection and pseudoaneurysm is slight.(ABSTRACT TRUNCATED AT 250 WORDS)

3043. Lasky, J. B., et al. (1997). "Household objects as a cause of self-inflicted orbital apex syndrome." The Journal of trauma **42**(3): 555-558.

This report describes two cases of self-inflicted penetrating nonprojectile orbitointracranial injury. Suicide attempts caused by these types of injuries are very rare. An understanding of the orbital and intracranial anatomy and the avoidance head turn help to predict potential injury sites. Computed tomography and cerebral angiography were helpful in the treatment of these two cases.

3044. Latronico, T., et al. (2013). "Assessment of cell toxicity and matrix metalloproteinase-9 expression by antiretroviral drugs in cultured primary astrocytes." Glia **61**: S81.

Background: The toxic effects of new antiretroviral drugs on the central nervous system (CNS) are unclear. Because these drugs penetrate the brain even at low concentrations, it becomes crucial to determine the doses which can be toxic for the CNS resident cells. Moreover, after the recent introduction into clinical practice, it is unclear whether the efficacy of the antiretroviral drugs of new generation may also derive from their ability to exert extravirological effects on factors responsible for the development of HIV brain injury, e.g. matrix metalloproteinases (MMPs). Objective: To investigate on the toxicity of four different antiretroviral drugs and their ability to modulate the expression of gelatinase B (MMP-9) in astrocyte cultures. Methods: Primary cultures of rat astrocytes were activated by exposure to 10 mg/ml lipopolysaccaride (LPS) (positive control) and simultaneously treated for 20 h with increasing doses (1-5-10-25. 50 mM) of: Efavirenz (EFV); Darunavir (DRV); Maraviroc (MVC) or Raltegravir (RAL). MMP-9 mRNA

expression was assessed by RT-PCR. Quantitative determination of MMP-9 expression was done by computerized scanning densitometry. Single drug toxicity was assessed by the MTT test. Each drug was considered toxic at the concentration able to induce a percentage of cell survival above 60%. Results: The treatment with antiretroviral drugs inhibited MMP-9 mRNA expression in LPS-activated astrocytes in a dose-dependent manner. In particular, a statistically significant inhibition of MMP-9 expression was observed when astrocytes were treated with 25mM EFV (54% of inhibition) or with 50 mM RAL (43% of inhibition). As assessed by the MTT test, the toxicity of the antiretrovirals ranges from 10 and 50 mM. In particular, EFV was toxic for astrocytes at the concentration of 25 mM, MVC at 10 mM, while DRV and RAL were toxic at the concentration of 50mM. Conclusions: The present results indicate that EFV and RAL directly inhibit MMP-9 expression in LPS-activated astrocytes with mechanisms that are independent from their antiviral activity. The toxic doses of antiretrovirals are much higher than those found in the CSF of HIV-positive patients. Our results highlight some beneficial/deleterious extra-viral effects of the antiretroviral drugs that may be useful to improve the development of new therapeutic strategies for the management of HIV infection.

3045. Latussek, F. and G. Duncker (1985). "[Perforating eyelid injury with laceration of the left frontal lobe pole]." Perforierende Lidverletzung mit Lazeration des linken Stirn-Hirn-Poles. **82**(2): 212-213.

3046. Laudone, J. (2014). "It's all fun and games until somebody shoots his eye out." Hospital pediatrics **4**(4): 264-266.

3047. Lauer, S. A., et al. (1995). "Orbitocraniofacial gunshot wounds: craniofacial reconstruction and preparation of the anophthalmic socket." The Journal of cranio-maxillofacial trauma **1**(1): 21-27.

This article is a retrospective clinical and radiographic analysis of four patients who survived high caliber orbitocraniofacial gunshot injuries. Early multidisciplinary craniofacial reconstruction included repair of comminuted orbital fractures with multiple autogenous bone grafts and/or porous polyethylene implants, enucleation, and insertion of a hollow silicone sphere as an anophthalmic socket implant. Migration of the silicone implant occurred in one case, requiring replacement with an autogenous dermis fat graft. There were no cases of extrusion or infection. Socket motility remained limited in all cases, despite reapposition of the extraocular muscles. In two cases with autogenous bone grafts along the orbital roof, there was no radiographic evidence of graft resorption after three years. Soft tissue volume deficiency and superior sulcus deformity developed in the three cases which were followed for more than six months. Despite these limitations, all four patients are wearing comfortable ocular prostheses. The postoperative results support immediate preparation of the anophthalmic socket after craniofacial reconstruction of these injuries.

3048. Laure, B. (2008). "Re: Reconstruction of bony mandibular and maxillary defects with one single transfer of a free fibula osteocutaneous flap." Journal of Plastic, Reconstructive and Aesthetic Surgery **61**(11): 1386-1387.

3049. Laure, B., et al. (2007). "[Post-traumatic disinsertion of the superior oblique muscle trochlea]." Desinsertion post-traumatique de la poulie du muscle oblique superieur. **108**(6): 551-554.

INTRODUCTION: Ophthalmologic examination may rule out an ocular wound in the event of orbital traumatism. Some lesions are obvious but others may not be detected. We report a case of superior oblique muscle trochlea trauma. This infrequent pathology is illustrated with a scanned imagery and magnetic resonance imaging (MRI)., OBSERVATION: The initial penetrating trauma was caused by a hook in the medial canthus. The wound was sutured in the emergency unit. Three days later, oblique diplopia developed. Three weeks later, abnormal ocular movements appeared when contracting the frontal muscle. The patient then decided to consult. One month after the traumatism, the orthoptic assessment confirmed the presence of an acquired Brown syndrome suggesting a lesion of the superior oblique muscle. Orbital MRI could not find the trochlea and revealed a thickening by retraction of the posterior portion of the muscle and a hypotrophic aspect of the anterior portion. A fracture of the right orbital edge was revealed by the scanner. Surgical exploration was performed., DISCUSSION: The trochlea is located very anteriorly and likely to be affected in the event of an internal palpebral wound. A direct traumatism of the pulley and/or the superior oblique muscle leads to an acquired Brown syndrome. This observation stresses the importance of surgical wound exploration for the supero-medial palpebral area as well as using MRI which allows proving the diagnosis.

3050. Laure, B., et al. (2008). "Reconstruction of bony mandibular and maxillary defects with one single transfer of a free fibula osteocutaneous flap." Journal of plastic, reconstructive & aesthetic surgery : JPRAS **61**(2): 200-203.

One-stage bone reconstruction of both the maxilla and the mandible with a single bone transfer is unusual in microsurgery. The authors report and describe the surgical technique of an original one-stage bone reconstruction of the maxilla and the mandible in a defect caused by a gunshot injury. The reconstruction was performed with a free fibular osteocutaneous flap. A concomitant maxillo-mandibular defect is uncommon. Gunshot injuries and tumours are the two main causes of this defect. The reconstruction of maxillary and mandibular defects can be a surgical challenge. The reconstruction was performed in one stage with the free transfer of a fibular osteocutaneous flap.

3051. Lausberg, G. (1965). "[Cranial gunshot injuries in peace time]." Schadelschussverletzungen der Friedenszeit. **13**(3): 517-543.

3052. Lausberg, G. (1968). "[Prognosis and surgery indication of suicidal gunshot head injuries]." Prognose und Operationsindikation der suicidalen Kopfschussverletzungen. **94**: 204-208.

3053. Lauterbach, A., et al. (2006). "Fatal impalement injury of the head due to a curtain rail." International journal of legal medicine **120**(6): 380-382.

During a dispute, a boy was injured by a curtain rail which penetrated the skull in the left frontal region and led to severe brain injury. Despite intensive medical care, death occurred 10 days later due to malignant cerebral edema. With regard to the question whether the trauma resulted from throwing or pushing, some biomechanical aspects are discussed including individual morphologic findings as well as the kinetic energy required for penetrating the skull. According to the calculated data, we conclude that the velocity necessary for penetrating could be reached by throwing the curtain rail.

3054. Lauzier, D. C., et al. (2022). "Neurointerventional management of cerebrovascular trauma." Journal of neurointerventional surgery **14**(7): 718-722.

Traumatic cerebrovascular injuries following blunt or penetrating trauma are common and carry a high risk of permanent disability or death. Proper screening, diagnosis, and treatment of these lesions is essential to improve patient outcomes. Advances in imaging continue to improve the accuracy of non-invasive diagnosis of these injuries while new clinical data provide better evidence for optimal management, whether medical or invasive. Here, we review screening, diagnosis, and treatment of traumatic cerebrovascular injuries.

3055. Lavergne, P., et al. (2016). "Penetrating brain injury, recent case series of a single institution and literature review." Canadian Journal of Neurological Sciences **43**: S39.

Background: Penetrating brain injury is a rare entity. Furthermore, clinical presentation can be highly variable and management difficult, especially when the foreign body is retain in the skull Methods: We present a serie of three recent cases of penetrating brain injury that happened at our institutionm including clinical and radiological data. We discuss management of those challenging cases and present a brief review of the literature. Results: Our cases (3) encompassed different mechanisms: bilateral nail gun injury, knife and aircraft propeller. All patients were male, with a median age of 37 years old. Work-up was negative for intracranial vascular injury. All patients were treated with initial craniectomy (bilateral in one case) and a course of antibiotics. Cranioplasty was later performed. All patients survived and evolved in favorable fashion. Conclusions: Penetrating brain injury is a rare injury, requiring individualized surgical and medical management. A few recommendations may be found in the literature but are often based on literature from blunt traumatic brain injury or war-related injuries.

3056. Lavin, J. P., Jr. and S. S. Polsky (1983). "Abdominal trauma during pregnancy." Clinics in perinatology **10**(2): 423-438.

In summary, trauma occurs relatively frequently among pregnant patients. Various anatomic and physiologic changes of pregnancy may alter the type of injury experienced by pregnant women. These changes may also alter the manifestations of given injuries and the treatment required to reestablish maternal-fetal hemostasis. Fortunately, most trauma experienced by pregnant individuals is minor and is associated with good prognosis for both the mother and her fetus. Blunt trauma as a result of automobile collision is the most frequent form of serious injury involving pregnant women. However, several cases of penetrating abdominal wounds have also been reported. Both blunt and penetrating trauma may frequently injure the uterus. Fetal intracranial injury and fracture, as well as abruption, often occur as a result of blunt trauma. Multiple direct fetal, placental, and cord injuries have been reported as a result of penetrating trauma. Both blunt and penetrating trauma frequently cause injury to other intraabdominal organs, and blunt trauma is associated with an especially high incidence of pelvic fracture and retroperitoneal hemorrhage. Laparotomy is often required to treat such injuries. At the time of the laparotomy, difficult decisions are required in determining whether the fetus is best delivered or left in utero. Recent technologic advances for assessing fetal status may be helpful in these decisions. Rarely, a mother may expire with her living fetus undelivered, and a rapid postmortem cesarean section may save the fetal life. During the last several years, the prognosis for both trauma victims and gravid women with complicated pregnancies and their fetuses has improved markedly. Hopefully, during the next several years, the knowledge and therapeutic modalities developed to treat each group will be combined to provide optimal care for the pregnant trauma victim and her fetus.

3057. Lavy, T. and S. A. Asleh (2003). "Ocular rubber bullet injuries." Eye (London, England) **17**(7): 821-824.

PURPOSE: To report the type and severity of ocular and orbital injuries caused by rubber bullets., METHODS: A total of 42 consecutive patients seen over a 3-month period with ocular and orbital rubber bullet injuries were assessed clinically and radiographically within 1 day of injury, and the findings were recorded. Clinical outcomes following treatment were also recorded up to 6 months postinjury., RESULTS: A total of 90% of the patients were male. The mean age of patients was 25.0 years (4-60). Of the patients, 54% had lid or skin lacerations, 40% hyphaema, 38% ruptured globe, 33% orbital fracture, 26% retinal damage, and 21% retained rubber bullet in or around the orbit. At follow-up, 53% of the patients had a visual acuity of less than 6/60, 7% less than 6/18 to 6/60, and 40% 6/18 or better., CONCLUSIONS: The term 'rubber bullet' is misleading. 'Rubber bullets' cause a wide variety of ocular and periocular injuries. Orbital fractures are common. The tissues of the orbit are easily penetrated. If the globe is hit, it is rarely salvageable.

3058. Lawan, A. and S. A. Danjuma (2012). "Arrow injuries to the eye." Annals of African medicine **11**(2): 116-118.

Two male siblings aged 10 and 17 years, respectively, presented to our hospital with two days history of being shot in the right eyes with arrows. The patients presented with severe pains, bleeding, swelling, discharge and loss of vision. There was positive history of application of traditional eye medicine and an unsuccessful attempt was made to remove the arrows. Both patients presented with panophthalmitis. X-rays of the orbits and para nasal sinuses indicated the tip of the arrow was lodged to the apex of the orbit in the younger patient, and the arrow vertically traverses the eye/ orbit and lodged in the roof of the maxillary sinus in the other patient with fluid level in the lower third of the sinus. The patients were placed on broad-spectrum systemic antibiotics, had base line investigations and prepared for exploration. The patients had evisceration with removal of the arrows.

3059. Lawless, M., et al. (1986). "Surfboard-related ocular injuries." Australian and New Zealand journal of ophthalmology **14**(1): 55-57.

Three cases of ocular trauma caused by surfboards are reported. The severe nature of the injuries is discussed and the prevalence of this type of injury is reviewed.

3060. Laws, E. R., et al. (2005). "Gunshot wounds to the head in the 16th century: Commentary." Neurosurgery **57**(6): 1314-1315.

3061. Lawson, D., et al. (1990). "An unusual intracerebral foreign body associated with eye trauma." Australian and New Zealand journal of ophthalmology **18**(2): 221-223.

A case report is presented of penetrating orbital trauma in the driver of a motor vehicle which collided with a kangaroo. A tooth fragment from the kangaroo traversed the orbit, lodging intracranially. Management of the case is described and appropriate choice of antibiotic regime discussed.

3062. Lawson-Smith, M. J., et al. (2006). "Lateral medullary syndrome caused by penetrating head injury." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **13**(7): 792-794.

Herein, we report a rare case of a patient surviving penetrating trauma to the brainstem. Low velocity penetrating head injuries may be occult and are associated with a high incidence of vascular injury.

3063. Layton, M. E., et al. (1997). "Cerebral penetration injury leads to H2O2 generation in microdialysis samples." Neuroscience letters **236**(2): 63-66.

Delayed tissue damage is proposed to be caused by reactive oxygen species. We investigated the effects of microdialysis probe penetration into rat piriform cortex on hydrogen peroxide (H2O2) in brain extracellular fluid (ECF). H2O2 decreased immediately after probe insertion into the brain, but increased over 300% in samples within minutes after collection. We assessed H2O2 changes in vitro in microdialysis perfusion media containing various ascorbic acid concentrations and confirmed ascorbic acid is a source of H2O2. We conclude that decreased H2O2 concentrations in perfusion media as it passes through the brain reflect an extracellular antioxidant effect, whereas the increase in H2O2 with time after sample collection indicates that H2O2 generating substances are present in ECF. Thus, the potential for producing reactive oxygen species in brain ECF exists following penetration injury, especially if transition metals are released into the neuronal microenvironment.

3064. Lazaridis, C., et al. (2021). "Civilian Firearm-Inflicted Brain Injury: Coagulopathy, Vascular Injuries, and Triage." Current neurology and neuroscience reports **21**(9): 47.

PURPOSE OF REVIEW: Civilian firearm-inflicted penetrating brain injury (PBI) carries high morbidity and mortality. Concurrently, the evidence base guiding management decisions remains limited. Faced with large volume of PBI patients, we have made observations in relation to coagulopathy and cerebrovascular injuries. We here review this literature in addition to the question about early prognostication as it may inform neurosurgical decision-making., RECENT FINDINGS: The triad of coagulopathy, low motor score, and radiographic compression of basal cisterns comprises a phenotype of injury with exceedingly high mortality. PBI leads to high rates of cerebral arterial and venous injuries, and projectile trajectory is emerging as an independent predictor of outcome. The combination of coagulopathy with cerebrovascular injury creates a specific endophenotype. The nature and role of coagulopathy remain to be deciphered, and consideration to the use of tranexamic acid should be given. Prospective controlled trials are needed to create clinical evidence free of patient selection bias.

3065. Lazarjan, M. S., et al. (2014). "Experimental investigation of the mechanical properties of brain simulants used for cranial gunshot simulation." Forensic science international **239**: 73-78.

The mechanical properties of the human brain at high strain rate were investigated to analyse the mechanisms that cause backspatter when a cranial gunshot wound occurs. Different concentrations of gelatine and a new material (M1) developed in this work were tested and compared to bovine brain samples. Kinetic energy absorption and expansion rate of the samples caused by the impact of a bullet from .22 air rifle (AR) (average velocity (uav) of 290m/s) and .22 long rifle (LR) (average velocity (uav) of 330m/s) were analysed using a high speed camera (24,000fps). The AR projectile had, in the region of interest, an average kinetic energy (Ek) of 42+/-1.3J. On average, the bovine brain absorbed 50+/-5% of Ek, and the simulants 46-58+/-5%. The Ek of the .22 LR was 141+/-3.7J. The bovine brain absorbed 27% of the .22LR Ek and the simulants 15-29%. The expansion of the sample, after penetration, was measured. The bovine brain experienced significant plastic deformation whereas the gelatine solution exhibited a principally elastic response. The permanent damage patterns in the M1 material were much closer to those in brain tissue, than were the

damage patterns in the gelatine. The results provide a first step to developing a realistic experimental simulant for the human brain which can produce the same blood backspatter patterns as a human brain during a cranial gunshot. These results can also be used to improve the 3D models of human heads used in car crash and blast trauma injury research.

3066. Lazarjan, M. S., et al. (2015). "Visualization of the air ejected from the temporary cavity in brain and tissue simulants during gunshot wounding." Forensic science international **246**: 104-109.

One hypothesis for the physical mechanism responsible for backspatter during cranial gunshot wounding is that air is ejected by the collapse of the temporary cavity formed around the bullet path. Using bovine and ovine heads and simulant materials, evidence of this ejection was sought by measuring the velocity of the air that was drawn in and ejected from the cavity in front of the wound channel after bullet impact. A laminar flow of fog-laden air was arranged in front of the wound channel and two high speed cameras recording at 30,000 frames/second captured the air motion. All samples were shot with standard 9 mm x 19 mm FMJ ammunition. Different concentrations of ballistic gelatine were used to characterize the effect of elasticity of the material on the velocity of the air. Fresh bovine and ovine heads were shot with the same experimental set up to investigate if there was induction of air into, and ejection of air from the entrance wounds. The results show, for the first time, that the temporary cavity does eject air in gelatine. The velocity of in-drawn air for 3, 5 and 10% concentration of gelatine was 81, 76 and 65 m/s respectively and the velocity of ejected air for 5 and 10% concentration of gelatine were 43 and 72 m/s respectively. The results show that when the concentration of gelatine is increased, the velocity of the air drawn into the cavity decreases and the velocity of the ejected air increases. However, no ejection was observed in 3% gelatine, ovine or bovine heads. Although ejection of air was not observed, ejection of brain from the wound channel was seen. Using the velocity of the ejected brain, the minimum intracranial pressure required to eject the brain tissue was estimated to be 712 kPa and 468 kPa for the sheep and bovine heads respectively.

3067. Lazic, T. and J. Strugar (2009). "Nail in the midbrain." Neurology **72**(17): 1531.

3068. Lazzeri, C., et al. (2020). "Comorbidities and Age in Brain-Dead Donors and Liver Transplantation: A 15-Year Retrospective Investigation." Experimental and clinical transplantation : official journal of the Middle East Society for Organ Transplantation **18**(1): 60-64.

OBJECTIVES: Although livers from older donors (> 70 y) have been shown to be increasingly more efficiently used for transplant, donor comorbidities are considered additional risk factors. This is quite intriguing as comorbidities are known to increase with advancing age in the donor population., MATERIALS AND METHODS: We assessed whether age and donor comorbidities influenced liver procurement over a 15-year period in a cohort of 1702 brain-dead donors in Tuscany, Italy., RESULTS: Over the study period, age of potential donors significantly increased (P = .02) as well as the proportion of patients who were > 55 years old. The incidence of hypertension, diabetes mellitus, and previously known coronary artery disease also significantly increased. We observed a progressive increase in the number of transplanted livers from donors with advancing age despite an increase in comorbidities. The highest incidences of traumatic brain injury and anoxic brain injury were observed in the youngest donors. Transaminase levels and use of vasoactive drugs were lower in donors who were >= 72 years old., CONCLUSIONS: According to our results, criteria for liver donors have already changed. Although age does not seem to be a limiting factor, older donors deserve a more accurate donor selection due to the higher incidence of risk factors (primarily diabetes mellitus).

3069. Le Blanc-Louvry, I., et al. (2012). "A brain penetration after Taser injury: controversies regarding Taser gun safety." Forensic science international **221**(1-3): e7-11.

We report the case of a 27 year old man who was injured by a Taser gun device which penetrated the frontal part of the skull and damaged the underlying frontal lobe. Cerebral penetration was revealed by a brain CT scan. A neurosurgical procedure was required to remove the dart from the skull and brain and the evolution was successful allowing discharge of the patient one week later. There were no additional lesions, particularly electrifying lesion, as only one probe had penetrated the skull. We also observed the length of a Taser dart is sufficient to allow brain penetration. Fortunately, no infection or neurological complication occurred following brain injury. This case study

underlines the potential risk induced by the use of Taser stun gun. Although generally regarded as a safe alternative, serious injuries have however been reported and questions regarding the safety of the device still remains unresolved.

3070. Le Feuvre, D. (2011). "Endovascular treatment of cranio-cervical vascular trauma." Journal of neurointerventional surgery **3**: A39.

Introduction Cranio-cervical trauma carries a high morbidity and mortality. Because of the vital structures and inaccessibility surgical treatment of these injuries is often high. Endovascular intervention lends itself to the treatment of vascular injuries. This in mind we reviewed our endovascular treatment of cranio-cervical injuries over a 1-year period. Methods Between September 15, 2008 and September 14, 2009 we reviewed the patients we had been asked to treat endovasculary by the trauma surgeons or who had been referred directly to our neurosurgical unit. The demographic profile and the mode of injury was reviewed and the vascular injury was anatomically and pathologically assessed using the DSA. Next the specific treatment for the different vascular injuries was reviewed. Results We identified 22 patients 64% sustaining penetrating injuries and 36% from blunt trauma. 50% of the injuries were false aneurysms, 36% CCFs, 9% were AVFs and 5% were dissections. Treatment used balloons, glue or coils depending on the injury. There was one asymptomatic complication. Conclusions Endovascular treatment offers a viable safe and often better alternative to surgical injuries to cranio-cervical injuries.

3071. Le Garff, E., et al. (2015). "Homemade Firearm Suicide With Dumbbell Pipe Triggering by an Air-Compressed Gun: Case Report and Review of Literature." The American journal of forensic medicine and pathology **36**(4): 257-261.

Firearm suicides are frequent and well described in the forensic literature, particularly in Europe and the United States. However, the use of homemade and improvised firearms is less well described. The present case reports a suicide with an original improvised gun created using an air-compressed pellet gun and a dumbbell pipe. The aims of this study were to describe the scene, the external examination of the corpse, the body scan, and the autopsy; to understand the mechanism of death; and to compare the results with a review of the forensic literature to highlight the epidemiology of homemade firearm use, the tools used for homemade and improvised firearms in suicides versus homicides, and the manners in which homemade firearms are used (homicide or suicide, particularly in complex suicide cases).

3072. Le, K., et al. (2014). "Does brain volume loss predict cognitive and narrative discourse performance following traumatic brain injury?" American journal of speech-language pathology **23**(2): S271-284.

PURPOSE: In this study, the authors investigated the relationship between brain volume loss and performance on cognitive measures, including working memory, immediate memory, executive functions, and intelligence, and a narrative discourse production task. An underlying goal was to examine the prognostic potential of a brain lesion metric for discourse outcomes. It was hypothesized that brain volume loss would correlate with and predict cognitive and narrative discourse measures and have prognostic value for discourse outcomes., METHOD: One hundred sixty-seven individuals with penetrating head injury participated. Correlational and regression analyses were performed for the percentages of total brain and hemispheric volume loss and scores on 4 cognitive measures (WMS-III Working Memory and Immediate Memory primary indexes, D-KEFS Sorting Test, and WAIS-III Full Scale IQ) and 7 narrative discourse measures (T-units, grammatical complexity, cohesion, local and global coherence, story completeness, and story grammar)., RESULTS: The volumetric measures had significant small-to-moderate correlations with all cognitive measures but only one significant correlation with the discourse measures. Findings from regression analyses were analogous but revealed several models that approached significance., CONCLUSION: Findings suggest that an overall measure of brain damage may be more predictive of general cognitive status than of narrative discourse ability. Atrophy measures in specific brain regions may be more informative.

3073. Le, T. D., et al. (2018). "Is the combat mortality index (CMI) applicable in prolonged field care for combat-related traumatic brain injury patients with polytrauma?" Shock **49**(6): 118.

Introduction: Traumatic brain injury (TBI) is the leading cause of death in combat casualties and is more lethal if hemorrhagic shock (HS) occurs. Early detection of HS has a discernible impact on timely interventions and can reduce

preventable death. The shock index (SI) and the new classification of HS (SI-4 Classification) lack reliable predictive capacity and have limited applicability in the forwarddeployed setting, especially in prolonged field care. As a solution to these limitations, we developed the CMI which reliably predicts early mortality in combat casualties. The purpose of this study was to determine if the CMI is applicable in prolonged field care for TBI patients and to assess its ability to identify early shock and risk of mortality. Methods: The Department of Defense Trauma Registry Data was used for this study. The study included US military patients injured in Iraq and Afghanistan from 2003 to 2014 with moderate and severe TBI (m/sTBI). m/sTBI was defined as an Abbreviated Injury Score (AIS) ≥2 for the head body region (BR) and was further stratified as isolated TBI (iTBI) or polytrauma TBI (pTBI). iTBI was defined as an AIS ≤2 for all other BRs and pTBI was defined as having an AIS >2 for one or more other BRs. The pre-hospital CMI (CMI-PH) was calculated as sum of scores of pre-hospital heart rate (HR) scaled 0 to 1 as 60-100 and < 60 or >100 bpm, systolic blood pressure (SBP) scaled 0 to 1 as ≥100 and < 100 mmHg and Glasgow Coma Scale total (GCS) scaled 0-2 as ≥14, 9-13 and 3-8. The CMI-PH scores ranged 0 to 4. The CMI-PH was compared to the SI, SI-4 classification as SI < 0.6 (I), 0.6≤SI < 1.0 (II), 1.0≤SI < 1.4 (III) and SI≥1.4 (IV), GCS and SBP with the primary outcome of mortality (died on arrival and inhospital). Area under the Receiver Operating Characteristic curve (AUROC), Hosmer-Lemeshow goodness of fit test, and sensitivity and specificity were used to discriminate and calibrate the CMI-PH from the existing indices. Logistic regression was used to calculate likelihood of mortality associated with the scores. Results: A total of 1398 patients met the inclusion criteria and 34.8% had polytrauma. Overall mortality was 4.2% (n = 59). Increasing CMI-PH scores were associated with increases in mortality (0.1%, 0.5%, 8.7%, 13.8%, and 57.5%). AUROC results showed the CMI-PH was a better predictor of mortality than GCS, SI, SI-4 Classification and SBP (0.89 vs 0.86, 0.55, 0.56, 0.53) in all m/sTBI and pTBI (0.84 vs 0.81, 0.68, 0.73, 0.56). Conclusion: The CMI-PH is a better predictor of mortality secondary to shock and can potentially facilitate timely life-saving interventions decreasing potentially preventable death from hemorrhage through early, accurate identification of trauma-related shock. The CMI-PH has potential applicability in prolonged field care and civilian trauma systems.

3074. Leach, P., et al. (2005). "An unusual cause of light headedness." Acta neurochirurgica **147**(12): 1301.

3075. Leach, P. and J. Thorne (2008). "Re: Unusual penetrating cranio-cerebral injuries in children from main plugs." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **24**(2): 163.

3076. Leake, D. (2012). "Transorbital intracranial penetrating injury: Evaluationofassociated vascular injury with cta and conventional angiography." Emergency radiology **19**(5): 377.

Purpose/Aim: 1. Recognize potential complications of transorbital intracranial penetrating injury including vascular injury. 2. Recognize the value of CTA (MIP's) and conventional angiography for initial and followup evaluation. Content Organization: 7 Y/O Boy found by parents. He had decrease level of consciousness and “not acting like himself”. A wicker basket with a exposed protruding metal structural support was noted by parents. There was blood on this structure. They also noted laceration of his upper eyelid. On admission to Emergency Room, patient was minimally responsive. Exam revealed a small 1.5 x 1.5 cm laceration of the lateral aspect of left upper eyelid. There was diffuse edema of left upper eyelid. Pupils were equally round and reactive to light. No ocular abnormality. Sclerae and conjunctivae are normal. CT Head exam demonstrated transorbital intracranial penetrating injury. CTA intracranial exam showed focal injury of anterior cerebral artery, confirmed by conventional angiography. Patient was treated conservatively. Initial followup (6 day) CTA exam showed apparent interval disappearance of vascular injury. Further followup imaging studies are scheduled. Summary/Conclusion: Transorbital intracranial penetrating injuries may have significant complications including vascular injury. Expeditious imaging with CT Face/ Brain and CTA Intracranial (MIP) is helpful in initial screening and followup of patients. In selected cases, further evaluation with MRI, MRA, and Conventional Angiography may sometimes be needed. Clinical evaluation may not disclose the intracranial penetrating injury. Imaging allows the classification of injury, so that appropriate clincial decisions can be made depending on the treatment algorithm. If vascular injuries are treated conservatively, then a followup CTA, MRA, or conventional angiogram is recommended in 1-3 months to rule out development of pseudoaneurysm.

3077. Leake, D. L. and M. B. Habal (1977). "Reconstitution of craniofacial osseous contour deformities, sequelae of trauma and post resection for tumors, with an alloplastic-autogenous graft." The Journal of trauma **17**(4): 299-303.

Our experience using a new technique for reconstructing contour defects of facial bones has been presented. It employs particulate, cancellous bone and an implantable prosthesis accurately fabricated of polyether urethane and polyethylene terephthalate cloth mesh which can be produced in a variety of configurations. A mannequin made of these materials displaying the various parts of the craniofacial complex that have been restored or are currently under investigation is shown in Figure 10. Large cranial vault defects, orbital floors, mandibles including chin augmentation, and nasal bone deformities have been successfully restored in man. Restoration of the pinna of the ear is currently being evaluated in laboratory animals.

3078. Leal, I., et al. (2015). "Exceptional penetrating orbital injury that spared the eye globe." BMJ case reports **2015**.

3079. Leary, J., et al. (2016). "Longitudinal changes in brain volume over the first year following traumatic brain injury." Brain injury **30**(5-6): 528-529.

Objectives: Studies in traumatic brain injury (TBI) have shown decreases in grey and white matter volumes following brain trauma. Despite continual volume loss, neuropsychological performance has been shown to improve over time. However, it is unclear whether volume loss is diffuse or regionally selective, if changes are related to TBI severity and if volumetric changes relate to changes in neuropsychological function. The present study sought to address these questions using a volumetric region of interest approach. We hypothesized that brain volumes would decrease in a regionally- specific manner and that volume loss would correspond with TBI severity. Additionally, we hypothesized that there may be an association between volume loss and neuropsychological performance. Methods: Twenty-seven patients (15 male) with non-penetrating TBI were classified by severity: mild, complicated mild or moderate/severe. Patients were assessed across three time points: sub-acute (less than 3 months), 6 months and an evaluation at 1 year following injury. The longitudinal pipeline within the Free Surfer software package (version 5.3) was used to quantify brain volumes. Neuropsychological assessments measured: attention, information processing speed, motor speed and fine motor dexterity, abstract reasoning and mental flexibility, whole-to-part construction and spatial reasoning, phases of memory including encoding, consolidation and recall and working memory. Statistical analyses were performed using SAS 9.3. Mixed effects models were used to detect brain volume changes over time, accounting for time since injury and total intracranial volume. Mixed effects models were also used to investigate changes in neuropsychological performance over time and to determine whether volumetric changes were associated with changes in neuropsychological performance. TBI severity was incorporated as a fixed effect variable. Results were corrected for multiple comparisons. The SAS Proc Mixed procedure was used to estimate correlations in the presence of repeated measures. Results: Volumetric analyses revealed significant decreases in the bilateral caudate (left: $p < 0.0001$; right: $p = 0.00014$), right putamen ($p = 0.0005$), right thalamus ($p = 0.0009$), right superior temporal gyrus ($p = 0.0005$) and left superior parietal lobule ($p = 0.0004$). Neuropsychological analyses revealed significant improvements in abstract reasoning ($p = 0.0024$) and processing speed ($p = 0.0018$). Volumetric changes and neuropsychological performance were not significantly related to TBI severity. No significant correlations were found between changes in brain volumes and neuropsychological performance. Conclusions: In line with our hypothesis, brain volumes appear to decline over the first year post-injury in a regionally- specific fashion. Volumetric reductions are independent of TBI severity, indicating that even mild injuries may result in chronic loss of brain tissue. However, neuropsychological performance does not appear to be associated with volume loss. Although neuropsychological performance in the first year post-injury appears to be unrelated to volumetric changes, there may be long-term implications for the development of co-morbid psychiatric and neurological disorders in patients who sustain TBI and subsequent volume loss.

3080. Leathers, R., et al. (2003). "Orofacial injury in underserved minority populations." Dental clinics of North America **47**(1): 127-139.

The translation of clinical and epidemiological research findings into cliniical practice in the management of orofacial injuries at an inner-city community promises a reduction in the incidence and severity of orofacial injuries. This article reports on the sociodemographic characteristics, economical impact, nature of injuries, and associated risk factors of mandible fractures sustained in the inner-city community treated at KDMC. An overwhelmingly high incidence of intentional/assaultive injuries were treated at KDMC that contribute to the escalating cost of medical care provided at the public county hospital. Knowledge of associated risk factors and nature of injuries is fundamental to the development of a sound screening and interventional program tailored to the high-risk minority groups, to reduce the

high burden of preventable orofacial injuries in this community. Multidisciplinary health professionals should recognize the relationship between alcohol and substance abuse and orofacial injuries and the subtle signs of domestic abuse. and should provide social support and counseling intervention to reduce risk of recurrent injuries in abused victims.

3081. Leaver, R. C. and J. D. Loeser (1971). "Lhermitte's phenomenon after high velocity missile injuries of the brain." Journal of neurosurgery **34**(2 Pt 1): 159-163.

High velocity wounds of the brain have been associated with the development of Lhermitte's phenomenon in 26 of 56 consecutive cases from Vietnam studied from 1 month to 1 year after injury. No antecedent factors could be identified. Civilian trauma and elective neurosurgical procedures have not, to our knowledge, been reported to cause this sign. Subarachnoid or subdural adhesions are suggested as the cause of Lhermitte's phenomenon in these patients.

3082. Lebedev, V. V., et al. (1996). "[Weapons-related craniocerebral wounds in peacetime (their classification and characteristics)]." Oruzheinye cherepno-mozgovye raneniia mirnogo vremeni (klassifikatsiia, kharakteristika).(3): 12-19.

3083. Lebedev, V. V., et al. (1996). "[The diagnosis of peacetime firearms craniocerebral wounds in the acute period]." Diagnosika oruzheinykh cherepno-mozgovykh ranenii mirnogo vremeni v ostrom periode.(4): 19-22.

The paper deals with the diagnostic potentialities of using various techniques in the wounded persons with arms-induced brain injuries. The diagnosis of arms-induced wounds of the skull and brain must be comprehensive and made concurrently with therapeutical measures. The instrumental methods must be applied to the extent accessible for the given wounded person and a study should be stopped immediately after a diagnosis is established.

3084. Lebl, D. R., et al. (2013). "Vertebral artery injury associated with blunt cervical spine trauma: a multivariate regression analysis." Spine **38**(16): 1352-1361.

STUDY DESIGN: Retrospective analysis of prospective registry data., OBJECTIVE: To determine the patient characteristics, risk factors, and fracture patterns associated with vertebral artery injury (VAI) in patients with blunt cervical spine injury., SUMMARY OF BACKGROUND DATA: VAI associated with cervical spine trauma has the potential for catastrophical clinical sequelae. The patterns of cervical spine injury and patient characteristics associated with VAI remain to be determined., METHODS: A retrospective review of prospectively collected data from the American College of Surgeons trauma registries at 3 level-1 trauma centers identified all patients with a cervical spine injury on multidetector computed tomographic scan during a 3-year period (January 1, 2007, to January 1, 2010). Fracture pattern and patient characteristics were recorded. Logistic multivariate regression analysis of independent predictors for VAI and subgroup analysis of neurological events related to VAI was performed., RESULTS: Twenty-one percent of 1204 patients with cervical injuries (n = 253) underwent screening for VAI by multidetector computed tomography angiogram. VAI was diagnosed in 17% (42 of 253), unilateral in 15% (38 of 253), and bilateral in 1.6% (4 of 253) and was associated with a lower Glasgow coma scale ($P < 0.001$), a higher injury severity score ($P < 0.01$), and a higher mortality ($P < 0.001$). VAI was associated with ankylosing spondylitis/diffuse idiopathic skeletal hyperosteosis (crude odds ratio [OR] = 8.04; 95% confidence interval [CI], 1.30-49.68; $P = 0.034$), and occipitocervical dissociation ($P < 0.001$) by univariate analysis and fracture displacement into the transverse foramen 1 mm or more (adjusted OR = 3.29; 95% CI, 1.15-9.41; $P = 0.026$), and basilar skull fracture (adjusted OR = 4.25; 95% CI, 1.25-14.47; $P= 0.021$), by multivariate regression model. Subgroup analyses of neurological events secondary to VAI occurred in 14% (6 of 42) and the stroke-related mortality rate was 4.8% (2 of 42). Neurological events were associated with male sex ($P = 0.024$), facet subluxation/dislocation (crude OR = 9.00; 95% CI, 1.51-53.74; $P = 0.004$) and the diagnosis of ankylosing spondylitis/diffuse idiopathic skeletal hyperosteosis (OR = 40.67; 95% CI, 5.27-313.96; $P < 0.001$)., CONCLUSION: VAI associated with blunt cervical spine injury is a marker for more severely injured patients. High-risk patients with basilar skull fractures, occipitocervical dissociation, fracture displacement into the transverse foramen more than 1 mm, ankylosing spondylitis/diffuse idiopathic skeletal hyperosteosis, and facet subluxation/dislocation deserve focused consideration for VAI screening.

3085. Lebos, M. R. and R. Saadia (1994). "The overlooked blunt component in penetrating neck injuries: three case reports." The Journal of trauma **36**(3): 410-411.

Three cases of penetrating neck injury associated with an unsuspected blunt carotid injury are reported. Attention is drawn to the possibility of this rare association, that can cause irreversible damage, if overlooked. Early angiogram and possibly duplex Doppler scanning are warranted to prevent neurologic sequelae.

3086. Lechner, R., et al. (2010). "[Patterns and causes of injuries in a contemporary combat environment]." Verletzungsmuster und -ursachen in modernen Kriegen. **113**(2): 106-113.

Epidemiological analyses of injury patterns and mechanisms help to identify the expertise military surgeons need in a combat setting and accordingly help to adjust infrastructure and training requirements. Therefore, a MEDLINE search (1949-2009), World Wide Web search (keywords "combat, casualties, war, military, wounded and neurosurgery") and an analysis of deaths among allied war casualties in Afghanistan and Iraq were performed. Up to 10th December 2009 there had been 4,688 allied military deaths in Iraq and 1,538 in Afghanistan. Of these 22% died in non-hostile action, 33% in direct combat situations and the majority of 45% in indirect combat actions. The leading causes of injury were explosive devices (70%) and gunshot wounds. Chest or abdominal injuries (40%) and traumatic brain injuries (35%) were the main causes of death for soldiers killed in action. The case fatality rate in Iraq is approximately half that of the Vietnam War, whereas the killed-in-action rate in Afghanistan (18.7%) is similar to the Vietnam War (20%); however, the amputation rate is twice as high in modern conflicts. Approximately 8-15% of the fatal injuries seem to be potentially survivable.Military surgeons must have an excellent expertise in a wide variety of surgical specialties. Life saving emergency care, especially in the fields of thoracic, visceral and vascular surgery as well as practical skills in the fields of neurosurgery and oral and maxillofacial surgery are required. Additionally, it is of vital importance to ensure the availability of sufficient tactical and strategic medical evacuation capabilities for the wounded.

3087. Lecklitner, M. L., et al. (1988). "Bone imaging in the assessment of en bloc osteocutaneous autotransplantation." Clinical nuclear medicine **13**(3): 186-187.

A patient is presented who sustained an avulsed portion of the mandible and all soft tissues of the floor of the oral cavity, requiring an autogenous en bloc transplant to replace the avulsed tissues. The clinical role of bone imaging in assessing the patency of the microvasculature and viability of the vascularized osteocutaneous graft is discussed, and the criticality of the time of image acquisition in prognosticating the success of the transplantation is emphasized.

3088. Ledgerwood, A. M., et al. (1980). "Primary repair vs ligation for carotid artery injuries." Archives of surgery (Chicago, Ill. : 1960) **115**(4): 488-493.

The morbidity and mortality of carotid arterial injuries in 36 patients were retrospectively reviewed. Primary repair was achieved in 31 patients; nine patients had a stroke postoperatively and five died. Five patients were treated with ligation; three had a stroke postoperatively, but all survived. Postoperative stroke and mortality correlated best with neurological deficit on administration. Patients in shock or with absent arterial flow were also more likely to have postoperative stroke. Twenty-two patients were normal neurologically on admission; all were normal postoperatively and all survived. Five patients were admitted unconscious in severe shock, precluding accurate neurological evaluation; two were normal following repair and three had stroke. Nine patients had a stroke or coma on admission; all nine had postoperative stroke and five died. Autopsy disclosed bilateral cerebral edema in two patients, cerebral edema and ipsilateral ischemic infarction in two patients, and cerebral edema with bilateral necrosis in one patient. No patient had hemorrhagic infarction. On the basis of these findings, carotid artery repair is recommended in all patients who are not comatose, have stable vital signs, and have technically reparable injuries.

3089. Lee, A. D. and Y. S. Oh (2007). "Unusual delayed presentation of a nail gun injury through the skull base." The Laryngoscope **117**(6): 977-980.

Published reports of nail gun injuries to the face are uncommon. We describe an unusual delayed presentation with injury through the infratemporal fossa and a literature review. A 55-year-old patient presented 2 weeks after an unrecognized injury with complaints of a headache. Imaging revealed a nail traversing the infratemporal fossa with intracranial extension. The nail was removed through a preauricular approach without sequelae. Nail gun missiles to the face are uncommon, dramatic, but often nonfatal because of their relative low velocity. Patients are usually diagnosed at the time of injury, evaluated with computed tomography and angiography, and treated with surgery.

3090. Lee, B. L. and P. Sternberg, Jr. (1996). "Ocular nail gun injuries." Ophthalmology **103**(9): 1453-1457.

PURPOSE: Penetrating ocular trauma resulting from nails can have disastrous visual consequences. Ocular nail gun injuries occur when a nail propelled at high velocity penetrates the globe. The authors report four consecutive patients with ocular injuries resulting from nail guns., METHODS: Four patients with ocular nail gun injuries are described: one with scleral penetrating injury, one with corneal penetrating injury, and two with perforating (through-and-through) injuries of the globe., RESULTS: Three of the four patients recovered good visual acuity after surgical intervention., CONCLUSION: Although dependent on the site of impact, the visual prognosis may be less severe than expected because the nail penetrates the eye at a high velocity such that there are less contusive forces. Adherence to safety precautions involving the use of nail guns as well as the obligatory use of safety glasses should reduce the incidence of these injuries.

3091. Lee, C., et al. (2017). "Patterns of trauma and violence among nomadic pastoralists at the nileke site (500-221 BCE), Northwestern Xinjiang Province, China." American journal of physical anthropology **162**: 259.

The Nileke cemetery site is located in the Junggar Basin between the Tianshan and Altai mountain ranges. This region connects the steppe grasslands of Kazakhstan and Mongolia with the oasis states of the Tarim Basin. They were nomadic pastoralists, possibly related to the Pazyryk culture. A total of 46 individuals were analyzed (18 females, 27 males, and 1 indeterminate) for cranial trauma. Twenty percent of the crania had some evidence of trauma (9/46). Seven males and two females had cranial trauma. One female had suffered a blow to the left eye orbit and one female had a broken right zygomatic bone. Both of these injuries are consistent with interpersonal violence. Two males also showed evidence of interpersonal fighting. Both males had broken noses. Five males showed injuries consistent with the use of weaponry. Two individuals had sword cuts to the left parietal and the nose. Two men had healed blunt force or low velocity projectile wounds to the frontal and parietals. One male had a keyhole shaped wound on the left parietal from being grazed by a high velocity projectile. One male had a penetrating wound from a metal weapon on the right parietal. This individual also had evidence of trepanation to treat the wound. The pattern and location of the majority of these injuries suggest that the attackers were on horseback while those injured were on the ground. The trauma pattern and frequencies at Nileke are similar to other regional nomadic pastoralist sites and different from agriculturalist sites.

3092. Lee, C. C., et al. (2021). "What Factors Are Associated With Open Treatment of Pediatric Mandibular Fractures?" Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **79**(6): 1292-1301.

PURPOSE: There is a paucity of data with respect to management of pediatric facial fractures. The purpose of this study was to describe the population of pediatric patients with mandibular fractures at our institution and to assess predictors of fractures requiring open reduction and internal fixation (ORIF)., PATIENTS AND METHODS: This was a retrospective cohort study of patients aged <=17 years presenting with mandibular fractures. The primary predictor variable was age >=13 years and <13 years. The primary outcome variable was ORIF (yes or no). Epidemiologic factors and complications were also assessed. Descriptive, bivariate, and multiple logistic regression statistics were computed to measure the association between predictor variables and ORIF., RESULTS: The study sample was composed of 84 subjects with 61 subjects aged >=13 years and 23 subjects aged <13 years. ORIF was used for 21.4% of subjects. Increased age was associated with ORIF (P = .009). After adjusting for the effects of concurrent variables, age (P = .047, OR = 2.30, 95% CI = 1.01 to 5.24), fracture displacement between 2 and 4 mm (P = .032, OR = 18.1, 95% CI = 1.29 to 254), fracture displacement >4 mm (P = .019, OR = 16.9, 95% CI = 1.60 to 179), and the presence of 3 fractures (P = .027, OR = 30.8, 95% CI = 0.001 to 0.641) were positive independent predictors of ORIF. Concomitant facial, skull, or skull base fractures (P = .039, OR = 0.027, 95% CI = 0.001 to 0.641) were a negative independent predictor of ORIF. Secondarily, both mechanism of injury and fracture location varied significantly by age and gender. Complication rate was 6.33%., CONCLUSIONS: Most pediatric mandibular fractures were managed nonoperatively. Increased age, fracture displacement, presence of 3 fractures, and concomitant craniofacial injuries were independent predictors of ORIF. Complication rates were low regardless of treatment modality.

3093. Lee, C. S. and K. H. Park (2010). "Six nails in the head: multiple pneumatic nail gun head injury." British journal of neurosurgery **24**(4): 493-494.

A 62-year-old man was admitted to our hospital after attempting to commit suicide with a pneumatic nail gun. Six nails were launched. Because the nail head acted as a brake, the launched nail could make a hole in the skull but could not entirely pass it.

3094. Lee, C. Y. and H. W. Kim (2018). "Angiographic change on time interval in traumatic-direct carotid cavernous fistula without venous reflux, and treatment with LVIS stent alone." Interdisciplinary Neurosurgery: Advanced Techniques and Case Management **14**: 5-8.

Traumatic carotid cavernous fistula (CCF) is usually high flow, direct type and typically manifested by venous hypertension and reflux, therefore it can lead to various neurologic deficit as well as severe ophthalmic symptoms including exophthalmos, congestion and visual disturbance. On the contrary, in traumatic-direct CCF without high flow that causes venous hypertension and/or reflux, the natural clinical course is obscure, and the diagnosis may be difficult. The treatment has not been well documented in detail. We are reporting on sequential angiographic change on time interval in traumatic-direct CCF without venous hypertension and/or reflux, and experience of treatment using LVIS stent.

3095. Lee, C. Y., et al. (1991). "Pediatric chin injury: occult condylar fractures of the mandible." Pediatric emergency care **7**(3): 160-162.

The diagnosis of occult mandibular condylar fractures in children is often missed or delayed on initial examination when children present with a laceration to the chin. A clue to the diagnosis of this type of skeletal injury to the mandible is the knowledge of a commonly occurring pattern of injury associated with chin trauma. Chin laceration, fracture of the parasymphyseal region near the chin, and fracture of the condyles are often concomitant injuries of the mandible. This article reviews three case reports of children who sustained a chin laceration, fracture in the region near the chin, and fracture to the mandibular condyles secondary to chin trauma that were not initially diagnosed on clinical examination.

3096. Lee, H. K. (1979). "Brain scanning in a case of through and through gunshot head wound." Clinical nuclear medicine **4**(7): 306.

3097. Lee, J. A. and H. Y. Lee (2002). "A case of retained wooden foreign body in orbit." Korean journal of ophthalmology : KJO **16**(2): 114-118.

A 41-year-old man visited our clinic complaining of esodeviation of the right eye. He had been operated on for corneal laceration 3 years before. One month later, exodeviation of the right eye had developed. The result of computed tomography (CT) was reported as orbital abscess and cellulitis. Although antibiotic treatment was administered for 2 weeks, the exodeviation didn't improve. On ocular examinations performed in our hospital in November-2001, his right eye was esotropic and had a relative afferent pupillary defect. Vision of the right eye was decreased to 0.02. Fundus examination showed optic atrophy. A new CT scan disclosed a foreign body introduced into the right medial orbital wall, nasal cavity and ethmoidal sinus. Although foreign body was surgically removed, vision and eye movement were not improved. In the case of a patient who has undergone orbital trauma, complete history taking and physical examinations must be performed. On suspicion of a foreign body, imaging study such as CT or MRI must be performed. However, because CT findings can be variable, careful follow-up is needed.

3098. Lee, J. H. and D. G. Kim (2000). "Brain abscess related to metal fragments 47 years after head injury. Case report." Journal of neurosurgery **93**(3): 477-479.

The authors report a case of symptomatic brain abscess in a 51-year-old man who presented with personality changes and generalized seizures. He had survived a grenade explosion injury during the Korean War 47 years previously. Computerized tomography scanning revealed multiple conglomerate rim-enhancing lesions and metallic foreign bodies in the right frontal lobe. The mass was totally removed and Pseudomonas aeruginosa was isolated from

microbial cultures. Retained foreign bodies in the brain, whether bone or metal, should be removed at the time of injury if at all possible. If this cannot be accomplished, patients with such retained foreign bodies should be carefully monitored for life.

3099. Lee, J. S., et al. (1999). "Orbitocranial injury caused by wood." Korean journal of ophthalmology : KJO **13**(2): 128-132.

A rare case of a patient with orbitocranial injury by a wooden foreign body is reported. Penetrating periorbital wound by a wooden stick with entry site at the right upper eyelid was related to the invasion into the temporal lobe. Fortunately, the anterior and posterior segments of eye were unharmed, but right ocular motility was markedly restricted mechanically in all directions. Forced duction test was strong positive, especially the dextroversion of the right eye. Computed tomography scan showed a well-delineated low density from the orbital wall into the temporal lobe. The wooden foreign body was subsequently removed from the orbit and the temporal lobe, through the neurosurgical frontotemporal approach. After the wooden foreign body was removed, the ocular movement of the right eye fully recovered without any intracranial or ocular complications.

3100. Lee, K. C., et al. (2021). "Are Facial Gunshot Wounds More Fatal When They Are Self-Inflicted or Other-Inflicted?" Craniomaxillofacial Trauma and Reconstruction.

Study Design: This was a retrospective cohort study of the 2014 Nationwide Emergency Department Sample (NEDS). Objective: Intraoral and submental projectile entry points may be less fatal than other facial entry points due to the indirect access to the intracranial structures and the protection offered by the intervening maxillofacial complex. Because intraoral and submental trajectories are almost always present in the setting of attempted suicide, this study sought to determine if intent (self-harm versus other-harm) influenced mortality in facial gunshot wound (GSW) patients. Methods: All patients with a diagnosis of a facial fracture secondary to firearm injury were included in the study sample. The primary predictor was self-harm. Secondary predictors were derived from patient, injury, and hospitalization characteristics. The study outcome was death. Univariate time to event analyses were conducted for all study predictors. A multivariate regression model for mortality was created using all relevant predictors. Results: The final sample included 668 facial GSW injuries, of which 19.3% were attributed to self-harm. Self-inflicted GSWs were more likely to involve the mandible (58.9 vs 46.0%, $P < 0.01$), ZMC/maxilla (47.3 vs 32.5%, $P < 0.01$), and intracranial cavity (48.1 vs 22.6%, $P < 0.01$). The overall mortality rate was 7.3%, and the mean time to death was 2.2 days. After controlling for pertinent covariates, the risk of mortality was independently decreased with mandibular injury (HR = 0.36, $P = 0.03$). However, mortality was increased by self-harm intent (HR = 3.94, $P < 0.01$) and intracranial involvement (HR = 11.24, $P < 0.01$). Conclusions: Consistent with a pattern of intraoral and submental entry points, self-inflicted facial GSWs demonstrated higher rates of mandibular injury. Despite this finding, self-harm injuries still carried a higher incidence of intracranial injury and a greater independent risk of mortality. Our results refute any notion that the mechanism and trajectory of self-inflicted GSWs is less fatal.

3101. Lee, K. H., et al. (2007). "An unusual case of penetrating injury to the spine resulting in cauda equina syndrome: case presentation and a review of the literature." Spine **32**(9): E290-293.

STUDY DESIGN: Case study., OBJECTIVE: We present an unusual case of cauda equina syndrome due to a penetrating injury in which the brake caliper of a motorcycle lodged in the lumbar canal of the operator of the vehicle after a road accident and provide a review of the literature on penetrating injury to the spine., SUMMARY OF BACKGROUND DATA: While the large majority of penetrating spinal injuries are due to gunshot wounds, penetrating injury to the spine causing cauda equina syndrome is rare., METHODS: We report the case of a 42-year-old man involved in a motorcycle accident in which the brake caliper penetrated the lumbar region and entered the lumbar canal through the interlaminar space between L2 and L3. He had a complete motor and sensory deficit in the lower extremities with absent rectal tone. The patient was taken urgently to the operating room and underwent removal of the foreign object and repair of a dural laceration. He was treated with a course of intravenous antibiotics., RESULTS: The wound healed without evidence for cerebrospinal fluid leakage or infection. The patient made a good neurologic recovery, becoming ambulatory with bowel and bladder continence at 5 months following the injury., CONCLUSIONS: Surgical removal of foreign object resulted in resolution of cauda equina syndrome injury.

3102. Lee, K. S. and B. L. Lee (2020). "Epilepsy caused by an unrecognized pencil lead misdiagnosed as intracerebral cavernous malformation." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **36**(3): 647-650.

Transorbital penetrating injury is relatively uncommon following head trauma, and delayed onset of neurological complications due to retained intracerebral foreign bodies has rarely been reported. We describe the first child case of late-onset epilepsy caused by an accidental transorbital penetrating injury, resulting in a retained pencil lead fragment that was mistaken for cavernous malformation. A 14-year-old girl presented with abrupt onset of nocturnal bilateral tonic seizures. The patient was previously healthy and denied any head trauma. The seizures were not well controlled by antiepileptic drugs. Right frontal lobe epilepsy due to a cavernous malformation was suspected on the basis of brain magnetic resonance imaging and electroencephalography findings. A planned operation unexpectedly revealed the intracerebral pencil lead. This foreign body had gone undetected for 11 years following a minor transorbital penetrating injury. The patient remained seizure-free during the 1-year post-operative follow-up period. Head trauma by a pencil can cause transorbital penetrating injury in children. It is difficult to detect retained small foreign body fragments and the clinical presentation can be delayed. It may be mistakenly diagnosed as other pathologies, especially when patients deny any history of head trauma.

3103. Lee, L. K. (2019). "These are all our lanes." Injury Epidemiology **6**.

3104. Lee, M., et al. (2018). "Traumatic brain injury induces calpain-2 mediated cleavage of HSP70.1, a lysosomal stabilisation protein." Journal of Investigative Medicine **66**(1): 120-121.

Purpose of study Recent studies suggest the role of heat-shock protein 70.1 (Hsp70.1) in maintaining lysosomal membrane integrity. Destabilisation of lysosomes promotes programmed cell death and is associated with progression of intracellular morphology relating to granulovacuolar degeneration, a pathological hallmark of Alzheimer's Disease (AD). Our laboratory previously identified a link between traumatic brain injury (TBI) and AD by showing that calpain-2 activation is involved in tau phosphorylation and oligomer accumulation. This study will investigate effects of TBI-induced calpain activation on Hsp70.1 and determine involvement of calpain-1 or calpain-2 in lysosomal stability. Methods used Controlled cortical impact model of TBI was used on wild-type (WT) and calpain-1 KO (C1KO) C57Bl/6 mice. A 5 mm craniotomy was performed with anaesthesia, and a penetrating injury was induced on cortex lateral to the sagittal suture. Single injection of a selective calpain-2 inhibitor (C2I, 0.3 mg/kg) was made intraperitoneally 1 hour after TBI. For sham surgery, mice were subjected to craniotomy only. Brains were isolated 24 hour after TBI and cortical tissue surrounding injury was homogenised in homogenization buffer containing a protease and phosphatase inhibitor cocktail. After two rounds of centrifugation, P2 membrane (pellet) fraction was resuspended in lysis buffer. Primary antibody for western blot (WB) was Hsp70.1 (1:3000). Summary of results WB showed breakdown products of Hsp70.1 after TBI with apparent Mw of 50, 37 and 25 kDa. Quantification of WB indicated that ratio of breakdown products to full-length Hsp70.1 was significantly higher in WT and C1KO mice after TBI, as compared to sham (n=3 animals. $p<0.05$ sham vs WT. $p<0.01$ sham vs C1KO). Post-TBI injection of C2I appeared to prevent Hsp70.1 truncation. Conclusions TBI resulted in rapid calpain-2-mediated Hsp70.1 truncation, as selective inhibition of calpain-2 decreased Hsp70.1 cleavage, which was evident in absence of calpain-1. Our results support the critical role of calpain-2 in neuronal death and provide an additional link between TBI and AD through calpain-2-mediated cleavage of Hsp70.1, and resulting lysosomal destabilisation.

3105. Lee, N., et al. (2005). "Penetrating brain injury leads to activation of ciliary neurotrophic factor receptors." Neuroscience letters **374**(3): 161-165.

Endogenous injury response mechanisms likely reduce secondary neuronal loss following CNS trauma by activating growth factor receptors. Therefore, it is important to determine which growth factor receptors are activated in vivo by CNS trauma and which signal transduction pathways are affected in which cell types. We present a model of penetrating brain injury utilizing stereotaxic insertion of a fine needle. This procedure can be used to anatomically characterize injury response mechanisms through immediate, local application of pharmacological agents. We find, through immunohistochemistry, that injury of the rat facial motor nucleus leads to activation of STAT3, a neuronal survival factor, in the dendrites, nuclei and cytoplasm of the motor neurons. A similar response was observed with the

trigeminal motor nucleus. Use of the ciliary neurotrophic factor (CNTF) receptor antagonist, AADH-CNTF, indicated that the STAT3 activation resulted largely, and perhaps entirely, from injury-induced activation of CNTF receptors.

3106. Lee, N., et al. (2013). "The contribution of ciliary neurotrophic factor receptors to adult motor neuron survival in vivo is specific to insult type and distinct from that for embryonic motor neurons." The Journal of comparative neurology **521**(14): 3217-3225.

Exogenous ciliary neurotrophic factor (CNTF) promotes motor neuron (MN) survival following trauma and in genetic models of MN disease. Unconditional disruption of the mouse CNTF receptor alpha (CNTFRalpha) gene leads to MN loss, demonstrating a developmental role for endogenous CNTF receptor signaling. These data also suggest that CNTF receptors may promote adult MN survival and that appropriately manipulating the receptors could effectively treat adult MN disorders. This effort would greatly benefit from a better understanding of the roles played by CNTF receptors in adult MNs. We have previously found that adult onset disruption of CNTFRalpha in facial MNs of "floxed CNTFRalpha" mice by AAV-Cre vector injection leads to significantly more MN loss than in identically treated controls. While indicating that CNTF receptors can promote adult MN survival, the data did not distinguish between potential roles in MN maintenance versus roles in protecting MNs from the injection associated trauma or the toxicity of the chronic Cre recombinase (Cre) produced by the AAV-Cre. Here we used an inducible Cre gene construct to produce adult-onset CNTFRalpha disruption in facial MNs without the traumatic and toxic effects of the AAV-Cre procedure. The MNs survive without CNTFRalpha, even when challenged by facial nerve crush or the injection-associated trauma, thereby suggesting, in conjunction with our previous study, that endogenous CNTF receptor signaling can protect MNs against toxic insult, such as that produced by chronic Cre. The data also indicate that in vivo CNTF receptors play very different roles in adult and embryonic MNs.

3107. Lee, P. K. H., et al. (2018). "Critical Consideration in Surgical Approach to the Neck in a Case of Absent Common Carotid with Concurrent Anomalous Vertebral Artery." The American surgeon **84**(12): e532-e534.

3108. Lee, R. K., et al. (1991). "Incidence rates of firearm injuries in Galveston, Texas, 1979-1981." American journal of epidemiology **134**(5): 511-521.

Firearm injury mortality rates have been characterized in various settings, but little is known of the total magnitude of firearm injury, including morbidity. The authors determined population-based incidence rates of firearm injury among residents of Galveston, Texas, from 1979-1981 by using police, emergency department, hospital, emergency medical services, medical examiner, and vital records to identify 239 firearm injury cases. Vital records, medical examiner, and police records each identified more than 95% of the fatalities, but police records (sensitivity = 98%) were better than emergency department or hospital records (sensitivity = 82% and 28%, respectively) for identifying all nonfatal cases. The annual age-adjusted incidence rate of firearm injury was 128 per 100,000 persons. Black males, with the highest firearm injury rate (459 per 100,000 persons), were injured at 46 times the rate of white females (10 per 100,000 persons). The overall case fatality rate was 30%, including 25% of the assaults/homicides, 81% of the parasuicides/suicides, and 0% of the unintentional injuries. On the basis of the case fatality rates, an estimated 140,000 firearm injuries occur in the United States annually. The case fatality rate for penetrating head injuries was 80% versus 48% for chest injuries and 6% for all other parts of the body. The results are discussed with respect to policy recommendations for reducing firearm injuries.

3109. Lee, S., et al. (2017). "Microglial inflammasome activation in penetrating ballistic-like brain injury." Journal of neurotrauma **34**(13): A4.

Penetrating traumatic brain injury (PTBI) remains a significant cause of death and disability in the United States without effective therapies. A rodent PTBI model, penetrating ballistic-like brain injury (PBBI) has uncovered several secondary pathophysiological mechanisms such as reduced glucose uptake, neurodegeneration, inflammation, and apoptosis that magnify the primary injury. Targeting components of these mechanisms may help improve PTBI outcomes. Activators of innate immunity contribute to secondary injury mechanisms following traumatic brain injury (TBI). Inflammasomes are the key regulators of Il-1b mediated inflammation after TBI and present as clinically relevant targets for therapy. The role of inflammasomes in PBBI pathophysiology has yet to be determined. Towards this, adult

male Sprague-Dawley rats were subjected to unilateral sham or PBBI surgery and sacrificed at various time points. Tissues were assessed for expression of cytokines IL-1b, IL-18 and components of the inflammasome, ASC (apoptosis-associated speck like protein containing a caspase activation and recruitment domain), caspase-1, NLRP3 (NOD-like receptor protein 3) and GSDMD (gasdermin-D) by immunoblot analysis and assessed for ASC cell-type expression by immunohistochemistry. Cortical IL-1b and IL-18 expression increased 4 h-48 h and 48 h-72 h, respectively after injury. PBBI also increased caspase-1, ASC, NLRP3, and GSDMD expression from 24 h-48 h. Compared to sham and contralateral cortex, microglial numbers significantly increased 48 h postinjury in the ipsilateral cortex. ASC expression was predominantly increased in activated microglia, permeating the enlarged cell bodies and into the processes. Taken together, this is the first report of inflammasome activation after PBBI and suggests that these activators of inflammation lead to an exacerbation of the pro-inflammatory state postinjury which could underlie the long-term sequlae of PBBI. Inhibition of the inflammasome in PBBI will evaluate its therapeutic potential for PTBI. Supported by NIH NINDS award R01NS089443.

3110. Lee, S. H., et al. (1991). "Diaphragmatic injury." Gaoxiong yi xue ke xue za zhi = The Kaohsiung journal of medical sciences **7**(12): 622-627.

From Feb. 1976 to Oct. 1990, 43 patients with diaphragmatic injuries were admitted to Kaohsiung Medical College Hospital. Blunt injuries occurred in 27 cases and penetrating injuries in 16 cases. The diagnosis is usually made by chest roentgenogram, chest CT, or during operations for other associated injuries. Delayed diagnoses were noted in 7 cases in blunt injury group and 2 cases in penetrating injury group. Isolated diaphragm injury was found in only 2 patients. The perforated diaphragm were almost repaired by two layers of continuous suture. None of them needed prosthetic mesh for reconstruction and no recurrence of hernia was found. In the blunt injury group, these patients usually combined with rib or long bone fractures, major intracranial injury, liver or spleen lacerations and intestinal perforations; while in the penetrating injury group, liver lacerations and stomach perforations were the most common associated injuries. Two deaths were noted in each group and the associated injury were accounted for these deaths.

3111. Lee, S. T. (1992). "A delayed unusual presentation of a penetrating foreign body." Singapore medical journal **33**(3): 304-305.

Complications resulting from the penetrating percutaneous foreign bodies almost always arise in the early post injury period. Delayed presentations of previous asymptomatic foreign bodies are rare. In this case report, symptoms of tracheal irritation arose seven years following the initial penetrating shrapnel injury to the neck. Computed tomography scans enabled localisation of the foreign body at the tracheal wall and carotid sheath interface. The usefulness of this radiologic modality in the evaluation of the penetrating soft tissue injury is highlighted. A review of the phenomenon of the migrating and asymptomatic foreign body follows.

3112. Lee, S. W., et al. (2019). "The role of microglial inflammasome activation in pyroptotic cell death following penetrating traumatic brain injury." Journal of neuroinflammation **16**(1): 27.

BACKGROUND: Traumatic brain injury remains a significant cause of death and disability in the USA. Currently, there are no effective therapies to mitigate disability except for surgical interventions necessitating a need for continued research into uncovering novel therapeutic targets. In a recent study, we used a rodent model of penetrating traumatic brain injury known as penetrating ballistic-like brain injury (PBBI) to examine the role of innate immunity in post-traumatic secondary injury mechanisms. We previously reported that the inflammasome, a multiprotein complex composed of apoptosis-associated speck-like protein containing card and caspase-1, plays a role in secondary cell death mechanisms after PBBI, including inflammatory cell death (pyroptosis)., METHODS: In the current study, we used flow cytometry analysis to evaluate activated microglia and CD11b-positive leukocytes after PBBI and assessed inflammasome activation and pyroptosis of specific cellular populations. Sprague-Dawley male rats underwent PBBI or sham-operated procedures and ipsilateral cortical regions processed for flow cytometry and cellular analysis. Flow cytometry results were compared using one-way ANOVA followed by Tukey's multiple comparisons., RESULTS: At 48 h following PBBI, there was an increase in activated microglia and infiltrating leukocytes compared to sham controls that were associated with increased caspase-1 activity. Using a florescent probe to identify caspase-1 activity and a fluorescent assay to determine cell viability, evidence for pyroptosis in CD11b+ cells was also determined. Finally, while post-traumatic treatment with an anti-ASC antibody had no effect on the number of activated microglia and infiltrating

leukocytes, antibody treatment decreased caspase-1 activity in both resident microglia and infiltrating leukocytes and reduced pyroptotic CD11b+ cell death., CONCLUSIONS: These results provide evidence for inflammasome activation in microglia and infiltrating leukocytes after penetrating traumatic brain injury and a role for pyroptotic cell death in the pathophysiology. In addition to inhibiting neuronal cell death, therapeutic treatments targeting inflammasome activation may also provide beneficial effects by reducing the potentially detrimental consequences of activated microglia and infiltrating CD11b+ leukocytes following penetrating traumatic brain injury.

3113. Lee, S. W., et al. (2018). "Microglial Inflammasome Activation in Penetrating Ballistic-Like Brain Injury." Journal of neurotrauma **35**(14): 1681-1693.

Penetrating traumatic brain injury (PTBI) is a significant cause of death and disability in the United States. Inflammasomes are one of the key regulators of the interleukin (IL)-1beta mediated inflammatory responses after traumatic brain injury. However, the contribution of inflammasome signaling after PTBI has not been determined. In this study, adult male Sprague-Dawley rats were subjected to sham procedures or penetrating ballistic-like brain injury (PBBI) and sacrificed at various time-points. Tissues were assessed by immunoblot analysis for expression of IL-1beta, IL-18, and components of the inflammasome: apoptosis-associated speck-like protein containing a caspase-activation and recruitment domain (ASC), caspase-1, X-linked inhibitor of apoptosis protein (XIAP), nucleotide-binding oligomerization domain (NOD)-like receptor protein 3 (NLRP3), and gasdermin-D (GSDMD). Specific cell types expressing inflammasome proteins also were evaluated immunohistochemically and assessed quantitatively. After PBBI, expression of IL-1beta, IL-18, caspase-1, ASC, XIAP, and NLRP3 peaked around 48 h. Brain protein lysates from PTBI animals showed pyroptosome formation evidenced by ASC laddering, and also contained increased expression of GSDMD at 48 h after injury. ASC-positive immunoreactive neurons within the perilesional cortex were observed at 24 h. At 48 h, ASC expression was concentrated in morphologically activated cortical microglia. This expression of ASC in activated microglia persisted until 12 weeks following PBBI. This is the first report of inflammasome activation after PBBI. Our results demonstrate cell-specific patterns of inflammasome activation and pyroptosis predominantly in microglia, suggesting a sustained pro-inflammatory state following PBBI, thus offering a therapeutic target for this type of brain injury.

3114. Lee, T. S., et al. (2014). "Management of carotid artery trauma." Craniomaxillofacial trauma & reconstruction **7**(3): 175-189.

With increased awareness and liberal screening of trauma patients with identified risk factors, recent case series demonstrate improved early diagnosis of carotid artery trauma before they become problematio. There remains a need for unified screening criteria for both intracranial and extracranial carotid trauma. In the absence of contraindications, antithrombotic agents should be considered in blunt carotid artery injuries, as there is a significant risk of progression of vessel injury with observation alone. Despite CTA being used as a common screening modality, it appears to lack sufficient sensitivity. DSA remains to be the gold standard in screening. Endovascular techniques are becoming more widely accepted as the primary surgical modality in the treatment of blunt extracranial carotid injuries and penetrating/blunt intracranial carotid lesions. Nonetheless, open surgical approaches are still needed for the treatment of penetrating extracranial carotid injuries and in patients with unfavorable lesions for endovascular intervention.

3115. Lee, Y. C., et al. (2017). "Self-inflicted transorbital brain injury by chopsticks in a patient with acute psychosis." Hong Kong medical journal = Xianggang yi xue za zhi **23**(3): 313-314.

3116. Lee, Y. H., et al. (1999). "Surgical reconstruction of the contracted orbit." Plastic and reconstructive surgery **103**(4): 1129-1128.

Anophthalmic patients and patients afflicted with retinoblastoma incur severe deformity of the orbit. Treatment of the severely contracted orbit is very difficult, and patient satisfaction is often poor. Since 1988, we have performed temporalis muscle transfer and surgical expansion of the contracted bony orbit in 26 patients. Satisfactory results were obtained. Gradual expansion of the orbit was performed in case of congenital anophthalmic patients. The treatment should be established in multiplicity, among many methods available for contracted eye sockets, according to the degree of orbital deformity and the amount of residual conjunctiva. In case of severe deformity, volume expansion surgery and temporalis muscle transfer are necessary. If augmentation is required in the periorbital region, rib bone

onlay graft must be performed. We were able to shorten the operative time by modifying the three-wall orbital expansion technique of Tessier and Wolfe to a more simplified method. Our observations show that our procedures achieved symmetry in both eyes in all patients, and there have been no remarkable complications.

3117. Lefebvre, J., et al. (1972). "[Sodium loss of probable central origin after cranio-cerebral bullet injury]." Perte de sel d'origine centrale probable apres plaie cranio-cerebrale par balle. **33**(1): 73-82.

3118. Legge, R. H., et al. (1992). "Hypertropia following trochlear trauma." Journal of pediatric ophthalmology and strabismus **29**(3): 163-166.

Hypertropia following trauma to the trochlea is rare. The more widely recognized response of the trochlea to trauma is hypotropia or acquired Brown syndrome. We observed three cases of hypertropia following penetrating trauma to the trochlea. Each had computerized tomography and/or magnetic resonance imaging to assist in the understanding of the mechanism of the observed superior oblique dysfunction. The clinical course of these cases was variable. Awareness of the damaged trochlea's capacity to respond as a hypertropic as well as a hypotropic syndrome will allow for improved management of these unusual patients.

3119. Lehr, H. B. and W. T. Fitts, Jr. (1969). "The management of avulsion injuries of soft tissue." The Journal of trauma **9**(3): 261-273.

3120. Lei, B., et al. (2011). "Xenon protects against brain injury in both ischemic and hemorrhagic stroke." Journal of neurosurgical anesthesiology **23**(4): 403.

Introduction: Low dose xenon (Xe, eg, 30% inhaled) offers rapid blood brain barrier (BBB) penetration, negligible effects on blood and intracranial pressure, and weak neuroprotective efficacy. Moderate therapeutic hypothermia (33 to 341C) has shown benefit against a variety of brain insults, but requires mechanical ventilation. Mild hypothermia (eg, 361C), while clinically feasible to achieve in awake patients, offers negligible neuroprotection.1 In this study, we hypothesized that combined post-ischemic administration of Xe and mild hypothermia would offer neuroprotection superior to either treatment alone in a rat transient middle cerebral artery occlusion (MCAO) model. This would allow simple therapeutic intervention to be available to a larger fraction of patients. Because Xe could be used as an emergency stroke treatment, it is important to determine whether it could exacerbate intracerebral hemorrhage (ICH), which could initially present as occlusive vascular stroke. Xe has no known effect on coagulation. Therefore we hypothesized that xenon would not worsen outcome from experimental ICH. Methods: Male Wistar rats (250 to 275 g) were subjected to 70 minutes MCAO with pericranial temperature held at 37.51C. At 90 minutes post- MCAO, rats (n=20 per group) were randomly assigned to experimental groups to breath 30% Xe in 30% O2/40% N2 or 30% O2/70% N2 for 20 hours while with pericranial temperature maintained at 37.51C or 361C. Neurological function and total cerebral infarct volumes were evaluated at 4 weeks post-ischemia. Male C57BL/6 J mice (10 to 12 wk) were used to study ICH. Type IV-S Clostridial collagenase (0.075U in 0.4 mL NS) was microinjected into the left striatum. At 2 hours after injection, mice were randomly treated with 30% Xe in 30% O2/40% N2 or 30%O2/70% N2 for 20 hours. Brain water content (n=4 to 5 per group) was assessed 24 hours after injury. Rotorod latencies (n=7 to 9 per group) were measured for 7 days after injury. Results: There was a main effect for treatment group for MCAO infarct size [(37.5/No Xe=224±51mm3, 36.0/No Xe=177±72mm3, 37.5+Xe=212±76mm3, 36.0+Xe=157±82mm3, P=0.015). Between group differences were present only for 37.5/No Xe vs. 36.0+Xe, P=0.04). An identical pattern was present for neurologic score (37.5/ No Xe vs. 36.0+Xe, P=0.005). In the ICH study, compared with air, Xe significantly decreased whole brain water content from 80.19%±0.14% to 79.3%±0.29% (P=0.038), and improved neurologic function (P<0.01, Fig. 1). Conclusion: Sub-anesthetic doses of post-ischemic Xe served as a therapeutic adjuvant to mild hypothermia in the context of focal cerebral ischemia with long-term efficacy. Xe did not worsen ICH. In fact, outcome was improved. This is consistent with prior demonstration of attenuated perivascular inflammation by Xe.2 Neuroprotective effects of Xe in both ischemic and hemorrhagic stroke provide evidence that Xe has therapeutic potential and could be started immediately before a computed tomography scan.

3121. Leicht, J., et al. (2020). Penetrierendes Schadelhirntrauma mit Verletzung des Sinus transversus durch Hundebisse bei einem Kleinkind. **192**(1): 79-81.

3122. Leite Cavalcanti, A., et al. (2012). "Injuries to the head and face in Brazilian adolescents and teenagers victims of non-natural deaths." The Journal of forensic odonto-stomatology **30**(1): 13-21.

This study aimed to evaluate the occurrence of injuries to the head and face in adolescent and teenager victims of non-natural deaths. A retrospective study was undertaken by the analysis of medical forensic reports obtained from medical forensic examinations performed at the Department of Forensic Medicine of the city of Campina Grande, PB, Brazil, between January 2003 and December 2007. From a total of 607 reports issued during this time span, the study sample consisted of 423 reports (69.6%) referring to adolescents and teenagers of both genders, aged 12 to 18 years, who were confirmed to have died from external causes. The causes of death were encoded according to the Chapter XX of the International Statistical Classification of Diseases and Related Health Problems (ICD-10). The majority of victims were 17 year old males (25.8%). Firearms (33.3%) and transport accidents (32.2%) were the most common causes of death, with boys showing a 3.7 times greater likelihood of getting killed by firearms than girls. There was statistically significant relationship between the occurrence of transport accidents and gender. The majority of victims (71.6%) presented with multiple injuries throughout the body. There was statistically significant relationship between the occurrence of transport accidents and the presence of multiple injuries. A high percentage of the victims presented with injuries to the head and face. There was statistically significant relationship between the occurrence of transport accidents and the presence of injury to the head. Fatal gunshot wounds and transport accidents were the main causes of death of male adolescents and teenagers. The victims presented with multiple injuries, especially to the head and face, and the mandible was the most frequently injured facial bone. .

3123. Leivo, T., et al. (2014). "Sports-related eye trauma." Acta ophthalmologica **92**: 15.

Purpose: To present the epidemiology, treatment and outcome of sports-related eye injuries. To give recommendations for the use of protective eye-wear. Methods: All new sports-related eye injury patients in Helsinki University Eye Hospital in one year (2011-2012). Epidemiological, clinical and resource use data from the hospital records, completed by a patient questionnaire. Follow-up 3 months. Statistical analysis of the data. Results: One hundred and forty-nine 149 sports injury patients. Floorball caused 47, football 19, tennis 15, ice-hockey 12, cycling 8, badminton 7, basketball, baseball and combat sports 6 eye traumas. Relative to sports participation rate, injuries were commonest in rink bandy, floorball and tennis. Contusion was the primary diagnosis in 114 cases, followed by lid trauma, orbital trauma and penetrating injury. 32% of contusion patients had severe secondary diagnoses. Number of outpatient visits was 459, inpatient days 25. 23 patients needed major, 12 minor surgery. Sick leave days were 1220, physical activity restriction 2982. Seventeen patients had permanent functional impairment. Relative to the number of injuries, a permanent impairment was significantly commonest in ice-hockey. 18 cases were in OTS classes 1-3. 7 patients used protective eye-wear, 4 in ice-hockey. Compared to previous data, the number of eye injuries had statistically significantly declined in floorball, badminton, rink bandy and squash, increased in tennis and ice-hockey. In floorball in under 14 years' age group, where protective eye-wear had meanwhile been made mandatory; 11 (2002-03) vs 1 (current) eye trauma was observed. Conclusions: Floorball is the leading eye injury causing sport in Finland. Protective eye- wear in junior floorball has been effective in preventing injuries and should be mandatory in all age groups. In icehockey eye injuries are in incline, relatively severe and a third of injuries incurred in spite of eye mask. The proper use of the mask should be emphasised and the masks further developed.

3124. Lekas, M. D. and P. T. Welch (1984). "Reconstruction of post-traumatic sinus osteomyelitis." The Laryngoscope **94**(10): 1277-1280.

Osteomyelitis with a fistulous tract of the left fronto-nasal area. The patient received an Anzio Beachhead WW II right fronto-nasal injury repaired with a lucite cranioplasty. A staphylococcal infection involved the remnant of the left frontal sinus with a fistula at the nasion near the orbital ridge. Bone scan revealed increased activity consistent with osteomyelitis. Patient was treated with intravenous oxacillin. The lucite skull prosthesis was removed 2 weeks after admission via the bilateral osteoplastic coronal flap approach with fat obliteration of the residual frontal sinus. The intravenous oxacillin was maintained for 48 days and the patient was discharged. The patient was later readmitted for a cranioplasty using a preformed tantalum plate. The nasal flange of the tantalum caused a deformity that did not allow

the patient to wear his glasses. His third admission was for reconstruction of the tantalum and nasal deformity via a W-shaped incision.

3125. Lekgwara, P., et al. (2019). "Predicting dural tear in patients will skull fractures secondary to assault." Interdisciplinary Neurosurgery: Advanced Techniques and Case Management **18**.

Aim: Skull fractures of the calvarium associated with a dural tear are regarded as neurosurgical emergencies to prevent potentially devastating infective complications. We aimed to determine the significance of pre-operative clinical and radiological variables in predicting dural tear in 135 patients admitted over a 2 year period with skull fractures secondary to assault whom went for operative intervention. Methods: Retrospective data analysis of 135 patients admitted with skull fractures secondary to assault from January 2015–December 2016 was performed. Medical records were analyzed for patient demographics, mechanism of injury, CT scan findings, pre-operative suspicion including evidence for this suspicion of a dural tear, operative confirmation of a dural tear, and Glasgow Outcome Score. Management involved surgery with antibiotic cover. Results: Considering the mechanism of injury being assaulted with a brick was significantly associated with the absence of a dural tear and being stabbed in the head with significantly associated with the presence of a dural tear ($p = 0.02$). On bivariate analysis having a depressed skull fracture ($p = 0.002$), pneumocephalus ($p = 0.02$) or an intracerebral hematoma ($p = 0.001$) were each statistically associated with the operative confirmation of a dural tear. Neither the combined presence of a skull fracture with an acute subdural hematoma or an intracerebral contusion was statistically associated with an intra-operative dural tear. Conclusion: In patients with a skull fracture secondary to assault considering the mechanism of injury being assaulted with a brick significantly excluded, and being stabbed in the head significantly predicted, the intra-operative finding of a dural tear. Considering pre-operative radiology having a depressed skull fracture, pneumocephalus, or intracerebral hematoma were each significant predictive variables of there being an intra-operative dural tear.

3126. Lelubre, C. and F. S. Taccone (2016). "Transfusion strategies in patients with traumatic brain injury: Which is the optimal hemoglobin target?" Minerva anestesiologica **82**(1): 112-126.

Robertson et al. (JAMA 2014; 312:36-47) investigated the effects of two different thresholds of hemoglobin (Hb) to guide red blood cells transfusions (RBCT; 7 g/dL vs. 10 g/dL) in patients suffering from traumatic brain injury (TBI). In a two-center, controlled, open-label trial (from May 2006 and August 2012), comatose patients with a closed TBI were randomized within 6 hours since initial resuscitation to one of the two RBCT strategies and, in a factorial design (2x2), to receive erythropoietin (EPO) or placebo. Patients were excluded if they had a Glasgow Coma Scale (GCS) score of 3 with fixed and dilated pupils, penetrating trauma, pregnancy, life-threatening systemic injuries and severe preexisting diseases. A total of 200 patients (7 g/dL with [N.=49] or without EPO [N. =50]; 10 g/dL with [N.=53] or without EPO [N.=48]) were enrolled among 598 who were screened. There was no interaction between EPO and Hb thresholds on the primary outcome, which was the occurrence of favorable neurological outcome, assessed using the Glasgow Outcome Scale (GOS) at 6 months after the injury (favorable=GOS 4-5). Favorable outcome was similar between patients included in the 7 g/dL (37/87-43%) and the 10 g/dL group (31/94-33%) as if receiving EPO or placebo, even after adjustment for several covariates. Thromboembolic events were significantly more frequent in the group transfused at 10 g/dL (22/101 [22%] vs. 8/99 [8%]; P=0.009). We discussed how theses results might influence the management of such patients as well as the methodological limitations that underline the need for further investigations.

3127. Lemke, S., et al. (2016). "Automated Perimetry and Visual Dysfunction in Blast-Related Traumatic Brain Injury." Ophthalmology **123**(2): 415-424.

PURPOSE: To evaluate feasibility and results of automated perimetry in veterans with combat blast neurotrauma., DESIGN: Prospective, longitudinal, observational case series., PARTICIPANTS: Sixty-one patients in a Veterans Affairs Polytrauma Center diagnosed with traumatic brain injury (TBI) from combat blast exposure., METHODS: Study participants underwent automated perimetry at baseline (median interval, 2 months after injury) (Humphrey Field Analyzer, Carl Zeiss Meditec, Dublin, CA, Swedish Interactive Threshold Algorithm 30-2 Standard or Fast), and 36 of them were followed up (median interval, 10 months after baseline). Presence of significant mean deviation and pattern standard deviation was determined for testing with reliability indices <=20% for fixation loss, 15% for false-positives, and 33% for false-negatives. Test-retest stability of global visual field indices was assessed for tests with these cutoffs or with elevated fixation loss. Associations between global visual field defects and predictors were examined., MAIN OUTCOME

MEASURES: Global visual field indices (mean deviation and pattern standard deviation)., RESULTS: Among 61 study participants (109 study eyes) with baseline testing, a field that met reliability cutoffs was obtained for 48 participants (79%) and 78 eyes (72%). Fixation loss was found in 29% of eyes in initial testing. Nine study participants (15%) demonstrated hemianopia or quadrantanopia, and an additional 36% had an abnormal global visual field index. Global indices were relatively stable at follow-up testing for tests meeting fixation-loss cutoffs and tests that did not. Visual scotomas due to post-chiasmal lesions were associated with moderate to severe TBI or penetrating head injury, but other visual field deficits were prevalent across the range of mild to severe TBI. Ocular injury to the retina or choroid, poorer visual acuity, and pupillary defect were associated with visual field defects. Participants with depressed visual field sensitivity reported lower visual quality of life., CONCLUSIONS: Reliable automated perimetry can be accomplished in most patients with TBI from combat blast exposure and reveals high rates of visual field deficits, indicating that blast forces may significantly affect the eye and visual pathways. Copyright Published by Elsevier Inc.

3128. Lengenfelder, J., et al. (2022). "Attention in Pediatric Traumatic Brain Injury and the Impact on Social Functioning." Brain injury **36**(SUPPL 1): 104.

Objective: Cognitive deficits following traumatic brain injury (TBI) in children often involve difficulties in attention. Studies report varying percentages of attentional impairments in pediatric TBI (pTBI) based on the severity of the injury. Additionally, some children receive a diagnosis of secondary attention deficit hyperactivity disorder (ADHD) when they have not had any attentional deficits prior to their brain injury. Because of the prevalence of attention problems following TBI and their impact on academic and functional outcomes, understanding the specific nature of attention problems is critical. The current study examines different aspects of attentional performance in pTBI and evaluates the impact of attentional deficits on social functioning. Participants/Methods: 21 children with TBI, (age: M = 11.71, SD = 3.72) and 22 typically developing children (TDC; age: M = 10.95, SD = 3.12) completed the TEA-ch subtests Creature Counting, Walk, Don't Walk, and Code Transmission. Parents completed the Social Responsiveness Scale (SRS) and the Social & Communication Disorders Checklist (SCDC) Results: Results indicate a significant difference between children with TBI and TDC on the scaled scores for Code Transmission (F[1,40] = 8.84,p = .005) but not for Walk, Don't Walk (F[1,40] = 1.56,p = .219) and Creature Counting (F[1,40] = 1.92,p = .173). Performance on Code Transmission is correlated with parental evaluations of social ability (SRS; r-.519, p = .001) and social communication traits (SCDC; r = -.446, p = .004). Conclusions: The results suggest that children with TBI differ from TDC in sustained attention on a task requiring the ability to continuously attend to a series of spoken numbers listening for a particular sequence. No differences were found on other attentional measures that require attention control/switching or a shorter sustained attention and task requiring response inhibition. Additionally, sustained attention performance was related to parental ratings of social functioning, indicating that attentional problems may have implications for a child's social success. Understanding the specific nature of attentional impairments can guide targeted interventions for pTBI and evaluating whether such interventions can also contribute to improvements in social functioning would also be important to evaluate.

3129. Lenz, J.-H., et al. (2003). "Reconstruction of the frontal calvarian continuity in a child using a freeze-preserved autogenous bone graft." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **31**(3): 154-158.

Today, extended craniofacial defects in childhood can be treated by using modern techniques of bone banking and osteosynthesis, of particular importance when the restoration needs to consider calvarial growth. This is a report of an 8-year-old boy whose right frontal bone was removed during primary multidisciplinary trauma care. The bone was stored at a tissue bank using sterilization and freeze-dried preservation. Nine months later the graft was replaced and fixed with resorbable miniplates. Postoperatively no complications were observed and the (auto)graft has taken well. There was symmetrical craniofacial growth as well as a good aesthetic result three years after reconstruction.

3130. Leo, C., et al. (1969). "[Cranio-cerebral open injury from a nailing gun]." Trauma aperto cranio-encefalico da pistola chiodatrice. **25**(2): 271-277.

3131. Leone, A., et al. (2021). "Sinking bullet syndrome: A unique case of transhemispheric migration." Clinical neurology and neurosurgery **204**: 106607.

BACKGROUND: Spontaneous migration of retained intracranial bullet fragments is an increasingly recognized phenomenon. However, such migration is usually limited in extent, since it occurs along the bullet tract or cerebrospinal fluid (CSF) spaces. Transhemispheric migration through an intact cerebral hemisphere has not been previously reported., OBSERVATIONS: A 20-year old man sustained a gunshot wound (GSW) to the head with a left parieto-occipital entry point, resulting in retained bullet fragments within the anterior right frontal lobe. The patient developed medically refractory intracranial hypertension, necessitating a left decompressive hemicraniectomy. He exhibited a favorable postoperative course, with gradual neurologic recovery, and was ultimately discharged to a rehabilitation facility. Notwithstanding, serial head CT scans during the first 2 weeks revealed gradual transhemispheric migration of bullet fragments from the right frontal pole to the right occipital pole, traveling through largely intact, uninjured brain tissue., LESSONS: Transhemispheric migration of bullet fragments via intact brain tissue may rarely occur. While the exact mechanisms underlying this phenomenon remain unclear, potential factors may include: bullet weight, CSF pulsations, dissection through white matter tracts, and biomechanical effects of large skull defects. Bullet migration does not necessarily delay or prevent neurologic recovery.

3132. Leone, H. and B. W. Polsonetti (2005). "Amantadine for traumatic brain injury: does it improve cognition and reduce agitation?" Journal of clinical pharmacy and therapeutics **30**(2): 101-104.

OBJECTIVE: To review the available literature pertaining to amantadine as therapy for improving cognition and reducing agitation following a non-penetrating traumatic brain injury (TBI)., DATA SOURCES: Clinical literature was accessed through MEDLINE (from 1966 to February 2004) and bibliographic searches. Key search terms included 'amantadine', 'traumatic brain injury', 'cognition', and 'agitation'., DATA SYNTHESIS: Amantadine is primarily used for treatment and prophylaxis of influenza A. Its ability to improve mentation and motor function in patients with head injury remains questionable. An evaluation of five clinical trials, two case reports, and one case series is conducted focusing on the use of amantadine following TBI. Patients in clinical trials were assessed using a variety of neuropsychological tools aimed at, among other things, assessing cognition and agitation. Although individual patient results varied, the majority of patients studied showed improved neuropsychological test scores. Similar observations are noted in the case reports and case series. Improvement in cognition and reduced agitation seems to occur with post-injury amantadine therapy., CONCLUSIONS: Amantadine is a reasonable option for improving cognition and reducing agitation following a TBI but confirmatory evidence of the efficacy the drug is necessary.

3133. Leonessa, F., et al. (2011). "Identification of potential novel plasma biomarkers of closed head and penetrating ballistic traumatic brain injury by comparative count of unique peptides." Journal of neurotrauma **28**(6): A75.

OBJECTIVE: To identify novel potential candidate biomarkers of closed head and ballistic penetrating traumatic brain injury (TBI). METHODS: Plasma samples were collected transcardially at euthanasia from one hundred four Sprague-Dawley 15 min, and1, 6, 24 and 72 hours following lateral fluid percussion, penetrating ballistic brain injury or the respective control treatments (sham, anesthesia only and naïve). Each experimental group, as defined by injury/equivalent and survival time included 5-7 rats. Following abundant protein depletion, samples were digested with sequencing grade modified trypsin. Strong cation exchange fractions of the protein plasma digests were then analyzed by liquid chromatography-tandem mass spectrometry. Proteins were identified by at least two unique peptide sequences. Potential candidate biomarkers of TBI were identified by comparing the number of unique peptides per protein across different experimental groups. Potential candidates were prioritized by statistical significance of differences and biological significance. RESULTS: 10,217 proteins were identified by at least two unique sequences across 104 plasma samples; 1500-2500 proteins per sample. Based on the results, we have identified 24 nervous tissue proteins as potential novel candidate biomarkers of closed head and/or penetrating ballistic TBI. CONCLUSIONS: As an alternative for the preliminary identification of candidate biomarkers, a comparative count of unique peptide sequences detected per protein has the potential advantages of allowing for the comparative screen of a wider number of proteins, and of an intrinsic bias against more abundant proteins. Ongoing evaluations with antibody-based assays are aimed to obtain proof of concept for the validity of this identification approach, as well to verify some of the identified proteins as novel candidate biomarkers of TBI.

3134. Leonhard, M. J., et al. (2015). "Urban/Rural disparities in Oregon pediatric traumatic brain injury." Injury Epidemiology **2**(1): 1-10.

Background: Traumatic brain injury (TBI) greatly contributes to morbidity and mortality in the pediatric population. We examined potential urban/rural disparities in mortality amongst Oregon pediatric patients with TBI treated in trauma hospitals. Methods: We conducted a retrospective study of children ages 0–19 using the Oregon Trauma Registry for years 2009–2012. Geographic location of injury was classified using the National Center for Health Statistics Urban/Rural Classification Scheme. Incidence rates were calculated using Census data for denominators. Associations between urban/rural injury location and mortality were assessed using multivariable logistic regression, controlling for potential confounders. Generalized estimating equations were used to help account for clustering of data within hospitals. Results: Of 2794 pediatric patients with TBI, 46.6 % were injured in large metropolitan locations, 24.8 % in medium/small metropolitan locations, and 28.6 % in non-metropolitan (rural) locations. Children with rural locations of injury had a greater annualized TBI incidence rate, at 107/100,000 children per year, than those from large metropolitan areas (71/100,000 per year). Compared to children injured in urban locations, those in rural locations had more than twice the crude odds of mortality (odds ratio [OR], 2.5; 95 % CI, 1.6–4.0). This association remained significant (OR, 1.8; 95 % CI, 1.04–3.3) while adjusting for age, gender, race, insurance status, injury severity, and type of TBI (blunt vs. penetrating). Conclusion: We observed higher rates of TBI and greater proportions of severe injury in rural compared to urban areas in Oregon. Rural children treated in the trauma system for TBI were more likely to die than urban children after controlling for demographic and injury factors associated with urban/rural residence. Further research is needed to examine treatment disparities by urban/rural location. Future work should also identify interventions that can reduce risk of TBI and TBI-related mortality among children, particularly those who live in rural areas.

3135. León-Moreno, L. C., et al. (2020). "Kinematic Changes in a Mouse Model of Penetrating Hippocampal Injury and Their Recovery After Intranasal Administration of Endometrial Mesenchymal Stem Cell-Derived Extracellular Vesicles." Frontiers in Cellular Neuroscience **14**.

Locomotion speed changes appear following hippocampal injury. We used a hippocampal penetrating brain injury mouse model to analyze other kinematic changes. We found a significant decrease in locomotion speed in both open-field and tunnel walk tests. We described a new quantitative method that allows us to analyze and compare the displacement curves between mice steps. In the tunnel walk, we marked mice with indelible ink on the knee, ankle, and metatarsus of the left and right hindlimbs to evaluate both in every step. Animals with hippocampal damage exhibit slower locomotion speed in both hindlimbs. In contrast, in the cortical injured group, we observed significant speed decrease only in the right hindlimb. We found changes in the displacement patterns after hippocampal injury. Mesenchymal stem cell-derived extracellular vesicles had been used for the treatment of several diseases in animal models. Here, we evaluated the effects of intranasal administration of endometrial mesenchymal stem cell-derived extracellular vesicles on the outcome after the hippocampal injury. We report the presence of vascular endothelial growth factor, granulocyte–macrophage colony-stimulating factor, and interleukin 6 in these vesicles. We observed locomotion speed and displacement pattern preservation in mice after vesicle treatment. These mice had lower pyknotic cells percentage and a smaller damaged area in comparison with the nontreated group, probably due to angiogenesis, wound repair, and inflammation decrease. Our results build up on the evidence of the hippocampal role in walk control and suggest that the extracellular vesicles could confer neuroprotection to the damaged hippocampus.

3136. Lepić, M., et al. (2021). "Migration of the retained intracranial bullet to the spinal canal: A case report." Vojnosanitetski pregled **78**(10): 1103-1107.

Introduction. Retained intracranial missiles migration is rarely reported. Most of the time, the missile will migrate and remain intracranially, but in extremely rare cases, it may reach the spinal canal. The aim of the study was to present a patient with this rare clinical entity. Case report. The 29-years-old male suffered from the gunshot wound to the head through the left external auditory meatus. The bullet was located in the posterior fossa. Initial debridement without bullet removal was performed. Four months after the injury, the patient came back complaining of neck stiffness and progressive weakness of all extremities. Plain radiography revealed the bullet in the spinal canal at the level of C2 vertebra and computed tomography confirmed localization in the posterior aspect. An emergency procedure was performed for bullet removal and spinal cord decompression. Conclusion. The bullets tend to migrate. Migration to the spinal canal is rare, but takes a significant risk, due to the potential secondary injury. The removal of a bullet at-all-costs

may not be justified. However, the prediction of migration based on the predisposing factors would be of great value to treating these patients adequately.

3137. Lepoire, J., et al. (1966). "[Apropos of 2 nonfatal cases of transfixing wounds of the brain stem]." A propos de deux cas non mortels de plaies transfixiantes du tronc cerebral. **38**(4): 176-185.

3138. Leroux les Jardins, S., et al. (1989). "[Epikeratophakia: results in young patients with unilateral, post-traumatic aphakia using a congelated then dehydrated corneal lenticule (the Mac Donald, Kaufman technic)]." Epikeratophakies: resultats obtenus chez des aphakes jeunes unilateraux, post-traumatiques avec un lenticule de cornee congelee puis deshydratee (technique de M. Mac Donald, H. Kaufmann). **89**(6-7): 811-818.

We performed 11 epikeratophakias with a congelated lenticule (H. Kaufmann and M. Mac Donald technique) for aphakic post-traumatic eyes. The results have been good for the cicatrisation, and the visual result.

3139. Leshko, N., et al. (2022). "Characterization of antibiotic prophylaxis in traumatic facial fractures at a level i trauma center." Critical care medicine **50**(1 SUPPL): 788.

INTRODUCTION/HYPOTHESIS: While prophylactic antibiotics may reduce the risk of infection and promote healing in select traumatic facial fractures, recent guidelines recommend against routine the use in non-operative management as well as continuation for beyond 24 hours in the operative setting. At our institution, a lack of standardization has been observed with antibiotic prophylaxis in traumatic facial fractures as it relates to fracture type and duration of therapy. The objective of this study was to characterize antibiotic prophylaxis use within this population. METHODS: This retrospective study included patients admitted between June 2018-2020 with traumatic facial fractures due to blunt or penetrating injury and receipt of prophylactic antibiotics. The primary objective assessed the use of antibiotic prophylaxis as it relates to type and duration in non-surgical and surgical management. Secondary outcomes evaluated the incidence of infection at the fracture site(s), infections attributed to antibiotic exposure, and the cost of total antibiotic use. Data was analyzed through descriptive statistics. RESULTS: Of 107 patients screened, 63 were included. Baseline characteristics consisted of a majority male (64%) population aged 45 ± 20 years with fractures due to blunt injury (89%). The median number of fractures per patient was 4 [2-8] commonly located in orbital (25%), maxillary (24%), and nasal (17%) areas and managed non-surgically (60%). Most patients (52%) received a median inpatient course of ≤ 5 days; of this cohort, 59% received an outpatient course for an additional ≥ 7 days. Patients undergoing surgical fixation received a longer median inpatient course compared to those treated non-surgically (10 vs 4 days). The average patient spent $224 for an antibiotic course. No documented infections were identified at the site(s) of injury. Two patients were diagnosed with Clostridioides difficile. CONCLUSION: Patients with traumatic facial fractures were likely to receive extended prophylaxis for approximately eleven days more than current recommendations. Following presentation of the project results, a stewardship guideline limiting prophylaxis to the peri-operative setting was implemented. Future steps include post-implementation assessment of the guideline.

3140. Lesieur, O., et al. (2006). "Retained knife blade: an unusual cause for headache following massive alcohol intake." Emergency medicine journal : EMJ **23**(2): e13.

Massive alcohol intake usually resolves in a banal headache. We report a case of a patient presenting with acute alcohol intoxication in which the ensuing "hangover" was due to a knife blade deeply retained in the brain parenchyma. This case underlines the unpredictability of retained foreign bodies without a high level of suspicion and a detailed description of the circumstances of admission.

3141. Lesperance, K., et al. (2008). "The significance of penetrating gluteal injuries: an analysis of the Operation Iraqi Freedom experience." Journal of surgical education **65**(1): 61-66.

BACKGROUND: Although penetrating gluteal injuries rarely are life-threatening, the risk for concomitant injury to regional anatomic structures warrants additional evaluation. We analyzed factors affecting the management and outcomes of these injuries., METHODS: Retrospective analysis of prospectively collected data from the 31st Combat Support Hospital during Operation Iraqi Freedom over a 16 month period., RESULTS: From 3442 patients, 115 patients

(3.3%) suffered penetrating gluteal injuries. They were predominately male (98%) with a mean injury severity score of 13. Mortality was 6% (n = 7). Primary mechanisms of injury were improvised explosive devices (41%) and gunshot wounds (59%). Associated injuries were present in 57% of patients [orthopedic (35%), abdominal (29%), rectal (25%), vascular (21%), genitourinary (14%), pulmonary (11%), sphincter (9%)]. Overall, 76% required surgical management, with 14% developing postoperative complications. In total, 27 patients (24%) required stoma placement. Gunshot wounds were associated with through and through injuries (43% vs 6%, $p < 0.01$), rectal injury (35% vs 11%, $p < 0.05$), and stoma placement (32% vs 11%, $p < 0.05$). Blast injuries were associated with a higher mean transfusion requirement (11 vs 6 units, $p < 0.05$), increased length of stay (14 vs 9 days, $p < 0.05$), and traumatic brain injury (24% vs 6%, $p < 0.05$). Independent predictors of a need for stoma placement were gunshot wounds (odds ratio = 10, $p < 0.05$) and injury severity score greater than 20 (odds ratio = 27, $p < 0.01$)., CONCLUSIONS: Penetrating gluteal injuries are associated with significant damage to local structures. Gunshot wounds carry a higher risk of injury to the rectum and stoma placement, whereas blast injuries are associated with less local injury and more multisystem trauma.

3142. Leung, A., et al. (2020). "Transcranial magnetic stimulation for persistent post-traumatic headache-an INS/NANS expert consensus panel review and recommendation." Neuromodulation **23**(3): e35.

Introduction: The US Center for Disease Control and Prevention (CDC) estimated the prevalence of new traumatic brain injury (TBI) cases in the United States at over 1.7 million every year1. Persistent Post-Traumatic Brain Injury (PTBI) Related Headache (PTBI-HA) is one of the most common debilitating chronic pain conditions in patients after a mild/moderate traumatic brain injury. This high prevalence (>60%) of persistent chronic headache is often associated with neuropsychological dysfunction in mood, attention, and memory, which casts a profound negative impact on patients' quality of life and increases stress in their caregivers. Unfortunately, conventional pharmacological treatments for PTBI-HA have not been shown to be effective 2-4. As part of the effort by the international non-invasive neuromodulation community to address the opioid epidemic and under the guidance of a steering committee composed of leadership from both the International Neuromodulation Society(INS) and the North American Neuromodulation Society(NANS), this multi-disciplinary expert panel aims to:1) assess and rate the existing outcome evidence of repetitive Transcranial Magnetic Stimulation (rTMS) in managing PTBI-HA; and 2) provide TMS treatment recommendation/guideline for the PTBI-HA. Methods: A five-member expert task group was established under the guidance of a five-member INS/NANS steering committee to assess the utilization of rTMS in the treatment of PTBI-HA. Individual studies were first rated by the guideline established by American Academy of Neurology Classification of Evidence for Therapeutic Studies. The overall clinical evidence was then rated based on Type of Study Design and Level of Certainty, and recommendation was provided based on the US Preventive Service Task Force (USPSTF) and Centers for Disease Control and Prevention (CDC) criteria. Results: Based on the existing clinical outcome evidence for the shortterm efficacy (1-2 month) in alleviating PTBI-HA symptoms, the majority of the task group members rated the Study Design as I (Randomized Controlled Trials) for TMS at M1 or left LDLPFC, Level of Certainty in Evidence as High for PTBI-HA. The task group also rated USPSTF recommendation as A (Extremely Recommendable) and CDC recommendation as IA (Strongly Recommended) for the clinical implementation of the rTMS at either M1 or left LDLPFC for mild PTBI-HA with the latter being considered as alternate treatment location for patients with PTBI-HA and co-morbid severe depression Conclusion: After reviewing the existing literature, the panel concluded that the level and scope of evidence for rTMS in managing PTBI-HA is High and the treatment is Strongly Recommendable for the condition. (Figure Presented).

3143. Leung, L. Y., et al. (2017). "Differential effects of resuscitation strategies on coagulopathy following traumatic brain injury and hemorrhagic shock." Journal of neurotrauma **34**(13): A21.

This study examined the changes in blood coagulation profiles in rats exposed to penetrating ballistic-like brain injury (PBBI) combined with hemorrhagic shock (HS), and compared the effect of resuscitation with Hextend, Lactated Ringer's solution (LR) or whole blood (WB) on post-injury coagulation. Rats were assigned into three groups: Hextend, LR, and WB. All animals received a frontal PBBI followed by a 35-minute of HS (mean arterial pressure < 45mmHg). In the Hextend and LR groups, resuscitation fluid was infused followed by shed blood reinfusion. In WB group, shed blood was re-infused 15 minutes after the hypotensive period. Blood samples were analyzed using thromboelastography (TEG) and blood gas analyzer at four time points: Pre-injury baseline, post-PBBI, post-HS, and after the infusion of Hextend, LR or WB. TEG parameters included Reaction Time (R), Kinetics Time (K), Angle (a) and Maximum Amplitude (MA). R was significantly reduced vs. baseline by both PBBI and HS. K was significantly shorter and a was significantly greater

immediately following PBBI and HS vs. baseline. MA was significantly greater following PBBI vs. either baseline or post-HS. Hextend, LR and WB produced different coagulation profiles after PBBI and HS insults. Hextend resulted in a significantly smaller a ($p < .05$ vs. WB) and MA ($p < .05$ vs. Baseline and WB), indicating that Hextend infusion leads to a slower coagulation rate and reduced clot strength. In contrast, the parameters in LR and WB groups were comparable to the baseline values. Blood gas analysis revealed a significant reduction in hemoglobin and hematocrit following HS and PBBI, which were restored to baseline levels by WB resuscitation. On the contrary, a significant decrease ($p < .05$ vs. baseline or WB) in ctHb and Hct as well as an increased lactate level were detected following LR or Hextend resuscitation. The current results show that PBBI altered the coagulation parameters, which returned to the baseline levels after LR or WB resuscitation whereas Hextend resuscitation after PBBI/HS resulted in hypocoagulation.

3144. Leung, L. Y., et al. (2016). "Cardiac baroreflex responses in a rat model of penetrating ballistic-like brain injury (PBBI) with hypoxemia and hemorrhagic shock." Journal of neurotrauma **33**: A133.

This study examined the temporal change in cardiac baroreflex response following severe traumatic brain injury (TBI) with or without additional hypotensive/hypoxemic insults. Rats were randomly assigned into three groups ± sham craniotomy only, 10% PBBI only, and PBBI combined with hypoxemia/hemorrhagic shock (PHH). The PHH group received 30-min hypoxemia (fraction of inspired oxygen = 0.1) and then 30-min hemorrhagic hypotension (mean arterial pressure = 40mmHg) following PBBI. To assess the baroreflex function, phenylephrine was injected via femoral vein catheter with a sequential dosing regimen of 2, 1, 0.5, 5, 10 lg/kg. Systolic blood pressure (SBP) and electrocardiogram were recorded. Twenty minutes after the last dose of phenylephrine, the dosing regimen was repeated. This phenylephrine pressor test was performed on the injury day (day 0), and again on 1 and 5 days postinjury. A linear regression line of heart period (R-R interval from the electrocardiogram) against SBP was plotted for each test, in which the slope of the line was taken as an index of baroreflex sensitivity (BRS). Additionally, heart rate was derived from the electrocardiogram recordings. In PBBI and PHH group, BRS was higher than that in the sham group at all time points. While BRS remained steady in the sham control group (ranged 0.26 ± 0.08 -0.36 ± 0.11 ms/mmHg) throughout the experiment, it exhibited a gradual increase in the PBBI group with the peak (0.65 ± 0.15 ms/ mmHg) occurring at day 5 post-injury. In contrast, a decreasing trend was observed in the PHH group, in which an acute increase in BRS (0.59 ± 0.1ms/mmHg) was detected on day 0. The differences in heart rate were not significant between groups, yet PHH trended lower acutely following injury and at 5 days post-injury, indicating bradycardia. Persistent disturbance of cardiovascular responses induced by TBI and the additional insults may potentially result in reduced perfusion of the vital organs and consequently worsen the clinical outcomes.

3145. Leung, L. Y., et al. (2016). "Neurochemical changes following combined hypoxemia and hemorrhagic shock in a rat model of penetrating ballistic-like brain injury: A microdialysis study." The journal of trauma and acute care surgery **81**(5): 860-867.

BACKGROUND: Energy metabolic dysfunction is a key determinant of cellular damage following traumatic brain injury and may be worsened by additional insults. This study evaluated the acute/subacute effects of combined hypoxemia (HX) and hemorrhagic shock (HS) on cerebral interstitial levels of glucose, lactate, and pyruvate in a rat model of penetrating ballistic-like brain injury (PBBI)., METHODS: Rats were randomly assigned into the sham control, PBBI, and combined injury (P + HH) groups. The P + HH group received PBBI followed by 30-minute HX and 30 minute HS. Samples were collected from striatum (perilesional region) using intracerebral microdialysis at 1 to 3 hours after injury and then at 1 to 3, 7, and 14 days after injury. Glucose, lactate, and pyruvate were measured in the dialysate samples., RESULTS: Glucose levels dropped significantly up to 24 hours following injury in both PBBI and P + HH groups ($p < 0.05$). A reduction in pyruvate was observed in the PBBI group from 24 to 72 hours after injury (vs. sham). In the P + HH group, the pyruvate was significantly reduced from 2 to 24 hours after injury ($p < 0.05$ vs. PBBI). This prominent reduction persisted for 14 days after injury. In contrast, lactate levels were significantly increased in the PBBI group during the first 24 hours after injury and remained elevated out to 7 days. The P + HH group exhibited a similar trend of lactate increase as did the PBBI group. Critically, P + HH further increased the lactate-to-pyruvate ratio by more than twofold (vs. PBBI) during the first 24 hours. The ratio reached a peak at 2 hours and then gradually decreased, but the level remained significantly higher than that in the sham control from 2 to 14 days after injury ($p < 0.05$)., CONCLUSION: This study identified the temporal profile of energy-related neurochemical dysregulation induced by PBBI and combined injury in the perilesional region. Furthermore, combined HX and HS further reduced the pyruvate level and increased the lactate-to-pyruvate ratio following PBBI, indicating the exacerbation of posttraumatic metabolic perturbation.

3146. Leung, L. Y., et al. (2015). "Combined hypoxemic and hypotensive insults altered physiological responses and neurofunction in a severity-dependent manner following penetrating ballistic-like brain injury in rats." The journal of trauma and acute care surgery **79**(4 Suppl 2): S130-138.

BACKGROUND: Traumatic brain injury often occurs with concomitant hypoxemia (HX) and hemorrhagic shock (HS), leading to poor outcomes. This study characterized the acute physiology and subacute behavioral consequences of these additional insults in a model of penetrating ballistic-like brain injury (PBBI)., METHODS: Rats were randomly assigned into sham control, HX + HS (HH), 5% PBBI alone, 5% PBBI + HH, 10% PBBI alone, and 10% PBBI + HH groups. Mean arterial pressure, heart rate, and breathing rate were monitored continuously. In the combined injury groups, animals were subjected to 30-minute HX (Pao2, 30-40 mm Hg) and then 30-min HS (mean arterial pressure, 40 mm Hg) followed by fluid resuscitation with lactated Ringer's solution after PBBI or sham PBBI. Motor function was assessed using the rotarod task at 7 days and 14 days after injury. Cognitive function was assessed in the Morris water maze task from 13 days to 17 days after injury., RESULTS: Combined HH caused acute bradycardia that was reversed by fluid resuscitation. During HX phase, tachypnea was observed in all HH groups. Persistent bradypnea was detected in 10% PBBI + HH group during the resuscitation phase. PBBI produced significant decrements in motor performance (vs. sham and HH groups). Additional insults significantly worsened motor deficits following 5% PBBI but not 10% PBBI. Both 5% PBBI and 10% PBBI produced significant cognitive deficits in the Morris water maze task with worsened deficits evident following the more severe injury (i.e., 10% PBBI). Alternatively, rats subjected to 5% PBBI + HH exhibited cognitive impairment that was significantly worse compared with 5% PBBI alone, whereas this worsening effect was not detected in the 10% PBBI groups., CONCLUSION: This study characterized the physiological responses and neurobehavioral profiles following combined PBBI and HH. Ten percent PBBI produces motor and cognitive deficits, which may exceed a sensitivity threshold capacity. In contrast, 5% PBBI produces a lower, albeit significant, magnitude of deficits and thus provides a more sensitive screen for evaluating the cumulative effects of additional insults, which were indeed demonstrated to significantly worsen outcome.

3147. Leung, L. Y., et al. (2012). "Temporal and spatial profile of histopathological changes caused by hemorrhagic shock after penetrating ballistic-like brain injury (PBBI)." Journal of neurotrauma **29**(10): A218.

Introduction Traumatic brain injury (TBI) is often accompanied with hemorrhagic shock (HS). Evidence suggests that HS may worsen the brain insult and corresponding outcome. However, the complex neuropathological cascade of the combined injuries(TBI + HS) is poorly understood. This study examined whether HS following PBBI exacerbated histopathological outcome in different brain regions. Methods Rats were randomly assigned into four groups: Sham control(craniotomy only); PBBI; HS; PBBI + HS (n = 6/group/time point). Unilateral frontal PBBI was produced in the right hemisphere of isoflurane anesthetized rats. HS was induced by drawing blood from the tail artery to reduce mean arterial pressure to 40-45 mmHg. This hypotensive state was maintained for 60min. Lactated Ringer's solution was given as fluid resuscitation after HS. In the PBBI + HS group, HS was initiated 5 minutes after PBBI. Rats were sacrificed by transcardial perfusion at 3 and 7 days post-injury. Brains were harvested, post-fixed in 4% paraformaldehyde and cryoprotected in 20% sucrose solution. The samples were processed for Hematoxylin-Eosin (HE) staining, silver staining and immunostaining for glial fibrillary acidic protein (GFAP) for astrocyte activation. Lesion volume was quantified on HE-stained slices. Positive stained areas in silver-stained and immunostained slices were quantified using threshold analysis in cortical and subcortical regions of interest. Results Lesion volume in the PBBI + HS group was comparable to the PBBI group at 3 and 7d post-injury. At 3d post-injury, upregulation of GFAP in the hippocampus was significantly (3-fold) higher in the PBBI + HS vs. PBBI group but no significant differences in GFAP expression were detected between these 2 groups in the ipsilateral cerebral cortex, corpus callosum, striatum and thalamus. At 7d postinjury, GFAP expression in these brain regions remained elevated (compared to sham and HS) but was more pronounced in the corpus callosum and thalamus of the PBBI + HS group (compared to PBBI alone; $p < .05$). At 3d post-injury, the PBBI + HS and PBBI groups showed similar profiles of neuronal degeneration (measured by silver staining). Particularly in the corpus callosum, significantly (2-fold) more degenerated axonal fibers was observed in the PBBI + HS vs. PBBI group at 7d post-injury ($p < .05$). Notably, neurodegeneration was also evident in the contralateral hemisphere of PBBI and PBBI + HS animals. Conclusions Overall, the differential profiles of astrocyte activation and neurodegeneration in the PBBI + HS vs. the PBBI alone groups indicates that HS exacerbates the effects of PBBI producing more severe neuropathological outcome. Critically, the combined effects of PBBI + HS increased over time and were more apparent at 7 days post-injury. It has been well-established that HS reduces cerebral blood flow, depriving tissue of oxygen and nutrients and

promoting further damage to already compromised neurons and glia. Based on the current results, lesion volume analysis alone may not be sensitive enough to capture this aggravated effect. On the contrary, GFAP expression and silver staining may provide sensitive measures to detect the pathological differences between PBBI and the combined injury. Chronic effects of combined HS and PBBI injuries as well as other neuroinflammatory responses involving microglia remain to be determined.

3148. Leung, L. Y., et al. (2013). "Polytrauma and penetrating ballistic-like brain injury (PBBI): Effects of multiple secondary insults and their sequence on acute physiology, neurological deficits and mortality." Journal of neurotrauma **30**(15): A95.

Introduction TBI accompanied by additional systemic insults e.g. hemorrhagic shock (HS) and respiratory distress-induced hypoxemia (HX), gives rise to aggravated deficits in surviving casualties. Here we examined the combined effects of penetrating ballistic-like brain injury (PBBI), HS and HX and how the sequence of these insults affects physiological and neurological outcomes. Methods Rats were randomly assigned into one of 4 groups (n = 10/group): (1) PBBI, (2) PBBI + HS +HX (PBBI animals exposed to HS and then HX), (3) PBBI +HX+ HS (PBBI animals exposed to HX and then HS) or (4) PBBI + HX/HS (PBBI animals exposed to HX and HS simultaneously). Unilateral frontal PBBI (10%) was produced in the right hemisphere under isoflurane anesthesia. HS was induced by withdrawing blood from tail artery until mean arterial pressure (MAP) reached 40 mmHg. The hypotensive state was maintained for 30min, followed by fluid resuscitation. HX was induced by reducing the fraction of inspired oxygen (FiO2) to 0.10 (balanced with nitrogen) and the hypoxemic state was maintained for 30 min MAP, brain tissue oxygen (PbtO2), cerebral blood flow (CBF) and direct-current (DC) shifts were monitored simultaneously prior to injury and continuously for 2.5h. A separate cohort of animals (n = 6-10/group) was used to evaluate the mortality rate and neuroscore (up to 7 d post-injury). Results PbtO2 decreased during both HS and HX. Following HS, PbtO2 further reduced to 42%baseline level during HX in PBBI + HS +HX group. Such changes were not detected when the sequence was reversed (PBBI +HX+ HS). PBBI reduced CBF significantly in lesion core (63%) and peri-lesion region (21%). Inducing HX prior to HS after PBBI significantly decreased CBF in peri-lesion region by an additional 29% vs. PBBI alone during hypotension. Notably, while HX itself only decreased PbtO2 level but not CBF, HS prior to HX appeared to amplify the effect of HX leading to 48% reduction in CBF in lesion core and 22% in peri-lesion region during HX. Prolonged DC shifts were observed during both HS and HX in PBBI + HS +HX group, whereas in PBBI +HX+ HS group, depolarization occurred only during HX. Simultaneous HX/HS following PBBI caused persistent decrease in CBF but PbtO2 recovered shortly after resuscitation. Mortality rate in PBBI +HS+HX and PBBI +HX+HS groups was 50% and 33%, respectively. In contrast, PBBI alone or PBBI +HX/HS groups had no mortality. Neuroscores of all polytrauma groups were higher than PBBI alone group on post-injury day1-4, with the most prominent deficit seen in PBBI +HS+HX group. All surviving animals recovered gradually and showed no difference vs. PBBI alone group by day 5. Conclusions HS prior to HX produced more severe injury in the PBBI model. Studies have shown that HS with aggressive fluid resuscitation causes hemodilution and decreases oxygen-carrying capacity. This may account for the HS-induced additive effect of HX as well as the ensuing high mortality rates and significant neurological deficits. In contrast, HX prior to HS produced more modest physiological changes, as the negative effects of HX were readily resolved by restoring normoxia, posing less threat to the injured brain during the later hypotensive state. Yet, mortality and deficits were detected in PBBI +HX+HS group. PBBI + HX/HS produced the least severe injury, as HX-induced hypotension lowered the volume of blood loss to achieve the HS state. In summary, the sequence of PBBI, HX and HS resulted in distinct patterns of injury outcomes. These data provide further guidance for designing experimental TBI/polytrauma models and insights into treatment of polytrauma casualties with different injury patterns.

3149. Levenson, J. L. and A. B. Hamric (1989). "Ethical dilemmas in the treatment of patients following traumatic brain injury." Psychiatric medicine **7**(1): 59-71.

3150. Levett, D., et al. (2006). "Resuscitation fluids in trauma 1: Why give fluid and how to give it." Trauma **8**(1): 47-53.

Fluid resuscitation following trauma is necessary to restore compromised organ perfusion and hypoxic tissue damage. The activation of the Systemic Inflammatory Response Syndrome in response to both traumatic and subsequent hypoxic insults has implications for what represents the optimal fluid resuscitation strategy. There is no single resuscitation strategy that can be applied to all patients with traumatic injury. This article reviews the evidence available to help guide fluid therapy. A number of studies have suggested that timing of fluid therapy with respect to

surgical intervention is crucial. Prior to definitive treatment of injury permissive hypotension confers advantage, particularly in the setting of penetrating trauma. The situation is less clear in cases of blunt trauma, where further studies comparing restrictive with liberal fluid regimes are required. The site of injury will also influence the strategy to be adopted. Following traumatic brain injury, maintenance of cerebral perfusion pressure is likely to be of overriding importance. Once definitive surgical control of haemorrhage has been achieved, fluid therapy to maximise stroke volume and cardiac output is advised. Following the development of established critical illness, goal-directed therapy may increase mortality. © 2006 Edward Arnold (Publishers) Ltd.

3151. Levi, L. (1992). "Intracranial infection after missile injuries to the brain: report of 30 cases from the Lebanese Conflict." Neurosurgery **31**(1): 162.

3152. Levi, L., et al. (1990). "Wartime neurosurgical experience in Lebanon, 1982-85. I: Penetrating craniocerebral injuries." Israel journal of medical sciences **26**(10): 548-554.

The present report analyzes 116 penetrating wounds of the brain sustained during warfare in Lebanon during 1982-85. Two basic mechanisms of injury were encountered: high-velocity bullets, and shrapnel and stones from explosive devices; and in one case a radio antenna penetrated the head through the orbit. The site of impact was at the convexity in 87% of cases and at the base of the skull in the remaining 13%. Surgery was performed in 83% of the patients: debridement-craniotomy in 73%, burr hole for intracranial pressure monitoring only in 6% and scalp closure only in 4%. The remaining 17% did not require surgery because of transbasal penetration without intracranial mass (10%) or due to moribundity. Indriven bone or foreign body fragments were removed only if readily accessible. The mortality rate was highest among patients with a Glasgow Coma Scale of less than or equal to 4 on arrival, after high-velocity bullet wounds, when the intracranial path was multilobar or transventricular, and when associated lesions were accompanied by shock. A follow-up study of the 49 Israeli survivors for almost 6 years revealed intracerebral-retained bone fragments in 48%, but these did not result in increased immediate or late complications (e.g., infection, epilepsy). These results support our conservative approach. Since all victims of penetrating head injuries were evacuated from Lebanon to Rambam Medical Center, Haifa, our report can serve as an estimation of the incidence of penetrating brain wounds and their burden on a front-line hospital.

3153. Levi, L., et al. (1991). "Penetrating craniocerebral injuries in civilians." British journal of neurosurgery **5**(3): 241-247.

During a 6-year period (1984-89), 31 patients were treated at Rambam Medical Center with penetrating craniocerebral injuries (PCCI) not associated with military action. Eighteen (58%) patients died during their initial hospitalization; only two of them had admission Glasgow Coma Scale (GCS) above five. The admission GCS coupled with the mode of injury (type of missile and motivation of shooting) were valuable for early accurate prognosis assessment. Patients with admission GCS of 3 and 4 invariably died despite rapid treatment and attempted haematoma evacuation. The neurological status, CT appearance, as well as the motivation of shooting should be considered in order to assess accurately the possible outcome. Compared with our military series of 113 patients with PCCI, there were more extensive injuries, although the mean period until neurosurgical treatment was the same. Long-term complications connected to dural tears remote from the entrance wound occurred in three of the survivors.

3154. Levin, H. S. (2003). "Neuroplasticity following non-penetrating traumatic brain injury." Brain injury **17**(8): 665-674.

The primary objective of this review is to examine the methodology and evidence for neuroplasticity operating in recovery from traumatic brain injury (TBI), as compared with previous findings in patients sustaining perinatal and infantile focal vascular lesions. The evidence to date indicates that the traditional view of enhanced reorganization of function after early focal brain lesions might apply to early focal brain lesions, but does not conform with studies of early severe diffuse brain injury. In contrast to early focal vascular lesions, young age confers no advantage in the outcome of severe diffuse brain injury. Disruption of myelination could potentially alter connectivity, a suggestion which could be confirmed through diffusion tensor imaging (DTI). Initial reports of DTI in TBI patients support the possibility that this technique can demonstrate alterations in white matter connections which are not seen on conventional magnetic resonance imaging (MRI) and might change over time or with interventions. Preliminary functional MRI studies of TBI

patients indicate alterations in the pattern of brain activation, suggesting recruitment of more extensive cortical regions to perform tasks which stress computational resources. Functional MRI, coupled with DTI and possibly other imaging modalities holds the promise of elucidating mechanisms of neuroplasticity and repair following TBI.

3155. Levine, S. B. (1973). "Embolism of cerebral tissue to lungs." Archives of pathology **96**(3): 183-185.

3156. Levine, S. B., et al. (1986). "Evaluation and treatment of frontal sinus fractures." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **95**(1): 19-22.

We treated twenty-three patients with blunt or penetrating wounds of the frontal sinus from 1978 through 1983. Nondisplaced anterior wall fractures were observed or explored. Posterior table fractures--with displacement confirmed by computed tomography or polycycloidal tomography--were explored. Either obliteration of the sinus or nasofrontal duct reconstruction with a Sewall-Boyden-McKnaught flap was selected, depending on the magnitude of duct injury. In all cases, the anterior wall was primarily reconstructed. All penetrating wounds with posterior table involvement were treated by cranialization of the frontal sinus and temporalis muscle obliteration of the nasofrontal ducts. Only one case of meningitis occurred, resulting in prolonged hospitalization.

3157. Levkovitch-Verbin, H., et al. (2006). "Minocycline delays death of retinal ganglion cells in experimental glaucoma and after optic nerve transection." Archives of ophthalmology (Chicago, Ill. : 1960) **124**(4): 520-526.

OBJECTIVE: To evaluate the effect of minocycline hydrochloride on the survival of retinal ganglion cells (RGCs) in glaucomatous rat eyes and rat eyes after optic nerve transection (ONT)., METHODS: The effect of intraperitoneal injections of minocycline at dosages of 15 mg/kg per day, 22 mg/kg per day, and 45 mg/kg per day was evaluated and compared with saline in ONT (n = 174) and experimental glaucoma (n = 51)., RESULTS: The mean +/- SEM survival rate of RGCs 1 week after ONT was significantly higher with minocycline at dosages of 15 mg/kg per day (36% +/- 3%; n = 9; P = .04), 22 mg/kg per day (44% +/- 2%; n = 15; P = .001), and 45 mg/kg per day (39% +/- 3%; n = 10; P = .008) compared with saline (29% +/- 2%; n = 28). Minocycline at a dosage of 22 mg/kg per day was also significantly neuroprotective compared with saline 2 weeks after ONT (mean +/- SEM survival rate, 5% +/- 1% vs 3% +/- 0.4%, respectively; n = 20 [10 rats in each group]; P = .03). In experimental glaucoma, the mean +/- SEM percentage of RGCs after 4 weeks was 84% +/- 4% in the minocycline group (n = 15) compared with 65% +/- 4% in the saline group (n = 18) (P = .003). Apoptosis of RGCs was significantly delayed by minocycline 4 days and 1 week after ONT., CONCLUSION: Minocycline significantly enhances the survival of RGCs after ONT and in experimental glaucoma by delaying the apoptosis pathway., CLINICAL RELEVANCE: The safety record of minocycline and its ability to penetrate the blood-brain barrier suggest that this drug is a promising neuroprotective drug for optic nerve injuries.

3158. Levy, A. D., et al. (2006). "Virtual autopsy: preliminary experience in high-velocity gunshot wound victims." Radiology **240**(2): 522-528.

PURPOSE: To retrospectively assess virtual autopsy performed with multidetector computed tomography (CT) for the forensic evaluation of gunshot wound victims., MATERIALS AND METHODS: The institutional review board approved this HIPAA-compliant study and did not require informed consent of the next of kin. Thirteen consecutive male gunshot wound victims (mean age, 27 years) were scanned with 16-section multidetector CT prior to routine autopsy. Retrospectively, the total-body nonenhanced scans were interpreted at a three-dimensional workstation by radiologists blinded to autopsy findings. Images were evaluated for lethal wound, number and location of wound tracks, injured structures, and metal fragment location. After image review, autopsy reports and photographs were compared with the images and interpretations to validate the multidetector CT determinations., RESULTS: Multidetector CT aided in correct identification of all lethal wounds, and metallic fragment location was always precise. In four cases, multidetector CT aided in accurate assessment of organ injuries and lethal wounds but led to underestimation of the number of wounds if comingling paths occurred. In two cases of a chest wound, multidetector CT aided in accurate assessment of the chest as having the lethal wound but failed to help identify specific sites of hemorrhage. In two cases of craniofacial injury, the path of the wound was not clear. Autopsy revealed a total of 78 wound tracks (mean, 6; range, 1-24). Ten (13%) wound tracks were not identified at multidetector CT (six upper extremity wounds and four thigh wounds). In two cases, findings missed at autopsy (fracture of the cervical spine, bullet fragments in the posterior area of the neck) were

identified at multidetector CT., CONCLUSION: Multidetector CT can aid prediction of lethal wounds and location of metallic fragments.

3159. Levy, J. and T. Lifshitz (2001). "Eyelid fish-hook injury." International ophthalmology **24**(5): 297-298.

OBJECTIVE: To report a rare case of fish-hook eyelid injury., METHODS: Interventional case-report. A 25-year-old man presented with an upper eyelid fish-hook wound., RESULTS: The hook was extracted under local anaesthesia using the back-out method. Postoperatively, no complications were observed., CONCLUSIONS: In the absence of serious ocular damage, the back-out method seems to be the best option for the removal of the hook in eyelid injuries.

3160. Levy, L. F. (2001). "Medical negligence is very much in the news these days." The Central African journal of medicine **47**(7): 181.

3161. Levy, M. L. (2000). "Outcome prediction following penetrating craniocerebral injury in a civilian population: aggressive surgical management in patients with admission Glasgow Coma Scale scores of 6 to 15." Neurosurgical focus **8**(1): e2.

In an attempt to assess admission Glasgow Coma Scale (GCS) scores and other radiographic variables after penetrating craniocerebral injury in relationship to outcome, the author evaluated a series of 294 patients with penetrating injuries who presented with a GCS score of 6 to 15 over a 6-year period. Entrance criteria required a replicable neurological examination that was not altered by the presence of hypotension, drugs/toxins, or systemic injury. All patients underwent surgical intervention and aggressive perioperative management, including resuscitative protocols, in the neurosurgical intensive care unit. The author previously devised prospective models of outcome remained unchanged in this series. The variables most predictive of death include admission GCS score and subarachnoid hemorrhage in one model and admission GCS score and pupillary changes in a second when pupillary response was definitive at admission ($p < or = 0.00005$). Other important variables related to morbidity include admission GCS, bihemispheric injury when associated with intraventricular hemorrhage, and diffuse fragmentation ($p < or = 0.001$). In this study a significant relationship between operative intervention and survival ($p < or = 0.01$) was found in patients with an admission GCS scores of 6 to 8. No significant relationships between operative intervention and survival were found in patients with admission GCS scores of 9 to 12 and 13 to 15. A significant relationship between operative intervention and morbidity ($p < or = 0.01$) was also demonstrated in patients with an admission GCS score of 12 to 15. No significant relationships between operative intervention and morbidity were found in patients with an admission GCS score of 6 to 8 and 9 to 12.

3162. Levy, M. L., et al. (1996). "Economic, ethical, and outcome-based decisions regarding aggressive surgical management in patients with penetrating craniocerebral injury." Journal of health communication **1**(3): 301-308.

Each year fatalities in the United States increase as a result of gunshot wounds to the head. This increase, coupled with the progressive limitation of medical and economic resources available at major trauma centers, has brought into question the concept that everything possible should be done to save the lives of victims, who have only a minimal and nonpredictable chance of having a good outcome. Thus, consideration must be given to the economics of treating cranial gunshot wounds and the relationship of this treatment to outcome. When a good outcome can be predicted, treatment should be aggressive. However, when a good outcome cannot be predicted, surgical intervention will have no effect and the potential costs of aggressive treatment must also be considered. Clearly, there are ethical dilemmas involved in withholding operative treatment from any individual, even if there is only a minimal chance of a reasonable neurologic recovery. A negotiation-based approach should be used in determining the medical and ethical benefits of aggressive management strategies. Unfortunately, the care of critically ill patients is inconsistent with this approach. In order to insure that the best decision is made, guidelines dictating when to surgically intervene must be made an essential part of the patient/health care provider negotiation--even in worst case scenarios. The combination of an extremely poor prognosis for these injuries, and economic constraints faced by government-run facilities today could suggest that some patients should be allowed to die. Thus, the physician must be a source of information for the families, providing support and becoming a decision-making partner regarding potential intervention. In each situation, a strict set of guidelines must be formulated to establish a moral foundation for the ultimate mutual decision.

3163. Levy, M. L., et al. (1994). "Outcome prediction after penetrating craniocerebral injury in a civilian population: aggressive surgical management in patients with admission Glasgow Coma Scale scores of 3, 4, or 5." Neurosurgery **35**(1): 77-75.

In an attempt to evaluate the response of patients who have low admission Glasgow Coma Scale scores (GCS) after a penetrating craniocerebral injury to aggressive management, we evaluated a series of 190 patients with penetrating injuries who presented with a GCS score of 3, 4, or 5 during a 6-year period. Entrance criteria required replicable neurological examinations that were not altered by the presence of hypotension, drugs/toxins, or systemic injury. The surgical patients included 21 patients with an admission GCS score of 3, 24 with an admission GCS score of 4, and 15 with an admission GCS score of 5. All patients underwent surgical intervention and aggressive perioperative management in the neurosurgical intensive care, including resuscitative protocols. Five of the patients with a GCS score of 3 survived, all with poor outcomes. Seven of the patients with a GCS score of 4 survived, although only one had a good outcome. Eleven of the patients with a GCS score of 5 survived. Five had a Glasgow Outcome Score of 2, five had a Glasgow Outcome Score of 3, and one had a Glasgow Outcome Score of 4. We have devised a prospective model of outcome based on our series in an attempt to predict nonsurvivors at admission (while overpredicting for survivors). The variables most predictive of mortality include admission GCS score and subarachnoid hemorrhage in one model and admission GCS score and pupillary changes in a second, when pupillary response was definitive at admission ($P < \text{or} = 0.00005$). (ABSTRACT TRUNCATED AT 250 WORDS)

3164. Levy, M. L., et al. (1993). "Penetrating craniocerebral injury resultant from gunshot wounds: gang-related injury in children and adolescents." Neurosurgery **33**(6): 1018-1015.

We prospectively and retrospectively reviewed a series of 780 patients who presented to the University of Southern California/Los Angeles County Medical Center with a diagnosis of gunshot wound to the brain during an 8-year period. Of these, 105 were children ranging in age from 6 months to 17 years. Injuries were gang related in 76 (72%) children and adolescents. Stepwise linear regression analysis was used to formulate a predictive model of outcome in this population. Patient age ($F = 10.92$), sex ($F = 9.32$), occipital entry site ($F = 8.17$), bihemispheric injury ($F = 8.50$), and admission Glasgow Coma Scale ($F = 69.91$) were all found to correlate with outcome ($P < 0.05$). Significant differences between pediatric and adult populations were noted in transit time, entrance site, and age-related outcome. Occipital or assassination-type wounds were most common in children. In addition, a younger age was associated with poor outcome ($P < 0.0001$). We describe both the economic and racial trends in our population of patients in addition to weapon type and toxicological evaluation. The Department of Neurological Surgery is becoming directly involved in providing information to children at the junior high school level regarding gang activity and brain and spinal cord injury. In conjunction with the Community Youth Gang Services Organization and Think First Organization, we are attempting to integrate prevention through education and community mobilization. This is a plan aimed at informing and recovering the youth affected by gangs.

3165. Levy, M. L., et al. (1993). "The significance of subarachnoid hemorrhage after penetrating craniocerebral injury: correlations with angiography and outcome in a civilian population." Neurosurgery **32**(4): 532-540.

Certain clinical factors are considered to have an effect on patient outcome after penetrating missile injury. These include bilateral hemispheric injury, ventricular hemorrhage, intracerebral hemorrhage, mass effect, and missile or bony fragmentation. The relationship of subarachnoid hemorrhage (SAH) after penetrating craniocerebral injury and outcome is unknown. In addition, controversy exists regarding the role of angiography and the incidence of traumatic intracranial aneurysm in this population. Finally, can we assume that the incidence of traumatic intracranial aneurysm is equal in military and civilian populations, given the absence of penetrating shrapnel injury in civilian populations? Now that computed tomography has supplanted angiography as the primary diagnostic modality, increasing vigilance on the part of the physician and examination of angiography in high-risk patients should allow for enhanced outcome. We evaluated 100 patients with a diagnosis of cerebral gunshot wound over a 12-month period. All patients were evaluated neurologically at the time of admission and had imaging studies. Thirty-one patients with radiological evidence of SAH on computed tomography underwent angiography. Angiograms were limited to the side of the injury in patients with single-lobe or unilateral multilobe injuries and were bilateral in patients with bilateral hemispheric involvement. One intracranial aneurysm (3.2%) was documented and treated surgically. In those patients who died within 48 hours of

admission, 68% had SAH as compared with only 17% of those surviving. Outcome was based upon neurological evaluation at the time of discharge and at the time of clinical follow-up at 3 and 6 months.(ABSTRACT TRUNCATED AT 250 WORDS)

3166. Levy, M. L., et al. (2004). "A neuroforensic analysis of the wounds of President John F. Kennedy: Part 2--A study of the available evidence, eyewitness correlations, analysis, and conclusions." Neurosurgery **54**(6): 1298-1292.

A substantial body of literature exists surrounding the assassination and subsequent pathological examination of President John F. Kennedy. In the first part of this series, we provided a previously undocumented eyewitness account by a neurosurgeon of what transpired in Trauma Room 1 of Parkland Memorial Hospital on November 22, 1963. The current article reviews the copious literature and extensive controversy regarding President Kennedy's wounds. The autopsy report, ballistics data, official reviews of the autopsy data, and Dr. Grossman's observations are correlated in an effort to provide a neuroforensic analysis of the nature of the wounds that President Kennedy sustained. The final article of the series will relate the wounds to the timing of the shots and the location of the President as his limousine traversed Dealey Plaza and will discuss the sites from which the bullets could have been fired.

3167. Levy, Y. E., et al. (2014). "Surgical resections for posttraumatic epilepsy following gsws to the brain." Epilepsy Currents **14**: 361.

Rationale: Penetrating craniocerebral gunshot wounds (GSWs) have a high mortality, leaving survivors with devastating neurological deficits in the majority of cases. Posttraumatic intractable epilepsy is a major health problem in these patients and significantly impacts quality of life and leads to high rates of morbidity. While the surgical management of posttraumatic epilepsy following head trauma has previously been described, epilepsy surgery in patients following GSWs to the head has never before been reported. In this study, we aim to report the evaluation, and surgical treatment strategies used in patients who underwent successful epilepsy resections for medically refractory epilepsy following GSWs to the brain. Methods: A prospectively compiled database of epilepsy patients was used to identify patients that underwent epilepsy surgery for medically refractory epilepsy as a consequence of a prior GSW to the brain. Data regarding the seizure frequency, type of surgical resection and seizure outcomes were compiled. Results: From an epilepsy surgery database of 235 patients, three patients with a prior history of posttraumatic epilepsy following cranio-cerebral GSWs to the head were identified. Ages at surgery were 21, 25, and 27 years old and their GSWs to the head occurred at 18, 13 and 5 years respectively. Seizures began soon after the injury in all patients and became refractory to medications thereafter. All patients had shrapnel fragments intra-cranially and one patient had a prior VNS placed with no improvement in seizure frequency. In two patients, intracranial electrodes were placed for prolonged monitoring. In these patients a partial frontal lobectomy in one and a frontal-parietal resection in the other were performed. One of them underwent an awake craniotomy with language mapping due to the proximity of the seizure foci to language areas. The third patient underwent an orbitofrontal resection. All three patients became seizure free (Engel class Ia) following surgery. Conclusions: Post-traumatic epilepsy is a common sequel of penetrating head injuries. These cases might seem daunting and complex, but intracranial monitoring and surgical resections in these patients can be safely performed and may lead to favorable seizure outcomes. To our knowledge the surgical management of epilepsy following GSWs to the head has never described.

3168. Lew, J. F., et al. (1990). "Aerotolerant Clostridium tertium brain abscess following a lawn dart injury." Journal of clinical microbiology **28**(9): 2127-2129.

A young girl developed an intracranial abscess and necrotizing cellulitis following penetrating injury from a lawn dart. Initial identification of a gram-positive rod growing aerobically from clinical specimens was as a Bacillus organism, but the observation that the isolate grew poorly in subcultures for susceptibility testing but quite well under standard anaerobic culture techniques led to the identification of the organism as an aerotolerant Clostridium tertium. Early management of penetrating head trauma should include cranial imaging studies to detect fractures and intracranial pathology. Clinical microbiologists and clinicians should be aware of the phenomenon of aerotolerance in anaerobic bacteria to avoid errors in choice of antibiotic therapy.

3169. Lewis, A., et al. (2016). "Pregnancy and Brain Death: Lack of Guidance in U.S. Hospital Policies." American journal of perinatology **33**(14): 1382-1387.

Objective The death of Marlise Munoz, a pregnant woman who suffered an anoxic brain injury in November 2013, highlights the social, ethical, legal, and medical controversies associated with brain death in pregnancy. We sought to evaluate whether institutions in the United States have policies in place for situations in which a pregnant woman is declared brain dead. Study Design Institutional brain-death protocols from hospitals in the United States were obtained in cooperation with local and regional organ procurement agencies. Each protocol was reviewed to determine if and how it addressed brain death in pregnancy. Results We reviewed 317 unique brain-death protocols. In eight protocols (2.5%), it was noted that a pregnant patient could not be evaluated for brain death if the fetus could be preserved. Of the protocols that permitted brain-death evaluation, 289 (93.8%) did not include guidance about fetal management after maternal brain death and 305 (99%) did not indicate who was responsible for making decisions for the fetus. Conclusion Very few institutional brain-death policies address the issue of pregnancy. The creation of guidelines on management of the social and ethical challenges associated with brain death in pregnancy may be helpful. Copyright Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.

3170. Lewis, D. D., et al. (1996). "Thirty hours from referral to cross-clamp: a case study in organ procurement." Journal of transplant coordination : official publication of the North American Transplant Coordinators Organization (NATCO) **6**(2): 75-77.

Families of potential organ donors might have requests that prolong the donation process. Organ procurement organizations therefore should be sensitive to these issues, or risk losing potential donors. This study focused on a case that in duration surpassed 30 hours from initial referral to cross-clamp in the operating room. This article examines the legal, family, and management issues involved in such a case.

3171. Lewis, D. D. and R. R. Vidovich (1997). "Organ recovery following childbirth by a brain-dead mother: a case report." Journal of transplant coordination : official publication of the North American Transplant Coordinators Organization (NATCO) **7**(3): 103-105.

Little information is available in the medical and nursing literature concerning organ recovery from brain-dead, pregnant individuals. Many healthcare professionals might rule out such patients as potential donors, especially if childbirth is a possibility. This article presents an actual case study in which the birth of a healthy infant and recovery of organs from the mother were successful. It also reviews the available literature and discusses factors related to organ placement.

3172. Lewis, J. D., et al. (2015). "Anhedonia in combat veterans with penetrating head injury." Brain imaging and behavior **9**(3): 456-460.

Anhedonia is a common symptom following traumatic brain injury. The neural basis of anhedonia is poorly understood, but believed to involve disturbed reward processing, rather than the loss of sense of pleasure. This analysis was undertaken to determine if injury to specific regions of prefrontal cortex (PFC) result in anhedonia. A CT-based lesion analysis was undertaken in 192 participants of the Vietnam Head Injury Study, most with penetrating head injury. Participants were divided into left and right ventrolateral prefrontal, bilateral ventromedial prefrontal, and other injury locations. Anhedonia was measured by self-report in each group using the four-item anhedonia subscale score of the Beck Depression Inventory-II. Individuals with right ventrolateral injury reported greater severity of anhedonia compared to those with injury in the left ventrolateral region. These findings support an association between injury in the right ventrolateral PFC and anhedonia.

3173. Lewis, J. R., et al. (2008). "Mandibular reconstruction after gunshot trauma in a dog by use of recombinant human bone morphogenetic protein-2." Journal of the American Veterinary Medical Association **233**(10): 1598-1604.

CASE DESCRIPTION: A 6-year-old German Shorthaired Pointer was evaluated for possible reconstruction of a mandibular defect resulting from gunshot trauma., CLINICAL FINDINGS: A 5-cm defect of the right mandibular body was evident. A segment of the mandibular body was removed 9 weeks earlier because of severe contamination and comminution associated with gunshot trauma. Subsequent right-sided mandibular drift resulted in malocclusion in

which the left mandibular canine tooth caused trauma to mucosa of the hard palate medial to the left maxillary canine tooth. The right maxillary canine tooth caused trauma to gingiva lingual to the right mandibular canine tooth., TREATMENT AND OUTCOME: The right mandible was stabilized with a 2.0-mm maxillofacial miniplate positioned along the lateral alveolar margin and a 2.4-mm locking mandibular reconstruction plate placed along the ventrolateral mandible. An absorbable compression-resistant matrix containing collagen, hydroxyapatite, and tricalcium phosphate was soaked in recombinant human bone morphogenetic protein-2 (rhBMP-2; 7.2 mL of a 0.5 mg/mL solution for a dose of 3.6 mg) and placed in the defect. By 4 weeks after surgery, an exuberant callus was evident at the site of the defect. By 7 months after surgery, the callus had remodeled, resulting in normal appearance, normal occlusion, and excellent function of the jaw., CLINICAL RELEVANCE: Mandibular defects resulting from gunshot trauma can be treated by removal of contaminated tissue and comminuted bone fragments, followed by staged reconstruction. The combination of rhBMP-2 and compression-resistant matrix was effective in a staged mandibular reconstruction in a dog with a severe traumatic mandibular defect.

3174. Lewis, M. C. and D. E. Lewis (2016). "Frontal Sinus TASER Dart Injury." The Journal of emergency medicine **50**(3): 490-492.

3175. Lewis, S. R., et al. "Interventions to reduce body temperature to 35 [SUPERSCRIPT ZERO]C to 37 [SUPERSCRIPT ZERO]C in adults and children with traumatic brain injury." (10).

Background, Traumatic brain injury (TBI) is a major cause of death and disability, with an estimated 5.5 million people experiencing severe TBI worldwide every year. Observational clinical studies of people with TBI suggest an association between raised body temperature and unfavourable outcome, although this relationship is inconsistent. Additionally, preclinical models suggest that reducing temperature to 35 [degrees]C to 37.5 [degrees]C improves biochemical and histopathological outcomes compared to reducing temperature to a lower threshold of 33 [degrees]C to 35 [degrees]C. It is unknown whether reducing body temperature to 35 [degrees]C to 37.5 [degrees]C in people admitted to hospital with TBI is beneficial, has no effect, or causes harm. This is an update of a review last published in 2014., Objectives, To assess the effects of pharmacological interventions or physical interventions given with the intention of reducing body temperature to 35 [degrees]C to 37.5 [degrees]C in adults and children admitted to hospital after TBI., Search methods, We searched the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, Embase, Web of Science, and PubMed on 28 November 2019. We searched clinical trials registers, grey literature and references lists of reviews, and we carried out forward citation searches of included studies., Selection criteria, We included randomised controlled trials (RCTs) with participants of any age admitted to hospital following TBI. We included interventions that aimed to reduce body temperature to 35 [degrees]C to 37.5 [degrees]C: these included pharmacological interventions (such as paracetamol, or non-steroidal anti-inflammatory drugs), or physical interventions (such as surface cooling devices, bedside fans, or cooled intravenous fluids). Eligible comparators were placebo or usual care., Data collection and analysis, Two review authors independently assessed studies for inclusion, extracted data, and assessed risks of bias. We assessed the certainty of the evidence with GRADE., Main results, We included one RCT with 41 participants. This study recruited adult participants admitted to two intensive care units in Australia, and evaluated a pharmacological intervention. Researchers gave participants 1 g paracetamol or a placebo intravenously at four-hourly intervals for 72 hours., We could not be certain whether intravenous paracetamol influenced mortality at 28 days (risk ratio 2.86, 95% confidence interval 0.32 to 25.24). We judged the evidence for this outcome to be very low certainty, meaning we have very little confidence in this effect estimate, and the true result may be substantially different to this effect. We downgraded the certainty for imprecision (because the evidence was from a single study with very few participants), and study limitations (because we noted a high risk of selective reporting bias). This study was otherwise at low risk of bias., The included study did not report the primary outcome for this review, which was the number of people with a poor outcome at the end of follow-up (defined as death or dependency, as measured on a scale such as the Glasgow Outcome Score), or any of our secondary outcomes, which included the number of people with further intracranial haemorrhage, extracranial haemorrhage, abnormal intracranial pressure, or pneumonia or other serious infections., The only other completed trial that we found was of a physical intervention that compared advanced fever control (using a surface cooling device) versus conventional fever control in 12 participants. The trial was published as an abstract only, with insufficient details to allow inclusion, so we have added this to the 'studies awaiting classification' section, pending further information from the study authors or publication of the full study report., We identified four ongoing studies that will contribute evidence to future updates of the review if they measure relevant outcomes and, in

studies with a mixed population, report data separately for participants with TBI., Authors' concl sions, One small study contributed very low-certainty evidence for mortality to this review. The uncertainty is largely driven by limited research into reduction of body temperature to 35 [degrees]C to 37.5 [degrees]C in people with TBI. Further research that evaluates pharmacological or physical interventions, or both, may increase certainty in this field. We propose that future updates of the review, and ongoing and future research in this field, incorporate outcomes that are important to the people receiving the interventions, including side effects of any pharmacological agent (e.g. nausea or vomiting), and discomfort caused by physical therapies.

3176. Lewis, T. T., et al. (1991). "Metallic foreign body localisation with magnetic resonance imaging." Radiography today **57**(644): 16-17.

3177. Li, D.-R., et al. (2006). "Postmortem serum protein S100B levels with regard to the cause of death involving brain damage in medicolegal autopsy cases." Legal medicine (Tokyo, Japan) **8**(2): 71-77.

The protein S100 is an acidic calcium-binding protein, and the subunit S100B is the most abundantly found in the brain. The aim of the present study was a comprehensive analysis of serum S100B levels in medicolegal autopsy cases (within 48 h postmortem, n = 283) including victims with head and non-head injuries and also non-injury fatalities with regard to the cause of death involving brain damage. The serum level was usually higher in the subclavian vein than in the right heart and external iliac vein, and the lowest in the left heart blood, showing no significant postmortem influence. The serum level in the right heart and subclavian vein was markedly higher for acute deaths from head injury and asphyxiation due to neck compression (strangulation and hanging), and moderately and mildly elevated for other blunt and sharp instrument injury cases, respectively. For head injury, the serum levels were lower for subacute deaths than for acute deaths. These observations suggest that the elevation of serum S100B may mainly be caused by leakage following massive brain damage due to injury and cerebral hypoxia/ischemia, and in part by systemic hypoxic/traumatic tissue damage, depending on the survival time.

3178. Li, L., et al. (2016). "Multidisciplinary Team Treatment of Penetrating Head and Neck Trauma." The Journal of craniofacial surgery **27**(6): e534-536.

Penetrating head and neck trauma could cause significant mortality because of many important structures located in the brain and neck. Although high-velocity penetrating brain injury is often reported, reports of low-velocity, combined head and neck penetrating injury are rare. Hereby, the authors present a case of an old man who had encountered a serious accident, a 29-cm iron fork penetrated into his neck, through the skull base and into brain. After treatment by multidisciplinary team, the patient was in rehabilitation. The multidisciplinary team assists rapid diagnosis and treatment of penetrating neck and head injury is the key to ensure a good outcome. Therefore, as the authors face such patients again, a multidisciplinary team is needed.

3179. Li, M., et al. (2013). "Bridging gaps between the recurrent laryngeal nerve and ansa cervicalis using autologous nerve grafts." Journal of voice : official journal of the Voice Foundation **27**(3): 381-387.

OBJECTIVES/HYPOTHESIS: We investigated the clinical efficacy of free nerve grafts in bridging gaps between the recurrent laryngeal nerve (RLN) and ansa cervicalis in patients with unilateral RLN injury., STUDY DESIGN: We retrospectively reviewed the charts of 14 patients who underwent relevant free nerve grafting and assessed the clinical outcomes of this procedure., METHODS: Between January 2000 and January 2010, 14 patients with unilateral vocal fold paralysis were enrolled in this study. In all patients, the RLN was resected and free nerve grafts were applied to bridge the gap between the distal stump of the RLN and the anterior root of ansa cervicalis during surgery. Videostroboscopy, acoustic analysis, perceptual evaluation, maximum phonation time (MPT), and laryngeal electromyography (EMG) were performed both preoperatively and postoperatively to assess the clinical outcomes., RESULTS: Videostroboscopic findings showed that glottic closure, vocal fold edge, vocal fold position, phase symmetry, and phase regularity were significantly improved postoperatively (P<0.05), and no paradoxical movements of vocal folds were observed. Perceptual evaluation showed that overall grade, roughness, breathiness, asthenia, and strain were also significantly decreased postoperatively (P<0.05). The acoustic parameters jitter (local) and shimmer (local) and the mean noise-to-harmonics ratio were significantly lower than the corresponding preoperative values (P<0.05). The postoperative MPT

values were also significantly longer than the preoperative values. Laryngeal EMG revealed significant improvement in voluntary motor unit recruitment during phonation postoperatively (P<0.05)., CONCLUSIONS: Free nerve grafting is an effective procedure in bridging the gap between the RLN and ansa cervicalis in patients with unilateral RLN injury, as well as a safe procedure without obvious morbidity. A satisfactory vocal outcome can be obtained.

3180. Li, M. S. and S. David (1996). "Topical glucocorticoids modulate the lesion interface after cerebral cortical stab wounds in adult rats." Glia **18**(4): 306-318.

A lesion interface, consisting of a glia limitans lined by a laminin-rich basal lamina and leptomeningeal cells, forms within 2-3 weeks after penetrating wounds to the adult mammalian central nervous system (CNS). This interface prevents the growth of axons across the lesion. We have examined the effects of topically applied steroids on the formation of such an interface after stab wounds to the adult rat cerebral cortex. Immediately after lesioning, the surface of cortex in the region of the wound was treated with a topical application of either 0.1% halcinonide or 0.05% betamethasone dipropionate or their respective placebos. Cryostat sections through the lesioned area were obtained 3 weeks later and assessed by immunofluorescence. Steroid treatment attenuated all components of the lesion. The continuous anti-laminin labeling along the lesion in untreated rats became patchy after steroid treatment. The number of leptomeningeal cells that infiltrated into the wound was reduced in the laminin-negative regions in steroid-treated rats. In addition, astrocytic processes in the laminin-negative regions after steroid treatment were loosely arranged, compared with the tightly packed parallel processes forming the glia limitans in laminin-positive regions in controls. The mechanism of steroid-mediated attenuation of the lesion interface was examined in vitro. Betamethasone but not halcinonide reduced laminin secretion slightly in leptomeningeal cell cultures, but both steroids reduced cell proliferation. These results suggest that steroids modulate the formation of the lesion interface after CNS injury, at least in part by decreasing leptomeningeal cell proliferation. Such modulation of the lesion interface by steroids or other agents may permit the growth of axons across the lesion site and thus could enhance the overall degree of axon regeneration if other factors such as neurotrophic support and neutralization of axon growth inhibitory molecules are optimized.

3181. Li, S.-X., et al. (2011). "[Advance in animal models of traumatic brain injury]." Fa yi xue za zhi **27**(4): 286-294.

Traumatic brain injury (TBI) is a highly complex multi-factorial disorder. Animal models of TBI are used to elucidate primary and secondary injury mechanisms and pathophysiological changes and to provide the diagnostic and therapeutical basis for TBI. The choices of animal models depend upon the research objectives. However, various animal models have limitations. The models only can duplicate the pivotal injury mechanisms or a certain important pathophysiological course. The characteristics of human TBI can not fully be reflected by using these models. In the review, animal models of traumatic brain injury are classified as dynamic direct brain injury, indirect dynamic brain injury and combined neuro-traumatic models. Several common models are described for consideration.

3182. Li, X., et al. (2012). "Intraspinal penetrating stab injury to the middle thoracic spinal cord with no neurologic deficit." Orthopedics **35**(5): e770-773.

The annual incidence of traumatic spinal cord injury worldwide is estimated to be 35 patients per million. Nonmissile penetrating spinal injuries most commonly occur in the thoracic region, and the majority has neurologic deficits on admission. The management of patients who lack neurologic deficits is controversial due to the risk of neurologic status alteration intraoperatively. However, failure to intervene increases the risk of infection, delayed onset of neurologic deficits, and worsening functional outcome.A 17-year-old boy presented with an intradural T7-T8 knife penetration injury to the spinal cord with no neurologic deficit. Rapid surgical intervention was critical because the knife was lodged between the 2 hemispheres of the spinal cord. The patient was intubated in the lateral position, transferred to the prone position on a Jackson table, and underwent surgical decompression with laminectomy 1 level above and below the injury site, removal of the knife blade in the original path of trajectory, and repair of the dural tear with a collagen matrix. The patient sustained no neurologic sequelae from the penetrating knife injury. He was able to ambulate at discharge and had no complications. To our knowledge, this is the only report of a patient with intradural spinal cord penetration by a foreign object (knife blade) presenting with a normal neurologic preoperative examination that persisted throughout the course of postoperative care.

3183. Li, X., et al. (2021). "Blood-Based Brain and Global Biomarker Changes after Combined Hypoxemia and Hemorrhagic Shock in a Rat Model of Penetrating Ballistic-Like Brain Injury." Neurotrauma reports **2**(1): 370-380.

Penetrating traumatic brain injury (pTBI) often occurs with systemic insults such as hemorrhagic shock (HS) and hypoxemic (HX). This study examines rat models of penetrating ballistic-like brain injury (PBBI) and HX+HS to assess whether the blood levels of brain and systemic response biomarkers phosphorylated neurofilament-heavy protein (pNF-H), neurofilament-light protein (NF-L), alphaII-spectrin, heat shock protein (HSP70), and high mobility group box 1 protein (HMGB1) can distinguish pTBI from systemic insults and guide in pTBI diagnosis, prognosis, and monitoring. Thirty rats were randomly assigned to sham, PBBI, HS+HX, and PBBI+HS+HX groups. PBBI and sham groups underwent craniotomy with and without probe insertion and balloon expansion, respectively. HX and HS was then simulated by blood withdrawal and fraction of inspired oxygen (FIO2) reduction. Biomarker serum concentrations were determined at one (D1) and two (D2) days post-injury with enzyme-linked immunosorbent assay (ELISA) methods. Axonal injury-linked biomarkers pNF-H and NF-L serum levels in PBBI groups were higher than those in sham and HX+HS groups at D1 and D2 post-injury. The same was true for PBBI+HX+HS compared with sham (D2 only for pNF-H) and HX+HS groups. However, pNF-H and NF-L levels in PBBI+HX+HS groups were not different than their PBBI counterparts. At D1, alphaII-spectrin levels in the HX+HS and PBBI+HS+HX groups were higher than the sham groups. alphaII-spectrin levels in the HX+HS group were higher than the PBBI group. This suggests HX+HS as the common insult driving alphaII-spectrin elevations. In conclusion, pNF-H and NF-L may serve as specific serum biomarkers of pTBI in the presence or absence of systemic insults. alphaII-spectrin may be a sensitive acute biomarker in detecting systemic insults occurring alone or with pTBI.

3184. Li, X. S., et al. (1998). "Induction of IGF-1 mRNA expression following traumatic injury to the postnatal brain." Brain research. Molecular brain research **57**(1): 92-96.

A variety of adult, non-neural tissues respond to injury by increasing expression of the gene which encodes for insulin-like growth factor-1 (IGF-1). This response is thought to be a key component in the regenerative capacity of these tissues. In contrast, the central nervous system (CNS) has relatively little regenerative capacity following injury. Interestingly, compared to many non-neuronal tissues, little IGF-1 mRNA can be detected in the adult CNS, raising the possibility that its lack of regenerative capacity is related its relative lack of IGF-1 expression. However, in the 2-week-old adolescent CNS IGF-1 mRNA can be detected in numerous brain regions. Therefore, the purpose of this study was to determine the responsiveness of the IGF-1 gene to injury in adolescent CNS tissue, a period in which expression of this gene is relatively abundant. Expression of IGF-1 mRNA was measured by means of a sensitive solution hybridization/RNase protection assay in the parieto-occipital lobes of 2-week-old and adult mice following penetrating injury. Levels of IGF-1 transcript in the injured brains were significantly increased above those of controls in both 2-week-old and adult brains 3-day post injury and remained elevated for 1 week after injury. These observations demonstrate that the adult CNS, like other tissues, can respond to injury by increasing expression of IGF-1 mRNA.

3185. Li, X.-S., et al. (2017). "Nonmissile Penetrating Head Injuries: Surgical Management and Review of the Literature." World neurosurgery **98**: 873.e879-873.e825.

BACKGROUND: Nonmissile penetrating head injuries (NPHIs) in the civilian population are rare but potentially fatal. Although numerous cases have been reported in the literature, the surgical management of such injuries is still ambiguous, especially with development of surgical techniques. Here, we report 5 cases of NPHIs managed with different surgical techniques and review the literature on surgical treatment of these injuries to outline the appropriate management for these patients from a neurosurgical perspective., METHODS: We retrospectively reviewed 5 cases of NPHIs managed surgically in our department. The clinical data were collected, including cause, type of objects, way of penetration, initial clinical evaluation, imaging, surgical intervention, postoperative care, complication, follow-up, and outcome. In addition, a systematic review of the literature was performed in the PubMed database to search for articles on surgical treatment of these injuries., RESULTS: These 5 cases were caused by twisted steel bar, electric welding rod, and sewing needle, respectively. Preoperative imaging, including computed tomography, magnetic resonance imaging, and digital subtraction angiography, was selectively performed to assist the operative plan. Foreign objects were removed surgically in all cases. Postoperative prophylactic administration of antibiotics and anticonvulsants was used to

prevent infectious and epileptic complications. Most of the patients achieved a better outcome except for one., CONCLUSIONS: NPHIs can be fatal but they can be managed with satisfactory results by proper preoperative imaging evaluation, rapid appropriate surgical management, and accurate postoperative care. Personalized surgical intervention should be undertaken depending on the mechanism and extent of the NPHI.

3186. Li, Y., et al. (2021). "Wearable Mixed-Reality Holographic Navigation Guiding the Management of Penetrating Intracranial Injury Caused by a Nail." Journal of digital imaging **34**(2): 362-366.

Penetrating brain injury caused by a nail is an extremely rare neurosurgical emergency that poses a challenge for neurosurgeons. Nail entering the brain from the orbit and lodging within the cranial cavity is even more unusual. A 53-year-old male was found unconscious at a construction site, and brain CT revealed not only the presence of a nail beneath the inner table of the parietal bone, but also traumatic intracerebral hematoma. Consequently, accurate localization of the nail and hematoma was mandatory for surgical plan. During surgical planning, computational model reconstruction and trajectory calculation were completed using preoperative CT in 3D Slicer. Under the guidance of a head-mounted mixed-reality holographic computer, the neurosurgeon was able to visualize and interact with the hologram of the surgical plan, and intraoperative findings demonstrated that our low-cost portable wearable mixed-reality holographic navigation assisted precise localization of the nail and intracerebral hematoma, assuring less injury to the already compromised brain. After the surgery, the patient could obey commands, and postoperative imaging ruled out the possibility of brain abscess during follow-up. To the best of our knowledge, this is the first report on using a low-cost wearable mixed-reality holographic navigation to guide the management of penetrating intracranial injury caused by a nail.

3187. Li, Y., et al. (2011). "Clinical research on surgery of inferior orbital wall fracture caused by gun or ammunition explosion." International Journal of Ophthalmology **11**(3): 498-499.

AIM: To investigate an effective treatment of craniofacial fracture patients in modern warfare for rapid recovery in normal face and physiological function. METHODS: Different parts of different pathological fractures were submitted to different treatment options: minimally invasive surgery, cosmetic incision and fixing method such as titanium mesh and plate were taken to different parts of the craniofacial fracture under the guidance of nasal endoscope; medical Earbrain cements (EC) was applied for reposition and fixation of craniofacial bone fragments. RESULTS: The patients could quickly return to normal face and physiological function after craniofacial fracture surgery. CONCLUSION: Different minimally invasive surgery, cosmetic incision and fixing method such as titanium mesh and plate endoscope-guidedly is a very effective method; application of EC for fracture reduction and fixation of craniofacial bone fragments can accelerate healing.

3188. Li, Y.-q., et al. (2003). "[Repair of facial defect with expanded skin flap from medial upper arm]." Zhonghua shao shang za zhi = Zhonghua shaoshang zazhi = Chinese journal of burns **19**(4): 223-225.

OBJECTIVE: To investigate the blood supply of the expanded skin flap from medial upper arm and its application on the reparation of facial defect due to scar resection., METHODS: The operation was carried out for three steps: 1) The expander was embed under the superior proper fascia. 2) The skin flap from medial upper arm was created with superior ulnar collateral artery as blood supply and attributive branches of basilic and axillary veins as blood collection and was grafted onto the facial defect. 3). After being separated from donor site, the skin flap was employed to cover the facial defect with maximal area of 15 x 10 cm(2)., RESULTS: Seven patients in all with facial scar and defects were managed with the skin flap. All the grafted skin flaps survived at last with nearly normal skin color, texture and contour. And the scar in donor sites seemed to be neglectable., CONCLUSION: Reparation of facial defects with medial upper arm skin flap after expanding could be recommended. But longer treatment time and some obsessive action of upper limbs and head might be disadvantages.

3189. Li, Z., et al. (2019). "Management of a Steel Bar Injury Penetrating the Head and Neck: A Case Report and Review of the Literature." World neurosurgery **123**: 168-173.

BACKGROUND: Nonmissile penetrating injuries to the head and neck caused by a steel bar are rare, and a standard management strategy is lacking., CASE DESCRIPTION: A 42-year-old woman sustained a steel bar injury with penetration of the head and neck. Computed tomography and three-dimensional reconstruction were performed for preoperative evaluation. Digital subtraction angiography was performed to confirm potential vascular injury. The steel bar was successfully removed through an open surgical procedure by a multidisciplinary team., CONCLUSIONS: Relevant literature regarding nonmissile penetrating injuries involving a steel bar was reviewed to propose appropriate management strategies. Comprehensive imaging evaluation and prompt surgery by a multidisciplinary team contributed to the successful removal of the steel bar.

3190. Li, Z., et al. (2001). "Gut barrier function damage following multiple firearm injuries in a porcine model." Chinese medical sciences journal = Chung-kuo i hsueh k'o hsueh tsa chih **16**(4): 209-213.

OBJECTIVE: To study the characteristics and pathogenesis of gut barrier damage following multiple firearm injuries in a porcine model., METHODS: Twenty-four small pigs were divided into 4 groups: control group (n = 6, group C), group H (n = 6, gunshot-induced tangential fracture of parietal bone), group L (n = 6, gunshot-induced comminuted fracture of bilateral femora) and group M (n = 6, combined group H + L). Gastric intramucosal pH (pHi), plasma endotoxin levels in portal vein, and plasma D-lactate levels were measured and blood samples were cultured at different intervals after trauma. The animals were sacrificed at 72 h following trauma and intestinal tissues were harvested for pathological examination and diamine oxidase (DAO) activity measurement., RESULTS: In group M at 72 h, pHi was significantly lower than that of group H and L ($P < 0.01$), and plasma endotoxin level was significantly higher than that of group H ($P < 0.01$) and group L ($P < 0.05$). Simultaneously, in group M, D-lactate level was markedly higher than that of group H ($P < 0.01$), and incidence of positive blood culture was much higher than that of group H and L ($P < 0.05$). Necrosis and exfoliation were revealed at ileum villus top in all trauma groups, especially in group M, in which ileum DAO activity declined most significantly as well., CONCLUSION: Multiple trauma is prone to cause gastrointestinal ischemia even without hemorrhagic shock. The damage of gut barrier in multiple trauma appears to be more severe than that in one-site trauma, thereby promoting gut-derived endotoxemia and bacterial translocation and contributing to the development of endogenous infection.

3191. Liang, B. (2000). "[Radiological study of orbital foreign body]." Yan ke xue bao = Eye science **16**(2): 116-117.

OBJECTIVE: To study the factors influencing of foreign body., METHODS: 527 cases of orbital foreign body was analysed and the relationship between foreign body and projection position or projection angle was retrospectively reviewed., RESULTS: Foreign body in 13 cases was found in the lateral radiogram(No foreign body in the posteroanterior radiogram). In 12 cases foreign body was found in the Belot's radiogram(No foreign body in P. A. and lateral radiognam). In ten cases foreign body was found in the Vogts radiogram (No foreign body in P. A., lateral, Belot's radiogram). In the first radiogram, one case was found to have foreign body in the Lateral but P. A. In the second radiogram, just the reverse of above., CONCLUSION: The image of foreign body was influenced by projection position and projection angle between foreign body and X-ray. The patients must take Belot's or Vogt's radiogram except routine P. A. and Lateral radiogram. Sometimes the patients should be taken more radiogram after moving the eye ball direction in order to find the small and flact foreign body.

3192. Liang, C., et al. (2016). "RNAi-mediated silencing of HLA A2 suppressed acute rejection against human fibroblast xenografts in the striatum of 6-OHDA lesioned rats." Journal of neuroimmunology **297**: 28-37.

Major histocompatibility complex class l (MHC I) molecules play a role in determining whether transplanted cells will be accepted or rejected, and masking of MHC I on donor cells has been found useful for immunoprotection of neural xenografts. In the present study, primary human embryonic lung fibroblasts (HELF), HELF treated with lentivirus-mediated small interfering RNAs (siRNAs) targeting human leukocyte antigen A2 (HLA A2, MHC I in humans) (siHELF), and rat embryonic lung fibroblasts (RELF) were stereotaxically grafted into the striatum of 6-hydroxydopamine lesioned rats to explore whether knockdown of HLA A2 could reduce host immune responses against xenografts. Before lentiviral infection, the cells were transduced with retroviruses harboring tyrosine hydroxylase cDNA. Knockdown of HLA A2 protein was examined by Western blotting. The immune responses (the number of CD4 and CD8 T-cells in the brain and peripheral blood), glial reaction, and survival of human fibroblasts were quantitatively evaluated by flow cytometry and immunohistochemistry at 4d, 2w, and 6w post-graft. Animal behaviors were assessed by counting apomorphine-induced

rotations pre- and post-grafts. It was shown that a lower level of HLA A2 was observed in siHELF grafts than in HELF grafts, and knockdown of HLA A2 decreased rat immune responses, as indicated by less remarkable increases in the number of CD8 and CD4 T-cells in the brain and the ratio of CD4:CD8 T-cells in the peripheral blood in rats grafted with siHELF. Rats grafted with siHELF exhibited a significant improvement in motor asymmetry post-transplantation and a better survival of human fibroblasts at 2w. The increasing number of activated microglia and the decreasing number of astrocytes were found in three groups of rats post-implantation. These data suggested that RNAi-mediated knockdown of HLA A2 could suppress acute rejection against xenogeneic human cell transplants in the rat brain.

3193. Liang, C.-C., et al. (2004). "Reconstruction of traumatic Stensen duct defect using a vein graft as a conduit: two case reports." Annals of plastic surgery **52**(1): 102-104.

Treatment of Stensen duct defect is still controversial. The authors describe the successful use of a retrograde vein graft as a conduit for traumatic segmental Stensen duct defect reconstruction. One patient sustained facial trauma with severe duct crushing and severance, the other had multiple cutting injuries with segmental duct defect. However, primary repair was impossible. A retrograde vein graft harvested from forearm for Stensen duct defect reconstruction was performed using microsurgical technique. A silicon stent was retained for 8 weeks. The sialographic examination showed good functional results without stricture postoperatively. This could be an option for treating such a complicated defect.

3194. Liao, Y., et al. (2013). "Rescuing the neonatal brain from hypoxic injury with autologous cord blood." Bone marrow transplantation **48**(7): 890-900.

Brain injury resulting from perinatal hypoxic-ischemic encephalopathy (HIE) is a major cause of acute mortality in infants and chronic neurologic disability in surviving children. Recent multicenter clinical trials demonstrated the effectiveness of hypothermia initiated within the first 6 postnatal hours to reduce the risk of death or major neurological disabilities among neonates with HIE. However, in these trials, approximately 40% of cooled infants died or survived with significant impairments. Therefore, adjunct therapies are required to improve the outcome in neonates with HIE. Cord blood (CB) is a rich source of stem cells. Administration of human CB cells in animal models of HIE has generally resulted in improved outcomes and multiple mechanisms have been suggested including anti-inflammation, release of neurotrophic factors and stimulation of endogenous neurogenesis. Investigators at Duke are conducting studies of autologous CB infusion in neonates with HIE and in children with cerebral palsy. These pilot studies indicate no added risk from the regimens used, but results of ongoing placebo-controlled trials are needed to assess efficacy. Meanwhile, further investigations are warranted to determine the best strategies, that is, timing, dosing, route of delivery, choice of stem cells and ex vivo modulations, to attain long-term benefits of CB stem cell therapy.

3195. Lichte, P., et al. (2010). "A civilian perspective on ballistic trauma and gunshot injuries." Scandinavian journal of trauma, resuscitation and emergency medicine **18**: 35.

BACKGROUND: Gun violence is on the rise in some European countries, however most of the literature on gunshot injuries pertains to military weaponry and is difficult to apply to civilians, due to dissimilarities in wound contamination and wounding potential of firearms and ammunition. Gunshot injuries in civilians have more focal injury patterns and should be considered distinct entities., METHODS: A search of the National Library of Medicine and the National Institutes of Health MEDLINE database was performed using PubMed., RESULTS: Craniocerebral gunshot injuries are often lethal, especially after suicide attempts. The treatment of non space consuming haematomas and the indications for invasive pressure measurement are controversial. Civilian gunshot injuries to the torso mostly intend to kill; however for those patients who do not die at the scene and are hemodynamically stable, insertion of a chest tube is usually the only required procedure for the majority of penetrating chest injuries. In penetrating abdominal injuries there is a trend towards non-operative care, provided that the patient is hemodynamically stable. Spinal gunshots can also often be treated without operation. Gunshot injuries of the extremities are rarely life-threatening but can be associated with severe morbidity.With the exception of craniocerebral, bowel, articular, or severe soft tissue injury, the use of antibiotics is controversial and may depend on the surgeon's preference., CONCLUSION: The treatment strategy for patients with gunshot injuries to the torso mostly depends on the hemodynamic status of the patient. Whereas hemodynamically unstable patients require immediate operative measures like thoracotomy or laparotomy,

hemodynamically stable patients might be treated with minor surgical procedures (e.g. chest tube) or even conservatively.

3196. Lichter, H., et al. (1999). "Penetrating orbitocranial knife injury." Journal of pediatric ophthalmology and strabismus **36**(1): 44-46.

3197. Lidin, E., et al. (2022). "Hippocampal Expression of Cytochrome P450 1B1 in Penetrating Traumatic Brain Injury." International journal of molecular sciences **23**(2).

Hippocampal dysfunction contributes to multiple traumatic brain injury sequala. Female rodents' outcome is superior to male which has been ascribed the neuroprotective sex hormones 17beta-estradiol and progesterone. Cytochrome P450 1B1 (CYP1B1) is an oxidative enzyme influencing the neuroinflammatory response by creating inflammatory mediators and metabolizing neuroprotective 17beta-estradiol and progesterone. In this study, we aimed to describe hippocampal CYP1B1 mRNA expression, protein presence of CYP1B1 and its key redox partner Cytochrome P450 reductase (CPR) in both sexes, as well as the effect of penetrating traumatic brain injury (pTBI). A total 64 adult Sprague Dawley rats divided by sex received pTBI or sham-surgery and were assigned survival times of 1-, 3-, 5- or 7 days. CYP1B1 mRNA was quantified using in-situ hybridization and immunohistochemistry performed to verify protein colocalization. CYP1B1 mRNA expression was present in all subregions but greatest in CA2 irrespective of sex, survival time or intervention. At 3-, 5- and 7 days post-injury, expression in CA2 was reduced in male rats subjected to pTBI compared to sham-surgery. Females subjected to pTBI instead exhibited increased expression in all CA subregions 3 days post-injury, the only time point expression in CA2 was greater in females than in males. Immunohistochemical analysis confirmed neuronal CYP1B1 protein in all hippocampal subregions, while CPR was limited to CA1 and CA2. CYP1B1 mRNA is constitutively expressed in both sexes. In response to pTBI, females displayed a more urgent but brief regulatory response than males. This indicates there may be sex-dependent differences in CYP1B1 activity, possibly influencing inflammation and neuroprotection in pTBI.

3198. Lieb, A. S., et al. (1997). "Tetraparesis due to vertebral physeal fracture in an adult dog with congenital hypothyroidism." The Journal of small animal practice **38**(8): 364-367.

A four-year-old male affenpinscher was referred for evaluation of hindlimb weakness that had progressed to tetraparesis over a period of four weeks. Neurological examination was suggestive of a cervical spinal cord lesion. Radiographic examination revealed diffuse skeletal immaturity with open physes and epiphyseal dysplasia in long bones and vertebrae, consistent with a diagnosis of congenital hypothyroidism. Total and free serum T4 concentrations were very low, indicative of hypothyroidism. Survey radiographs of the cervical spine revealed a dorsally displaced Salter-Harris type I fracture of the cranial portion of the fourth cervical vertebra with the endplate present in the vertebral canal. Although signs of transverse myelopathy are uncommon in dogs with congenital hypothyroidism, they may be associated with either intervertebral disc protrusion or endplate displacement into the vertebral canal secondary to the epiphyseal abnormalities associated with congenital hypothyroidism.

3199. Liebenberg, W. A., et al. (2005). "Penetrating civilian craniocerebral gunshot wounds: a protocol of delayed surgery." Neurosurgery **57**(2): 293-299.

OBJECTIVE: Several factors have led to our unique approach of delayed definitive debridement. We wanted to evaluate the effectiveness of our management and compare it with the existing data in the literature., METHODS: We retrospectively reviewed the records of 194 patients presenting between January 1996 and October 2003 with penetrating craniocerebral gunshot wounds. After exclusion criteria, 125 patients qualified., RESULTS: Of the patients, 88.8% were male. The mean age was 24.9 +/- 10.9 years. In 70.4% of patients, the presenting Glasgow Coma Scale (GCS) score was 3 to 8. Only 38 (30.4%) of the 125 patients survived, with poor outcome in 2 and good outcome in 36. Bilaterally fixed and dilated pupils and bihemispheric tract on computed tomographic scan were significantly related to poor outcome. There were 49 surgical procedures performed on 27 of the patients, with a mortality rate of 7.4%. Of the 38 survivors, 13 underwent no surgery. Average time to surgery was 11.04 days. Total rate of infection was 8%, and it did not influence outcome. No patient presenting with a GCS score of 3 or 4 survived. Seventeen patients attended follow-up, for a total of 3609 days (average, 212 d) and very few late complications., CONCLUSION: Our supportive care

of patients is not optimal. We should have saved more of our patients who presented with GCS scores of 14 and 15 who subsequently died. We have been able to report unconventionally late surgical management of two-thirds of survivors, with no surgery in one-third of survivors. Despite a high rate of infectious complications, infection did not lead to death or disability. Our protocol rarely leads to patients surviving in a permanently vegetative state. In the future, we would perform early surgery for patients who present awake and continue our current management for poor-grade patients. In this way, we will improve the number of good outcomes without increasing the population of severely damaged and dependent survivors.

3200. Liebeskind, A. L., et al. (1973). "Spontaneous movement of an intracranial missile." Neuroradiology **5**(3): 129-132.

3201. Liebman, K. M., et al. (1996). "Endovascular management of aneurysm and carotid-cavernous fistulae from gunshot wounds to the skull base and oropharynx." The Journal of cranio-maxillofacial trauma **2**(2): 10-16.

The clinician must be aware of the potential for vascular injury that can result from gunshot wounds to the skull base and oropharynx. These lesions can be life-threatening or can result in irreversible neurologic defects. The goal is early diagnosis and efficient appropriate treatment. Endovascular therapy has been proven to be of great benefit for the treatment of traumatic aneurysms and carotid-cavernous fistulae. Utilizing either a reconstructive or a deconstructive approach, the traumatic lesions can be treated without the morbidity inherent to surgery of the skull base or cavernous sinus. This article discusses the authors' experience with endovascular treatment, explaining in detail the reconstructive and deconstructive approaches and providing clinical examples of the treatment of pseudoaneurysms and carotid-cavernous fistulae.

3202. Lignitz, E. and B. Madea (1994). "[Gunshot injuries in the orbital area]." Einschussverletzungen im Bereich der Orbita. **193**(5-6): 139-146.

Report on 4 cases with gunshot entrance wounds of the orbit or of periorbital regions. Among these cases is a certain suicide as well as a homicide where the physicians misdiagnosed the real cause of the perforating injury of the bulbus. In cases with single gunshot wounds and entrance in the orbit the diagnostic decision suicide or homicide may be impossible based alone on the anatomic findings.

3203. Liliang, P. C., et al. (2001). "Wooden splinter in the foramen magnum." Injury **32**(6): 497-498.

3204. Liliav, B. and R. Kalimuthu (2012). "Mantle design: a composite construct for orbital floor reconstruction." The Journal of craniofacial surgery **23**(4): 1125-1126.

We present a unique case of orbital floor and wall reconstruction after complete destruction by a self-inflicted gunshot wound. The complex comminuted fracture was repaired using a composite construct design (the mantle design) that was fixed in place using mini plates and screws. The designed composite graft was shaped exactly to fit the area of the orbital floor and maxilla to create stability and support for the globe. The orbital floor and maxilla were repaired using this special design, which was created based on the basic physical principles of mantle constructs that have been known for many years to be strong, durable, and stable. After surgery, radiologic evaluation revealed excellent placement of our construct. This particular reconstruction method may be used in patients with severe orbital bony destruction with no surrounding stable bony support elements, which are required to reconstruct the orbital floor in patients with trauma using either an autologous or a biologic implant.

3205. Lillard, P. L. (1978). "Five years experience with penetrating craniocerebral gunshot wounds." Surgical neurology **9**(2): 79-83.

This report reviews the clinical course and treatment of 83 cases of civilian penetrating craniocerebral gunshot wounds seen over a five-year period. The factors that determine mortality and morbidity are discussed. A conservative surgical approach in neurologically intact or less severely injured patients is re-emphasized. Increased intracranial

pressure appears to be a significant factor in more severely injured patients, and should be monitored and treated vigorously.

3206. Lim, B. X., et al. (2018). "Microbial characteristics of post-traumatic infective keratitis." European journal of ophthalmology **28**(1): 13-18.

PURPOSE: To determine the demographics, risk factors, clinical and microbiological characteristics, and treatment outcome of post-traumatic infective keratitis., METHODS: Consecutive patients with post-traumatic infective keratitis presenting to the Ophthalmology Department of a tertiary referral hospital in Singapore between March 2012 and March 2016 were prospectively identified. A standardized data collection form was used to document patient demographics, microbiological diagnosis, antibiotic sensitivity, and pretreatment and posttreatment ocular characteristics. Any contact lens-induced keratitis was excluded from the study., RESULTS: In total, 26 patients were included for analysis. The mean age was 40.0 years (SD +/- 19.4) and 84.6% of the patients were male. The majority of the patients (69.2%, n = 18) had sustained work-related injury in their eyes. Gram-negative organisms were predominant isolates (75.0%, n = 12) in culture-positive corneal scrapings (n = 16). Pan-sensitive Pseudomonas aeruginosa was the commonest organism isolated among the culture-positive cases (56.2%, n = 9). Three patients (18.7%) had developed fungal keratitis and Acanthamoeba was isolated in 1 patient (6.2%) with polymicrobial keratitis. Infections resolved with medical treatment in 22 eyes (84.6%) and 4 eyes (15.3%) required therapeutic corneal transplantation., CONCLUSIONS: A shift of practice in post-traumatic infective keratitis should be considered in tropical countries to include Gram-negative cover. Work safety practices with vigilance in initiating treatment and education by front-line physicians such as ophthalmology and general practitioners should be reinforced.

3207. Lim, J., et al. (2017). "Use of patient specific hardware in panfacial gun shot wound trauma." Journal of oral and maxillofacial surgery **75**(10): e410-e411.

Panfacial injuries from gunshot wounds present a challenge to even the most seasoned facial trauma surgeons. Military surgeons documented experience comprise conventional treatment of pan facial injury from gunshot wound. The civilian/ noncombat experience has roots in military medicine. Additionally, evolving technology, virtual surgical planning (VSP), selective laser melting (SLM) custom plates are now available at our disposal. Our case report describes pre-surgical planning with VSP and fabrication of predetermined dimensions and contoured custom SLM plate. With such preparation we were able to lessen the intraoperative burden with a shortened general anesthesia time and provided predictable surgical outcomes. Patient was arrived to level 1 trauma center as level 1 trauma alert. Patient was triaged via standard ATLS protocol. Initial treatment of irrigation and debridement, and application of external fixation (Ex-Fix) was performed. CT face of post debridement and Ex-Fix was obtained with 1mm cuts. This imaging information was electronically transferred to 3D Systems Healthcare (3D Systems Healthcare, Littleton, Colorado). All reduction was planned virtually. Reduced dimensions were then utilized to fabricate SLM custom plates (KLS Martin, Jacksonville, FL). Custom plate system included surgical guides for predrilling, zygomaticofrontal suture plate, anterior maxilla plate, mandible recon plate. Post-operative CT scan shows reduction of fracture identical to VSP as planned. 6 month follow-up reveals stable facial dimensions and reconstruction. The patient has returned to normal activities of daily living. Intraoperatively, considerable time was spent to negotiate fibrotic scar tissue to develop soft tissue envelope for the hardware, as well as mobilizing fractured segments. A limitation of VSP lies in the prediction of the soft tissue envelope. However, this surgical obstacle was expected with re-entering at 2 weeks post injury. VSP and SLM custom platting system may provide a superior treatment option to conventional techniques. The biggest challenge of VSP and SLM plating system in this particular application is that current manufacturing turnaround time is approximately 2 weeks, from planning to operating theater. The 2- week delay of treatment can result in additional operative time spent to negotiate fibrotic tissue. This challenges the goal of shortening general anesthesia time. However, there are still benefits of virtual preplanning, including less intraoperative decision making and high precision reduction of fractures. As with any commercial product and services, we expect to see shorter turnaround time of these resources as VSP and SLM custom plating system is more widely utilized and as the market matures. By streamlining the process such as organizing VSP, manufacture of SLM plates and surgical guides (possible domestic or local manufacture), and transportation, these resources may become available with lower turnaround time. Then VSP and SLM plating system may be more feasible and universally embraced for cases such as ours. Currently, VSP and SLM plating system may be reserved for patients with extensive facial fractures and comorbidities that preclude immediate definitive surgical intervention.

3208. Lim, L. W., et al. (2007). "Iatrogenic traumatic brain injury: penetration of Kirschner's knitting needle into the middle cranial cavity." The Journal of craniofacial surgery **18**(3): 674-679.

Traumatic penetrations of foreign objects into the craniocerebral cavity are often encountered in the department of emergency and traumatology. A 5-year-old child was brought to the department of pediatric neurosurgery with a severe headache and fatigue. On admission, the patient had initial neurologic examinations and radiologic scans. The consciousness assessment by Glasgow Coma Scale was 13. Neuroradiologic studies revealed a long hyperdense object extending from the extracranial cavity into the middle cranial fossa. A thorough history was obtained with attention to how and when the injury was sustained. Two weeks before the incident, the child had a blunt trauma of mandibular fractures with dislocation of the temporomandibular joint. Maxillomandibular surgery was performed with a Kirschner's knitting needle to fixate the temporomandibular articulation and simple interdental ligatures for mandibular fracture stabilization. The present radiologic film suggested that the mandibular fracture was not properly fixated allowing the mobilization of Kirschner's needle moving either externally or internally. A standard pterional access with frontotemporosphenoidal approach was performed according to the method of Yasargil and Oikawa-Miyazawa followed by an extradural approach method of Dolenc to the middle cranial structure at the skull base. Several stages of hemostasis were carried out with electrohemocoagulation on the penetrated Kirschner's needle during the needle extracting process at the extradural space of the middle cranial fossa. Two weeks postoperatively, computed tomography scan revealed the supratentorial and middle craniocerebral structures were in symmetric localization. The patient was free of neurologic deficits with no signs of excessive cerebrospinal fluid volume formation. In conclusion, the method of fixation requires appropriate application techniques to ensure adequate fracture fixation during the healing cascade. The neurosurgical approach also requires a specific measure on its management and rehabilitation for the maintenance of such a patient.

3209. Lim, M., et al. (2001). "An unusual case of ocular self-injury." Eye (London, England) **15**(Pt 5): 660-661.

3210. Lim, R. C., Jr., et al. (1972). "Liver trauma: current method of management." Archives of surgery (Chicago, Ill. : 1960) **104**(4): 544-550.

3211. Limaiem, R., et al. (2013). "An unusual clinical presentation of ocular trauma in a child." International ophthalmology **33**(1): 87-89.

To report an unusual clinical presentation of ocular trauma in a child. Observational case report used in this study. A 12 year-old previously healthy boy presented with decreased vision and corneal opacity in the right eye following a punch in the face three years earlier. At presentation, his vision in the right eye was counting fingers. Ophthalmologic examination of the right eye revealed paracentral Descemet's membrane detachment and slit-lamp examination showed corneal opacity occupying almost 80 % of the corneal surface. In addition, there was a corneal white liquid collection communicating with the anterior chamber. The contralateral eye was within normal limits. The patient underwent penetrating keratoplasty. Bacteriological cultures of the corneal liquid did not reveal the presence of germs. The post-operative course was uneventful, the graft was clear and there was no evidence of graft rejection or failure. Visual acuity in the operated eye was 5/10. At present, the patient is still being followed up. The authors believe that this case is unique since Descemet's membrane detachment with liquid collection and corneal opacification has never been reported in literature to date.

3212. Limb, R. and M. Hunn (2020). "Management of penetrating anterior skull base injury from transnasal foreign body." Journal of Neurological Surgery, Part B Skull Base **81**.

We report the unusual case of a 35-year-old man who presented post self-insertion of a foreign body (a toothbrush with the bristled end snapped off) transnasally while suffering from a drug-induced psychosis. The tip of the retained object extended intracranially as far as the right foramen of Munro and caused unilateral obstructive hydrocephalus requiring emergency external ventricular drain insertion. There was no evidence of significant intracranial hemorrhage on initial imaging but the postcommunicating segments of both anterior cerebral arteries were significantly displaced by the object. After deliberating the safest surgical approach, we elected to perform a bifrontal craniotomy to

approach the anterior fossa floor inter-hemispherically, to gain proximal control of the anterior cerebral arteries and protect them from laceration. Once this was achieved, the foreign body was removed transnasally by the ENT surgeon, who had performed prior ligation of the ipsilateral anterior ethmoidal artery to prevent catastrophic nasal hemorrhage. Nasoendoscopy revealed surprisingly little damage to the nasal cavity. The skull base defect was repaired utilizing split calvarial bone graft obtained during the craniotomy, and a vascularized pericranial flap. Postoperatively the patient did not develop a CSF leak and displayed no signs of meningitis. His psychosis self-resolved within two weeks postoperatively and he was discharged home after a 2- week course of intravenous antibiotics and with psychiatry input. A delayed postoperative MRI demonstrated no obvious abscess, empyema or cerebral infarction. On review of the literature, such extreme cases of skull base penetrating injury appear to be rare and there is little technical advice available on optimal surgical strategies. This case provides an opportunity to discuss the management of such injuries and adds to a currently scarce body of knowledge on the topic. (Figure Presented) .

3213. Lin, C. and M. Lind (2017). "Pediatric intraoral trauma and neurologic sequela." Otolaryngology - Head and Neck Surgery (United States) **157**(1): P278.

Objectives: To describe a case of penetrating intraoral injury resulting in internal carotid artery (ICA) thrombosis and neurologic sequela in a pediatric patient. To recognize appropriate management and intervention for intraoral trauma. Methods: A 3-year-old boy presented to our pediatric tertiary medical center with a penetrating intraoral injury sustained when he fell off of a bed with a pencil in his mouth. This resulted in penetration of the pencil lateral to the right maxillary molars. Initial imaging revealed the foreign body within the masticator space and abutting the ICA at the level of the jugular foramen. On initial evaluation, he was neurologically intact. Additional radiologic evaluation with a computed tomography angiogram revealed thrombosis of the ICA from just distal to the carotid bifurcation to the level of the skull base. Results: After consultation with neurosurgery and interventional radiology, the foreign body was removed in the operating room without significant bleeding. The child was started on anticoagulation and antibiotics. Subsequent magnetic resonance angiography revealed thrombosis in the right middle cerebral artery. The patient developed left hemiplegia on postoperative day (POD) 1. The child regained left-sided strength over the next week and was discharged on POD8 with physical therapy. Conclusions: While pediatric intraoral trauma rarely results in vascular injury and neurologic sequelae, imaging is needed in cases of penetrating trauma for timely diagnosis of thrombosis and medical and surgical intervention. Patients with internal carotid thrombosis can initially present in the “lucid interval” without neurologic symptoms and become symptomatic several hours to days later.

3214. Lin, C. H., et al. (2001). "Microsurgical tissue transplantation or replantation in patients with psychoneurological impairment." Plastic and reconstructive surgery **108**(5): 1211-1217.

Sometimes patients with a psychoneurological impairment present with a traumatic injury that requires either microsurgical replantation or free-tissue transfer. We reviewed 38 patients undergoing 40 microvascular operations; the patients included 26 patients with psychological impairment (group 1), 3 with mental disability (group 2), and 9 with an acquired head injury and consciousness disturbance (Glasgow Coma Scale score < or =14) (group 3). Patients with a psychological impairment, especially those with a self-inflicted injury, are often uncooperative and do not recognize the necessity of restorative procedures. A multidisciplinary approach by the trauma surgeon, plastic surgeon, psychiatrist, and neurosurgeon, with coordinated assistance from the physician, nurse, therapist, and family, is required for treatment. In our study the success rate of replantation was 77.8 percent (14 of 18); for free tissue transfer the success rate was 95.5 percent (21 of 22). The overall success rate of microsurgical procedures (87.5 percent, 35 of 40) was similar to that in the population at large. Patients with psychological impairment tend to be lost during follow-up; therefore, their functional results may be poorer than expected. Nonetheless, patients with psychological impairment should not be deprived of the benefits of restorative surgery.

3215. Lin, H.-L., et al. (2007). "Management of transorbital brain injury." Journal of the Chinese Medical Association : JCMA **70**(1): 36-38.

Transorbital brain injuries caused by metal bar penetration are uncommon and often cause serious damage without prompt treatment. Artifacts caused by the penetrating metal bar on computed tomography (CT) often obscure the actual brain damage along the path of penetration, and delayed treatment for the brain insult may result. We present 2 cases of transorbital brain injury following penetration by a metal bar. CT scans were initially performed on

both patients. However, image resolution was poor and the extent of brain damage could not be ascertained due to severe artifacts associated with the metal bars. Both patients deteriorated in the emergency room and subsequently received surgical intervention. One patient recovered uneventfully. Unfortunately, the other patient died following surgery due to an unrecognized intracranial hemorrhage with brain herniation. Based on this experience, we recommend prompt surgical decompression with early CT follow-up to determine the true extent of brain damage and assess for possible delayed events inpatients with extended transorbital brain injuries caused by metal bars.

3216. Lin, N., et al. (2016). "Treatment of distal anterior circulation aneurysms with the pipeline embolization device: A US multicenter experience." Clinical neurosurgery **79**(1): 14-22.

Background: Utilization of the Pipeline embolization device (PED) to treat distal carotid circulation aneurysms has not been well studied. OBJECTIVE: To report the collective experience of using PED to treat distal anterior circulation aneurysms. METHODS: We retrospectively reviewed clinical and radiographic records of all patients who underwent Pipeline embolization of distal anterior circulation aneurysms at 10 US neurosurgical centers between 2011 and 2013. RESULTS: Twenty-eight patients (mean age 51.7 years; 18 women) with 28 aneurysms were included in the analyses. Fifteen aneurysms were fusiform, 5 dissecting, and 8 saccular. Average aneurysm size was 12.3 mm; 7 were giant. Twenty aneurysms were located along the middle cerebral artery, 6 along the anterior cerebral artery, and 2 along the anterior communicating artery. PED deployment was successful in 27 patients, with coils utilized in 6 cases. Clinical follow-up was available for an average of 10.7 months (range 3-26). Twenty-seven patients had follow-up neurovascular imaging: 21 aneurysms had complete occlusion, 4 had residual neck filling, and 2 had residual dome filling. Periprocedural complications (<30 days) occurred in 3 patients (10.7%), including 1 case of device failure resulting in stroke. Outcomes were good (modified Rankin Scale score 0 to 2) in 27 patients (96.4%) and fair (modified Rankin Scale 3) in 1. CONCLUSION: PED can be utilized in the treatment of distal anterior circulation aneurysms with difficult anatomy for conventional surgical or endovascular techniques. Larger-scale studies with long-term follow-up are needed to further elucidate the durability of PED treatment and its effect on perforator-rich vascular segments.

3217. Lin, V. W., et al. (2010). "Rehabilitation for a facial transplant patient: A case report." PM and R **2**(9): S36-S37.

Patients or Programs: A 46-year-old woman who sustained a gunshot wound to the face in 2004. Program Description: The patient had 23 reconstructive surgeries before near-total face transplant surgery in December 2008. Before the transplant, she required assistance for activities of daily living (ADL), community mobility, ate a pureed diet, had no sense of smell, and had a tracheotomy. Social interaction was nearly impossible, due to devastating facial disfigurement, including a lack of a nose and maxilla. Setting: Tertiary care hospital. Results: PM&R, physical, occupational, and speech therapy consults were initiated 7 days after surgery. Baseline deficits included no right eye, legal blindness in left eye, tracheostomy and gastrostomy tubes. She used written word, head nods/shakes, and hand gestures for expressive communication. She had no deficits in receptive communication or cognition. Her ICU goals included functional mobility and ADLs to minimal assist in 2 weeks, nutrition with PEG feeding, the use of a beside commode, functional transfers, performance of all light ADLs and retraining in basic facial expressions such as smiling, frowning, and opening/closing eyes. She was discharged to a surgical unit 22 days after surgery. She accomplished mastery of her ADL, including dressing and toileting in the bathroom. She resumed grooming, including brushing and braiding her long hair. Bathing, facial grooming, and feeding were initially restricted due to concern for infection in a host under immunosuppressive therapy. She vocalized after capping the tracheostomy but continued to use the white board for complex communication. With a screen reader, she read books and handouts. After surgical placement of an obturator prosthesis, her speech improved. She began olfactory reeducation and feeding training. Within 2 weeks, she could identify smells of coffee and perfume, and began to drink coffee and eat full pureed meals with set up. Conclusions: 10 weeks after facial transplant, the patient made significant improvement in mobility, ADLs and communication skills, and was discharged from the hospital.

3218. Lindeman, R. C. (1979). "Temporal bone trauma and facial paralysis." Otolaryngologic clinics of North America **12**(2): 403-413.

Temporal bone trauma includes a wide range of injuries of greater and lesser severity, most of which require the immediate attention of an otolaryngologist. The most common temporal bone injuries encountered in an emergency room setting include longitudinal and transverse fractures of the temporal bone with and without facial paralysis,

labyrinthine concussion, foreign bodies in the external canal, penetrating injuries via the external auditory canal, and pressure injuries, including otitic barotrauma, water skiing accidents, blows or slaps to the ear or side of the head, and severe impact noise. A brief but inclusive examination can be performed within the limitations necessarily imposed by an emergency room setting. Cranial nerve screening, balance testing, hearing, and vestibular evaluation can be accomplished with a considerable degree of accuracy. To a large extent, the long term result reflects the quality of the initial examination.

3219. Linden, J. A. and G. S. Renner (1995). "Trauma to the globe." Emergency medicine clinics of North America **13**(3): 581-605.

Trauma to the globe is a common problem seen in the emergency department that may lead to significant permanent visual disability. Common causes of globe trauma include motor vehicle crashes, assaults, falls, and sports-related and occupational injuries. Rapid collection of accurate historical data, expedient physical examination, evaluation, and treatment are of paramount importance in preserving visual capacity. This article summarizes the initial diagnostic and therapeutic approach, important prognostic indicators, and delayed complications of the traumatized globe. Accurate diagnosis and proper disposition are vital in salvaging visual capacity.

3220. Lindfors, M., et al. (2019). "Prognostic performance of computerized tomography scoring systems in civilian penetrating traumatic brain injury: an observational study." Acta neurochirurgica **161**(12): 2467-2478.

BACKGROUND: The prognosis of penetrating traumatic brain injury (pTBI) is poor yet highly variable. Current computerized tomography (CT) severity scores are commonly not used for pTBI prognostication but may provide important clinical information in these cohorts., METHODS: All consecutive pTBI patients from two large neurotrauma databases (Helsinki 1999-2015, Stockholm 2005-2014) were included. Outcome measures were 6-month mortality and unfavorable outcome (Glasgow Outcome Scale 1-3). Admission head CT scans were assessed according to the following: Marshall CT classification, Rotterdam CT score, Stockholm CT score, and Helsinki CT score. The discrimination (area under the receiver operating curve, AUC) and explanatory variance (pseudo-R2) of the CT scores were assessed individually and in addition to a base model including age, motor response, and pupil responsiveness., RESULTS: Altogether, 75 patients were included. Overall 6-month mortality and unfavorable outcome were 45% and 61% for all patients, and 31% and 51% for actively treated patients. The CT scores' AUCs and pseudo-R2s varied between 0.77-0.90 and 0.35-0.60 for mortality prediction and between 0.85-0.89 and 0.50-0.57 for unfavorable outcome prediction. The base model showed excellent performance for mortality (AUC 0.94, pseudo-R2 0.71) and unfavorable outcome (AUC 0.89, pseudo-R2 0.53) prediction. None of the CT scores increased the base model's AUC ($p > 0.05$) yet increased its pseudo-R2 (0.09-0.15) for unfavorable outcome prediction., CONCLUSION: Existing head CT scores demonstrate good-to-excellent performance in 6-month outcome prediction in pTBI patients. However, they do not add independent information to known outcome predictors, indicating that a unique score capturing the intracranial severity in pTBI may be warranted.

3221. Lindner, D., et al. (2004). "Unusual penetrating cranio-orbital injury by a cut-off wheel." The Journal of craniofacial surgery **15**(2): 226-228.

The rare case of a penetrating cranio-orbital injury and the surgical treatment is presented. A 38-year-old woman was brought to the Emergency Unit of the University of Leipzig Hospital after suffering a severe craniocerebral injury from a broken cut-off wheel. A computed tomography (CT) scan demonstrated the entrance of the cut-off wheel with extension from the left sinus maxillaris and frontalis through the median part of the left-sided orbit to the anterior skull base. After removing the cut-off wheel and metal splinters, the neurosurgeon performed an osteoplastic bifrontobasal trepanation with revision of the wound channel. Three years later, the patient has no neurological deficit and the CT scan shows a small hypodensity behind the sinus frontalis on the left side.

3222. Lindstrom, A.-C., et al. (2014). "Detection of gunshot residues (GSR) on a self-inflicted gunshot wound." Pathology **46**(3): 260-263.

3223. Ling, E. A. (1979). "Electron microscopic study of macrophages appearing in a stab wound of the brain of rats following intravenous injection of carbon particles." Archivum histologicum Japonicum = Nihon soshikigaku kiroku **42**(1): 41-50.

Colloidal carbon was introduced intravenously into young rats to label circulating monocytes before the stabbing of the brain. The rats were sacrificed 1 to 14 days after the stab wound. In the rats sacrificed between 3 to 7 days after the stabbing, numerous phagocytic cells were present in the needle wound. Electron microscope study showed that some of these phagocytic cells carried intracytoplasmic carbon particles. These carbon-labelled cells showed features either of a monocyte, full-blown macrophages, or typical microglia. It is believed that they are all derived from circulating monocytes which have ingested carbon particles in circulation and thereafter invaded the stab wound.

3224. Ling, S., et al. (2009). "Crucial role of corneal lymphangiogenesis for allograft rejection in alkali-burned cornea bed." Clinical & experimental ophthalmology **37**(9): 874-883.

BACKGROUND: To examine the time course of hemangiogenesis, lymphangiogenesis, inflammation after corneal alkaline burns and compare with the importance of corneal hemangiogenesis, lymphangiogenesis and inflammation in allograft rejection on alkali-burned cornea bed, respectively., METHODS: Rat corneal hemangiogenesis and lymphangiogenesis were examined by whole mount immunofluorescence and double enzyme-histochemistry, and the state of corneal inflammation was evaluated by inflammation index scoring and histopathology. Then, corneal transplantations were divided into six groups and performed before the burn (group A) and on day 3 (group B), 2 weeks (group C), 5 weeks (group D), 6 weeks (group E) and 8 weeks (group F) after alkaline burns, respectively. The immune rejection of grafts was evaluated by interferon-gamma, interleukin-2 enzyme-linked immunosorbent assay and slit-lamp examination., RESULTS: Both corneal lymphatic and blood vessels reached the top 2 weeks after the burn. Corneal lymphangiogenesis disappeared 5 weeks after the burn, and corneal hemangiogenesis regressed completely 3 weeks later. Corneal inflammation was strong on day 3, but resolved 6 weeks after the burn. Compared with other groups, the mean survival time of groups B (4.67 +/- 1.03 days) and C (5.00 +/- 0.63 days) was significantly shorter ($P < 0.05$). The difference of mean survival time of grafts between group D (9.50 +/- 1.05 days) and group E (9.83 +/- 0.75 days), between group D and group F (10.00 +/- 0.89 days) was not significant ($P > 0.05$)., CONCLUSIONS: Corneal lymphangiogenesis presents for a shorter duration than corneal hemangiogenesis or corneal inflammation but plays a crucial role in allograft rejection on alkali-burned cornea bed.

3225. Link, M. J., et al. (2010). "Vagoglossopharyngeal-associated syncope due to a retained bullet in the jugular foramen." Skull Base **20**(2): 105-109.

Gunshot wounds (GSWs) to the head are frequently fatal. Rarely, the bullet may lodge in the skull base and not cause significant brain injury. Typically, the bullet fragments are felt to be inert and do not require operative extirpation if they are within the bony confines of the skull base. We report the case of a bullet in the jugular foramen causing recurrent syncope that resolved after surgical removal of the bullet. The medical records from a patient who suffered a GSW to the head were retrospectively reviewed and the treatment and outcome documented. In 2000, a 20-year-old man suffered a GSW to the head. Immediate evaluation revealed the bullet in the right skull base at the jugular foramen, but no parenchymal brain injury. One year after the GSW, he began to experience stereotypical spells resulting in loss of consciousness. Extensive cardiovascular workup was normal. In 2002, the patient underwent removal of the bullet. He has been syncope-free since the operation and returned to his career in the military. We believe the retained bullet in this patient was irritating the IXX cranial nerves, resulting in syncope, similar to the mechanism in vagoglossopharyngeal neuralgia. Removing the bullet relieved the irritation and stopped the syncopal spells.

3226. Linskey, M. E., et al. (1994). "Stereotactic localization and removal of a bullet in the third ventricle causing obstructive hydrocephalus after a cerebral gunshot wound: case report." The Journal of trauma **36**(6): 881-884.

A bullet, lodged in the pineal-posterior region of the third ventricle and causing obstructive hydrocephalus, was removed without damage to critical adjacent vascular structures using stereotactic localization followed by laser-guided stereotactic craniotomy. Stereotactic techniques provided precise target localization and allowed dissection to be restricted to the previously injured missile track, thus avoiding any additional morbidity from the surgical procedure.

3227. Lipke, K. J. and H. O. C. Gumbel (2013). "Management of injuries of the eye and its adnexa." Facial plastic surgery : FPS **29**(4): 310-315.

The face plays the main role in interpersonal communication and in aesthetic perception. What is more, on account of the complex eyelid anatomy required to ensure the functioning of the eye, the treatment of periocular injuries requires a profound knowledge of anatomy and plastic reconstructive surgery, even if a loss of soft tissue is involved. Many methods for the reconstruction of eyelid defects have been described in the current literature. These methods must be guided by the site and extent of the defect on the one hand and by cosmetic requirements on the other to produce best results in terms of form and function. The treatment of injuries in the area of the eyelid involves some peculiarities that must be considered. The management of large defects in particular requires the cooperation of all head surgery disciplines. Copyright Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.

3228. Lippa, S. M., et al. (2020). "United States Military Service Members Demonstrate Substantial and Heterogeneous Long-Term Neuropsychological Dysfunction after Moderate, Severe, and Penetrating Traumatic Brain Injury." Journal of neurotrauma **37**(4): 608-617.

The objective of the study was to examine long-term neuropsychological outcome after moderate, severe, and penetrating traumatic brain injury (TBI) in U.S. military service members and veterans (SMVs). Eighty-five SMVs with a history of moderate (n = 18), severe (n = 17), or penetrating (n = 26) TBI, or an injury without TBI (i.e., trauma control [TC], n = 24) were assessed five or more years (mean = 69.4 months; standard deviation = 35.6) post-injury. All passed performance validity tests. Participants completed a battery of neurocognitive tests and a personality inventory. Five cognitive domain composites, each composed of four test scores, and an overall test battery mean (OTBM) were computed. The penetrating TBI group performed worse than the TC group and/or the moderate TBI group on most cognitive domains and the OTBM. The severe TBI group also performed worse than the TC group and moderate TBI group on processing speed and the OTBM, and worse than the TC group on attention/working memory. Just more than half of participants with severe (56%) or penetrating (64%) TBI met criteria for mild neurocognitive disorder, with processing speed the most commonly impaired domain. In addition, 80% of TBI participants had one or more clinically elevated scales on the Minnesota Multiphasic Personality Inventory-2-Restructured Form R (MMPI-2-RF), with somatic complaints the most common elevation. In conclusion, there was significantly reduced cognitive and psychological functioning many years after severe and penetrating TBI in SMVs. Cognitive and psychological dysfunction, however, were highly variable, with a substantial minority of SMVs having good outcome. Long-term individualized support is necessary for individuals after moderate, severe, and penetrating TBI.

3229. Lippa, S. M., et al. (2021). "Blood Biomarkers Relate to Cognitive Performance Years after Traumatic Brain Injury in Service Members and Veterans." Journal of the International Neuropsychological Society : JINS **27**(5): 508-514.

OBJECTIVE: This study examines the relationship of serum total tau, neurofilament light (NFL), ubiquitin carboxyl-terminal hydrolase L1 (UCH-L1), and glial fibrillary acidic protein (GFAP) with neurocognitive performance in service members and veterans with a history of traumatic brain injury (TBI)., METHOD: Service members (n = 488) with a history of uncomplicated mild (n = 172), complicated mild, moderate, severe, or penetrating TBI (sTBI; n = 126), injured controls (n = 116), and non-injured controls (n = 74) prospectively enrolled from Military Treatment Facilities. Participants completed a blood draw and neuropsychological assessment a year or more post-injury. Six neuropsychological composite scores and presence/absence of mild neurocognitive disorder (MNCD) were evaluated. Within each group, stepwise hierarchical regression models were conducted., RESULTS: Within the sTBI group, increased serum UCH-L1 was related to worse immediate memory and delayed memory (R2DELTA = .065-.084, ps < .05) performance, while increased GFAP was related to worse perceptual reasoning (R2DELTA = .030, p = .036). Unexpectedly, within injured controls, UCH-L1 and GFAP were inversely related to working memory (R2DELTA = .052-.071, ps < .05), and NFL was related to executive functioning (R2DELTA = .039, p = .021) and MNCD (Exp(B) = 1.119, p = .029)., CONCLUSIONS: Results suggest GFAP and UCH-L1 could play a role in predicting poor cognitive outcome following complicated mild and more severe TBI. Further investigation of blood biomarkers and cognition is warranted.

3230. Lippa, S. M., et al. (2022). "APOE Is Associated With Serum Tau Following Uncomplicated Mild Traumatic Brain Injury." Frontiers in neurology **13**.

Background and Objectives: APOE e4 has been linked to poor outcome following traumatic brain injury (TBI); however, the mechanisms behind this relationship are unclear. Few studies have investigated the relationship between the APOE genotype and established brain related protein biomarkers following TBI. The purpose of this study was to examine this relationship in service members and veterans (SMVs) following TBI. Methods: Participants were 209 SMVs [124 uncomplicated mild TBI (mTBI); 85 complicated mild, moderate, severe, or penetrating TBI (mod-sev TBI)] prospectively enrolled in the DVBIC-TBICoE 15-Year Longitudinal TBI Study. APOE genotyping was undertaken using non-fasting blood serum samples. Participants were divided into three groups: APOE e2+, APOE e3/e3, and APOE e4+. Results: In participants with mTBI, those with the APOE e2 allele had significantly lower levels of tau than those with APOE e4 ($p = 0.005$, $r = 0.43$, medium-large effect size). Those with APOE e3/e3 trended toward having higher tau than those APOE e2+ ($p = 0.076$, $r = 0.20$, small-medium effect size) and lower tau than those with APOE e4+ ($p = 0.062$, $r = 0.21$, small-medium effect size). There were no significant differences in biomarkers based on APOE in the mod-sev TBI group. Discussion: This study is the first to demonstrate APOE genotype is related to serum tau levels following a mTBI, extending prior findings to human serum following mTBI. In addition to higher serum tau levels in APOE e4 carriers, lower tau levels were observed in APOE e2 carriers, suggesting a possible protective effect.

3231. Lippa, S. M., et al. (2019). "Plasma Tau and Amyloid Are Not Reliably Related to Injury Characteristics, Neuropsychological Performance, or White Matter Integrity in Service Members with a History of Traumatic Brain Injury." Journal of neurotrauma **36**(14): 2190-2199.

The aim of this study was to examine the relationship between plasma tau and amyloid beta-42 (Abeta42), neuropsychological functioning, and white matter integrity in U.S. military service members with (n = 155) and without (n = 42) a history of uncomplicated mild (n = 83), complicated mild (n = 26), or moderate, severe, or penetrating (n = 46) traumatic brain injury (TBI). We hypothesized that higher levels of tau and Abeta42 would be related to reduced neurocognitive performance and white matter integrity. Participants were enrolled prospectively from Walter Reed National Military Medical Center. Participants completed a blood draw, neuropsychological assessment, and diffusion tensor imaging (General Electric 3T) of the whole brain. From 20 neuropsychological test scores, five cognitive domain scores were computed. Measures of fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD), and radial diffusivity (RD) were generated for 18 regions of interest (ROIs). There was no relationship found between the plasma biomarkers and neurocognitive performance in any of the three TBI groups (all ps >0.05; all R2 changes <0.146). Although not reaching statistical significance after correction for multiple comparisons, higher tau and Abeta42 tended to be related to higher FA and lower MD, RD, and AD in patients with a history of moderate, severe, or penetrating TBI. There was no consistent relationship between either of the biomarkers and white matter integrity in the complicated and uncomplicated mild TBI groups. In addition, there was no significant relationship between the biomarkers and age, education, sex, race, bodily injury severity, time since injury, TBI severity, or number of TBIs (all ps >0.15). Future investigation in larger samples of moderate, severe, and penetrating TBI are needed. Other plasma biomarkers, including phosphorylated tau, exosomal tau, and interleukin-10, may be more promising measures to use in the diagnosis, management, and treatment of TBI.

3232. Lipponen, A., et al. (2019). "In Vitro and In Vivo Pipeline for Validation of Disease-Modifying Effects of Systems Biology-Derived Network Treatments for Traumatic Brain Injury-Lessons Learned." International journal of molecular sciences **20**(21).

We developed a pipeline for the discovery of transcriptomics-derived disease-modifying therapies and used it to validate treatments in vitro and in vivo that could be repurposed for TBI treatment. Desmethylclomipramine, ionomycin, sirolimus and trimipramine, identified by in silico LINCS analysis as candidate treatments modulating the TBI-induced transcriptomics networks, were tested in neuron-BV2 microglial co-cultures, using tumour necrosis factor alpha as a monitoring biomarker for neuroinflammation, nitrite for nitric oxide-mediated neurotoxicity and microtubule associated protein 2-based immunostaining for neuronal survival. Based on (a) therapeutic time window in silico, (b) blood-brain barrier penetration and water solubility, (c) anti-inflammatory and neuroprotective effects in vitro ($p < 0.05$) and (d) target engagement of Nrf2 target genes ($p < 0.05$), desmethylclomipramine was validated in a lateral fluid-percussion model of TBI in rats. Despite the favourable in silico and in vitro outcomes, in vivo assessment of clomipramine, which metabolizes to desmethylclomipramine, failed to demonstrate favourable effects on motor and memory tests. In fact, clomipramine treatment worsened the composite neuroscore ($p < 0.05$). Weight loss ($p < 0.05$) and prolonged upregulation of plasma cytokines ($p < 0.05$) may have contributed to the worsened somatomotor outcome. Our pipeline

provides a rational stepwise procedure for evaluating favourable and unfavourable effects of systems-biology discovered compounds that modulate post-TBI transcriptomics.

3233. Liška, M., et al. (2017). "Traumatic aneurysms of middle cerebral artery after a penetrating craniocerebral trauma." Ceska Radiologie **71**(1): 41-46.

I.iika M, Vulev I, Llikovi Z, Kozik J, StcAo A, Stcno |. Traumatic aneurysms of middle cerebral artery after a penetrating craniocerebral trauma Traumatic aneurysms of cerebral arteries (TCA) are rare ami therefore their pathophysiology and morfology is not so thoroughly known. The goal of this paper is to present a case report of a TCA after a penetrating craniocerebral trauma in a 17-ycars old adolescent. The patient was admitted to hospital after a stab injury with an iron pole. Initial CT of the head showed an intracerebral hematoma, traumatic subarachnoidal hemorrhage and intraventricular hematoma, without hydrocephalus. Patients clinical status was improving on conservative therapy, however on 18th day following trauma a sudden clinical deterioration oc- cured. Control CT scan showed rebleeding and CT angiography showed two aneurysms of the left middle cerebral artery, that were according to localisation and history considered as traumatic. The patient underwent a successful endovascular treatment of both aneurysms and was dismissed from the hostpital with a minor neurologic deficit with a tendency to improve. Given the high risk of vascular injury after penetrating head trauma the authors suggest to perform cerebral angiography in these patients. Prove of a traumatic aneurysm may lead to prompt treatment with better prognosis.

3234. Little, J. M., et al. (1986). "Liver trauma." The Australian and New Zealand journal of surgery **56**(8): 613-619.

A series of 97 patients has been studied who were treated for liver injury at Westmead Hospital between January 1979 and January 1985. Patients were noted to be younger than those reported in previous series from Sydney, and to have suffered more frequent, significant, head injuries. Paramedical roadside intervention probably allowed more patients to reach hospital alive than was the case before the advent of the Intensive Care Ambulance system. Improved organ imaging has allowed more confident non-operative management of 13% of patients. Hepatic resection has been used infrequently (10%). Packing has been used in six patients as part of the definitive treatment of severe injuries and coagulopathy, and to allow the transfer of a further seven patients from peripheral hospitals. Ten of these 13 patients survived. Head injury continues to be a major cause of death in these patients. Death from the liver injury itself is usually associated with high grade damage to the liver and the associated hepatic veins and vena cava. It is speculated that improvement in the management of these lethal injuries will come about only from the early identification of patients likely to have suffered such trauma, and the pre-operative control of bleeding. Balloon catheter placement under radiological control, to tamponade the inferior vena cava and abdominal aorta, is suggested as one means by which this goal might be achieved.

3235. Littleton, T., et al. (2011). "Comparison of selected outcomes for traumatic brain injury with intracranial hemorrhage resulting from falls." Journal of Head Trauma Rehabilitation **26**(5): 423-424.

Introduction/Rationale Falls are the second leading cause of trauma activations and often result in traumatic brain injury (TBI), a leading cause of morbidity and mortality. Guidelines for the diagnosis and management of TBI vary, but the literature is scant regarding the management of intracranial hemorrhages (ICH) <1 centimeter(cm). Current protocol at a Level I trauma center allows trauma surgeons to manage ICH <1 cm, but no evidence exists regarding the frequency of ICH management by trauma surgeons versus neurosurgeons or differences in patient outcome. We hypothesize no difference in outcomes for patients managed by a trauma surgeon compared with a neurosurgeon. Method/Approach This is a retrospective chart review of data collected in the trauma registry of JPS Health Network (JPS) from 2006 to 2011. Patients included in the study presented to JPS with fall as the primary mechanism of injury and TBI with an ICH <1 cm. Patients sustaining penetrating wounds and patients transferred to other acute care facilities were excluded from analysis. Results/Effects Between 2006 and 2011, 343 patients presented with a TBI resulting from a fall. Patients ranged in age from 13 to 100 years, with a mean age of 58.05 (SD = 21.48). Sixty-six percent were male (n = 225), 70% were white (n = 239), 88% (n = 302) received neurosurgical consultation, and 13% (n = 44) died.With respect to between neurosurgical management and trauma surgeon management, no significant differences were found between patients' condition on discharge, $\chi 2(2) = 1.28$, ns, destination at discharge, $\chi 2(4) = 1.47$, ns, and length of stay, $F(1, 341) = 2.46$, ns. Conclusions/Limitations Although not all TBIs are a result of falls, this homogenous sample of patients enables us to draw conclusions regarding patient outcomes based on management services in the absence of

co-morbidities. With the expected increase of the aging population, we predict an increase in the number of trauma activations resulting from falls. Due to the demand placed on neurosurgeons for more severe brain injuries, these data suggest patients managed by trauma surgeons could have comparable outcomes to those managed by neurosurgeons when ICH <1 cm.

3236. Litvack, Z. N., et al. (2006). "Self-inflicted nail-gun injury with 12 cranial penetrations and associated cerebral trauma. Case report and review of the literature." Journal of neurosurgery **104**(5): 828-834.

In this case report, the authors describe a 33-year-old man who presented with headache due to the presence of 12 nail-gun nails impacted in his cranium and cerebral parenchyma. The authors also review the relevant literature regarding penetrating brain injury. The patient's physical examination revealed a Glasgow Coma Scale score of 15 and impairment of abduction of the right eye and abduction of the jaw producing dysarthria; the remaining results of the neurological examination were normal. Both x-ray films and computerized tomography (CT) scans of the head revealed the presence of 12 nails, the majority of which were located intracranially. A scattering artifact limited the ability of CT scanning to demonstrate any intracranial hemorrhage. Angiography did not demonstrate any evidence of traumatic vascular injury. After general anesthesia had been induced in the patient, the nails were removed in the operating room. Following removal of the final nail, a small left temporal craniotomy was performed to control hemorrhage from a tear in the left middle meningeal artery. Despite the development of a postoperative insular hematoma, the patient was discharged home with minimal deficits. This patient is the only known survivor of the largest number of foreign objects (12) to penetrate the skull intentionally. Overall, self-inflicted nail-gun injuries are less common than accidental discharges. A review of the literature, however, suggests that for penetrating brain injury, self-infliction is the more common mechanism. For those patients who survive such an injury, clinical decision making must focus on preventing further cortical or vascular damage. A rational management strategy should permit these patients to be discharged with no additional injury.

3237. Litvinenko, A. D., et al. (1964). "[METHOD OF INTERNAL COMPRESSION METALLO-OSTEOSYNTHESIS WITH OSTEOPLASTY]." METOD VNUTRENNEGO KOMPRESSIONNOGO METALLOOSTEOSINTEZA S KOSTNO I PLASTIKO I. **25**: 34-38.

3238. Liu, D. (2010). "Common denominators in retained orbital wooden foreign body." Ophthalmic plastic and reconstructive surgery **26**(6): 454-458.

PURPOSE: To identify some of the common denominators in the diverse presentation of retained orbital wooden foreign bodies., METHODS: A review of 9 cases of previously unrecognized retained orbital wooden foreign bodies. Intervention included surgical removal of the foreign bodies in 8 cases and fistula repair in 1 case after spontaneous foreign body extrusion. Outcome measures included return of normal vision, absence of motility disturbance, and resolution of pain, inflammation, eyelid abnormalities, and other symptoms., RESULTS: Presenting symptoms were diverse and included motility disturbance (5 of 9 patients), conjunctival injection with or without discharge (5 of 9 patients), decreased vision (4 of 9 patients), draining fistula (4 of 9 patients), and localized pain or sensation of tightness in the eyelid (4 of 9 patients). Uncommon symptoms included proptosis (2 of 9 patients), ptosis (2 of 9 patients), lower eyelid retraction (2 of 9 patients), and pain on ocular movement (1 of 9 patients). The interval between the injury and the diagnosis of retained wooden foreign body ranged from 10 days to 42 weeks., CONCLUSION: Occasionally, not all of the wooden pieces are removed at the time of initial orbital exploration, despite best efforts. Signs and symptoms of retained orbital wooden foreign body vary greatly. There is no single specific diagnostic or pathognomonic finding. Heightened awareness and a high index of suspicion are keys to proper diagnosis. It is important to have a properly worded consent that includes the possibility of residual wooden foreign bodies and the need for subsequent surgical exploration.

3239. Liu, D. and E. Al Shail (2002). "Retained orbital wooden foreign body: a surgical technique and rationale." Ophthalmology **109**(2): 393-399.

OBJECTIVE: To emphasize the potential complications of a retained orbital wooden foreign body (WFB) and the rationale of a surgical technique., DESIGN: Two interventional case reports., PARTICIPANTS: Two patients sustained an

orbital WFB injury. Both patients had ocular complications despite repeated attempts to remove the suspected residues., INTERVENTION: Computed tomography and magnetic resonance imaging of both patients at different intervals revealed evidence of orbital foreign body migration toward the cranium. A surgical technique combing transcranial and orbital approaches was used to remove the residues., MAIN OUTCOME MEASURES: Preoperative and postoperative vision, proptosis, ocular motility, and various ocular symptoms and signs., RESULTS: In both patients, no postoperative complications were seen, and all preoperative symptoms and signs were resolved at 9- and 19-month follow-ups, respectively., CONCLUSIONS: A retained orbital WFB can cause early or late complications and is known to have the potential to migrate intracranially. In selected patients, a team approach may be the best technique to ensure complete removal.

3240. Liu, H.-C., et al. (2008). "[Neurosurgical therapy of transorbital intracranial foreign bodies: review of 28 cases]." Zhonghua yi xue za zhi **88**(25): 1737-1741.

OBJECTIVE: To discuss the benefits and complications of the neurosurgical therapy in transorbital intracranial foreign bodies., METHODS: The clinical data of 28 cases of transorbital intracranial foreign bodies, metallic in 13 cases, vegetal 5 cases, and vitreous, plastic and other kinds in 10 cases, were analyzed retrospectively. Optic nerve injury was found in 13 cases, orbital apex syndrome in 11 cases; CSF rhinorrhea in 13 cases, CSF orbital leak in 3 cases, and hemiplegia in 2 cases. All the patients underwent head CT scan, and orbital horizontal and coronal CT scan. The patients with metallic foreign bodies had DSA exams, and the non-metallic cases had MRA scans. 22 cases had orbital-frontal craniotomy and foreign body resection, and 6 cases had direct foreign body extraction. All the cases received antibiotic and nerve nutritional therapy postoperatively., RESULT: The cases in which the foreign bodies came from the orbital roof into the skull recovered well postoperatively; and the cases in which the foreign bodies came from the superior orbital fissure into the skull showed hemiplegia (n = 2) or orbital apex syndrome (n = 6) postoperatively., CONCLUSION: Transorbital intracranial foreign body should be diagnosed in early stage to avoid missed diagnosis. Omission should be avoided during resection of the foreign body. The relationship between the foreign body and internal carotid artery should be examined carefully before the extraction. Direct extraction of foreign body causes less injury, and patients' condition should be followed up.

3241. Liu, M. T., et al. (2020). "Considerations for Management of Craniomaxillofacial Trauma in COVID-19 Patients." Plastic and reconstructive surgery **146**(2): 248e-250e.

3242. Liu, N., et al. (2011). "A novel model of traumatic brain injury that shows graded brain damage and behavioral deficits." Journal of neurotrauma **28**(5): A18.

Background: Animal models of traumatic brain injury (TBI) are essential for testing novel hypotheses and therapeutic interventions. Unfortunately, no single model has been able to reproduce the entire spectrum of these injuries. Dominant models currently used by investigators to examine focal injuries include the closed head injury (CHI), fluid percussion injury (FPI), and controlled cortical impact (CCI) injury models. CHI is produced by weight-dropping, and induces obvious brain damage and functional deficits. However, the force used may cause skull fracture and high mortality. The CCI model utilizes a rigid, piston-like impactor to produce a graded TBI. Because of the softness of the brain tissue, tip plunge imitates a penetration brain injury, and does not cause diffuse brain deformation and distinct functional deficits. In this study, we combined advantages of both the CHI and CCI models, and developed a new model of TBI that produces graded brain injury and functional deficits in mice. Methods: C57BL/6 mice (age 10 weeks, weight 20 g) were divided into four groups based on impact depth: sham, 0.5 mm, 1.0 mm, and 1.5mm from the surface of the skull. A midline craniotomy (5-mm diameter) was performed extending 2mm anteriorly and 3mm posteriorly from the bregma, centered over the sagittal suture. The skull flap was left in place and stabilized with adhesive, allowing for direct impact of the exposed skull without producing fractures. A bilateral cortical impact on the surface of the skull flap was performed using an electromagnetic impactor (tip diameter 3 mm, speed 3m/sec, and dwell time 50 msec). Following injury, the mice were subjected to a variety of cognitive and behavioral tests, and 4 weeks later they were sacrificed for histopathological examination. Results: Our results showed that the injury significantly decreased the neuroscore and increased foot drops in a severity-dependent manner, suggesting that our TBI model can produce graded motor deficits. In addition, Morris water maze testing showed increased latency to locate the hidden platform in a severity-dependent manner, suggesting that our model can produce graded memory deficits. Furthermore, adhesive removal testing

showed significant increases in time-tocontact and time-to-remove the adhesive tape from the paw in a severity-dependent manner, indicating graded somatosensory and motor deficits. Histological analysis showed a clear gradation in brain tissue damage following graded brain injuries. Conclusion: These findings collectively suggest that the current model may offer a sensitive, reliable, and clinically relevant model for the assessment of therapeutic strategies for TBI.

3243. Liu, P., et al. (2016). "Treatment of Pediatric Traumatic Intracranial Pseudoaneurysm Using Endovascular Covered Stent: Three Case Reports." World neurosurgery **88**: 693.e691-693.e696.

BACKGROUND: Pediatric traumatic intracranial pseudoaneurysm (TIPA) is a relatively rare clinical entity resulting from blunt, penetrating, or iatrogenic head trauma. The diagnosis, management, and prognosis of patients with pediatric TIPA is not well understood. Surgical craniotomy for TIPA is a high-risk operation. Advancements in minimally invasive technology have allowed for endovascular reconstruction of TIPA., CASE DESCRIPTION: We present our experience with use of endovascular covered stents for treatment of 3 pediatric patients with TIPA. The clinical and radiologic characteristics are presented. No procedure-related complications or deaths occurred during follow-up., CONCLUSIONS: In this study, the use of the Willis covered stent was associated with favorable prognoses in 3 patients with TIPA. No major complications were encountered during follow-up. The Willis covered stent appears to be a viable therapeutic modality in these patients. A definitive prognosis assessment will necessitate prospective clinical trials with longer duration of follow-up.

3244. Liu, Q., et al. (2002). "Up-regulation of cadherin-2 and cadherin-4 in regenerating visual structures of adult zebrafish." Experimental neurology **177**(2): 396-406.

Cadherins are homophilic cell adhesion molecules that control development of a variety of tissues and maintenance of adult structures. In this study, we examined expression of zebrafish cadherin-2 (Cdh2, N-cadherin) and cadherin-4 (Cdh4, R-cadherin) in the visual system of adult zebrafish after eye or optic nerve lesions using immunocytochemistry and immunoblotting. Both Cdh2 and Cdh4 immunoreactivities were specifically up-regulated in regenerating retina and/or the optic pathway. Furthermore, temporal expression patterns of these two cadherins were distinct during the regeneration of the injured tissues. Cadherins have been shown to regulate axonal outgrowth in the developing nervous system, but this is the first report, to our knowledge, of increased cadherin expression associated with axonal regeneration in the vertebrate central nervous system. Our results suggest that both Cdh2 and Cdh4 may be important for regeneration of injured retinal ganglion cell axons.

3245. Liu, R., et al. (2018). "Gunshot penetrating brain injury in children: report of three cases with review of the literature." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **34**(8): 1459-1463.

INTRODUCTION: Gunshot penetrating brain injury is common in military conflict area and in urban violence area, but similar incident in pediatric population is rarely reported., CASE REPORT: We reported three cases of gunshot penetrating brain injury in children. Two patients had a good recovery after surgery and no significant deficit on his neurologic function, the other patient was not having surgery due to the severity of the condition., CONCLUSIONS: We suggest surgery should be performed immediately to prevent further injury and refractory brain edema due to the injury, in any case of penetrating brain injury; a good prognosis can be achieved from early surgery and with appropriate post-operative treatment.

3246. Liu, S., et al. (2018). "Ileocecal junction perforation caused by a sewing needle in incarcerated inguinal hernia: An unusual case report." Medicine **97**(22): e10787.

INTRODUCTION: This case study is concerning the meticulous observation of the moving process and track of 2 ingested needles using interval x-ray radiography, trying to localize the foreign bodies and reduce unnecessary exploration of digestive tract., CASE PRESENTATION: An unusual case of a 1-year, 9-month-old female baby, with incarcerated hernia perforation caused by sewing needles with sharp ends, was reported herein. The patient had swallowed 2 sewing needles. One needle was excreted uneventfully after 8 days. On the contrary, the other needle stabbed the ileocecal junction wall into the right side of inguinal hernia sac after 9 days, and the patient received successful operation management. Interval x-ray confirmed that 1 needle-like foreign body moving down in 8 days until

excretion along with feces. However, the other pierced into the incarcerated hernia. Preoperative x-ray radiography successfully monitored the moving process and tract of the sewing needles. Considering the penetrating-migrating nature of the foreign bodies, once the sharp-pointed objects were located, they should be removed as the mortality and risk of related complications may be increased., CONCLUSION: Interval x-ray radiography represents a meticulous preoperative monitoring method of the moving process and tract of needle-like foreign bodies. Interval x-ray with real-time images accurately detecting the moving foreign bodies could be help to reduce the unnecessary exploration of digestive tract and subsequently prevent possible complications. Based on the basic findings from the interval x-ray, treatment choices of endoscopic removal and surgical intervention may be attempted.

3247. Liu, S.-Y., et al. (2008). "Endonasal transsphenoidal endoscopy-assisted removal of a shotgun pellet in the sphenoid sinus: a case report." Surgical neurology **70 Suppl 1**: S1-9.

BACKGROUND: Gunshot accidents are not uncommon in Taiwan, but involvement limited to the ocular region and sphenoid sinus is rare. Minimal invasive treatment by endonasal transsphenoidal endoscopy-assisted procedure should be considered if there are no additional injuries in the craniocerebral region., CASE DESCRIPTION: A 39-year-old man had severe pain in the left eye with resulting blindness after being accidentally hit in the left eye by a gunshot pellet while walking in a wooded area. He was referred from another hospital with the impression of left eyeball rupture. There was no severe neurologic deficit except for blindness of the left eye when he arrived at the emergency department of our hospital. Brain and orbits CT scans showed a round metallic foreign body at the right sphenoid sinus without predominant damages of brain parenchyma. Endonasal transsphenoidal endoscopy-assisted procedure was used to remove the shotgun pellet, and the patient had good clinical outcomes., CONCLUSION: Herein we present this rare case to show the possibility of a shotgun pellet injury remaining in the sphenoid sinus. The role of radiological studies such as CT scans and intraoperative C-arm fluoroscope plain films in diagnosis and management of this case is affirmed. The strategy of minimally invasive treatment by endonasal transsphenoidal endoscopy-assisted procedure for those limited injuries is a good choice for treatment.

3248. Liu, W., et al. (2019). "Role of Exosomes in Central Nervous System Diseases." Frontiers in Molecular Neuroscience **12**.

There are many types of intercellular communication, and extracellular vesicles are one of the important forms of this. They are released by a variety of cell types, are heterogeneous, and can roughly be divided into microvesicles and exosomes according to their occurrence and function. Of course, exosomes do not just play a role in cell-to-cell communication. In the nervous system, exosomes can participate in intercellular communication, maintain the myelin sheath, and eliminate waste. Similarly, exosomes in the brain can play a role in central nervous system diseases, such as stroke, Alzheimer's disease (AD), Parkinson's disease (PD), prion disease, and traumatic encephalopathy (CTE), with both positive and negative effects (such as the transfer of misfolded proteins). Exosomes contain a variety of key bioactive substances and can therefore be considered as a snapshot of the intracellular environment. Studies have shown that exosomes from the central nervous system can be found in cerebrospinal fluid and peripheral body fluids, and that their contents will change with disease occurrence. Because exosomes can penetrate the blood brain barrier (BBB) and are highly stable in peripheral circulation, they can protect disease-related molecules well and therefore, using exosomes as a biomarker of central nervous system diseases is an attractive prospect as they can be used to monitor disease development and enable early diagnosis and treatment optimization. In this review, we discuss the current state of knowledge of exosomes, and introduce their pathophysiological roles in different diseases of the central nervous system as well as their roles and applications as a viable pathological biomarker.

3249. Liu, W.-H., et al. (2011). "Transorbital penetrating brain injury by branchlet: a rare case." The Journal of emergency medicine **41**(5): 482-485.

Penetrating injury of the brain and skull is uncommon, representing about 0.4% of head injuries. With advances in radiological techniques such as high-resolution and reconstruction computed tomography (CT), assessment of injuries is more accurate and easier. In this article, we report the case of a 46-year-old man presenting with head injury after a branchlet had penetrated through the right orbit into the brain. CT scan of the brain revealed diffuse subarachnoid hemorrhage, intraventricular hemorrhage, and mild obstructive hydrocephalus. CT scan of the brain with reconstruction revealed that the branchlet tip penetrated through the medial aspect of the right orbit to the parasellar region. CT scan

of the brain with contrast showed gradual tapering of the right proximal internal carotid artery with total occlusion after the carotid bulb. Advance radiological examinations, such as three-dimensional CT, are required to obtain the correct emergent diagnosis and treatment of such injuries. Copyright A© 2011 Elsevier Inc. All rights reserved.

3250. Liu, W.-K., et al. (2009). "A delayed frontorbital abscess caused by a penetrating nonmissile foreign body (a bamboo stick)." Neurology India **57**(2): 208-210.

We report an interesting case of delayed frontal abscess caused by a penetrating nonmissile foreign body, a bamboo stick in a 1.5-year-old male child. A parietal craniotomy was performed, and the brain abscess was resected along with the foreign body without any damage to the surrounding brain tissue. He also received the appropriate antibiotics. The child made a good recovery.

3251. Liu, Y., et al. (2010). "Fabrication and surface characterization of single crystal PtBi and PtPb (100) and (001) surfaces." Physical chemistry chemical physics : PCCP **12**(40): 12978-12986.

High quality single crystal PtM (M = Bi or Pb) (100) and (001) surfaces have been generated from solid state bulk materials. The specific orientation was determined via X-ray Laue back-reflection and the miscut angles of the single crystal surfaces were ~0.3degree which was limited by instrumental resolution. The PtM (001) electrode had a Pt termination based on cyclic voltammetric (CV) profiles. The surface structure and composition of single crystal PtM surfaces have been studied by synchrotron-based in situ X-ray grazing incidence diffraction (GID) under active electrochemical control. Cycling of the potential to increasingly high values resulted in dramatic changes to the surface crystalline structure and composition of these single crystal electrodes. Well-defined Pt nano-domains in a hexagonal pattern with a 23degree offset angle to the substrate were formed on the PtM (001) surface after electrochemical pretreatment in supporting electrolyte (0.1M H(2)SO(4)), especially for E(ulp) (E(ulp) = upper limit potential) of +0.80 V or beyond. From an analysis of the diffraction peaks, the size of the Pt domains was estimated to be ~15 nm. The Pt domain formation on the single crystal surfaces, similar to results on polycrystalline intermetallic phases, was due to leaching of the less-noble elements (Bi or Pb) from the intermetallic matrix and sintering of the Pt atoms on the surfaces. On the other hand, Pt domains with a preferential direction but no offset angle to the substrate were formed on PtM (100) surface after similar electrochemical pretreatment. PtBi and PtPb single crystal surfaces exhibited different anisotropic electrocatalytic activities towards the electrooxidation of formic acid and other potential fuels for fuel cell applications. The reactivities of these single crystal electrodes towards the oxidation of small organic molecules were a function of E(ulp) values and maximal activities were around +0.60 V for PtBi(001) surface which might be due to formation of partially oxidized surfaces but around +1.20 V for PtPb(100) and (001) surfaces which might be due to the increasing boundary lines of Pt and PtPb grains.

3252. Liu, Y., et al. (2017). "Comparison of efficacy and safety of different chemotherapy regimens for progressive patients with brain metastasis of small cell lung cancer after radiotherapy." Cancer Research and Clinic **29**(3): 172-175 and 179.

Objective To analyze the efficacy and safety of different chemotherapy regimens for treatment of progressive patients with small cell lung cancer (SCLC) brain metastasis after radiotherapy. Methods 96 SCLC brain metastasis patients with progressive intracranial lesions after radiotherapy were divided into four groups: carmustine group (Group A, 28 cases), temozolomide group (Group B, 19 cases), topotecan group (Group C, 24 cases) and no chemotherapy group (Group D, 25 cases). Results In terms of brain metastases, there were no complete response cases in the whole groups. The rates of partial remission (PR), stable disease (SD) and progression of disease (PD) in Group A were 17.8 % (5/28), 53.6 % (15/28) and 28.6 % (8/28), respectively, the response rate (RR) of intracranial lesions was 17.9 % (5/28), and disease control (CR + PR + SD) rate was 71.4 % (20/28). The rates of PR, SD and PD in Group B were 15.8 % (3/19), 63.2 % (12/19) and 21.1 % (4/19), respectively, the RR of intracranial lesions was 15.8 % (3/19), and disease control rate was 78.9 % (15/19). The rates of PR, SD and PD in Group D were 8.3 % (2/24), 54.2 % (13/24) and 37.5 % (9/24), respectively, the RR rate of intracranial lesions was 8.3 % (2/24), and disease control rate was 62.5 % (15/24). In Group D, there was no response case, and 20 patients with PD (80.0 %) were found. The median progression-free survivals (PFSs) were (3.64±0.43) months, (4.68 ±0.49) months, (3.58 ±0.50) months, (2.60 ±0.31) months in Group A, B, C and D, respectively, and the median overall survivals (OSs) were (18.80±1.74) months, (18.76±1.85) months, (19.10±1.64) months and (9.64±0.84) months, respectively. The median OS of Group A, B or C was longer than that of Group D (P = 0.002). The

differences of grade HI - IV hematologic toxicities among the four subgroups were not statistically different. Patients in Group B had better tolerance to nausea and vomit. In Group D, the central nervous system symptoms such as fatigue and headache occurred frequently. Conclusions The response rate and OS of SCLC brain metastasis patients with progressive intracranial lesions after radiotherapy are improved after chemotherapy, however, PFS is not significantly prolonged. The efficacies of carmustine, temozolomide and topotecan are similar in short and long term, besides, temozolomide shows less adverse events and a higher disease control rate. The application of chemotherapy that could penetrate the blood-brain barrier can improve the efficacy on SCLC brain metastasis patients with progressive intracranial lesions after radiotherapy with well tolerance.

3253. Liuzzi, G. M., et al. (2011). "In vitro cell toxicity and matrix metalloproteinase-9 inhibition by antiretroviral drugs in cultured primary astrocytes." Infection **39**: S66.

Background: The toxic effects of new antiretroviral drugs on the central nervous system (CNS) are unclear. Because these drugs penetrate the brain even at low concentrations, it becomes crucial to determine the doses which can be toxic for the CNS resident cells. Moreover, after the recent introduction into clinical practice, it is unclear whether the efficacy of the antiretroviral drugs of new generation may also derive from their ability to exert extravirological effects on factors responsible for the development of HIV brain injury, e.g. matrix metalloproteinases (MMPs). Objective: To investigate on the toxicity of four different antiretroviral drugs and their ability to modulate the activity of MMPs in astrocyte cultures. Methods: Primary cultures of rat astrocytes were activated by exposure to 10 ?g/ml lipopolysaccaride (LPS) (positive control) and simultaneously treated for 20 h with increasing doses (1-5-10-25. 50 ?M) of: Efavirenz (EFV); Darunavir (DRV); Maraviroc (MVC) or Raltegravir (RAL). Culture supernatants were subjected to gelatin zymography for the assessment of MMP-2 and MMP-9 protein levels. Quantitative determination of MMP-9 and MMP-2 was done by computerized scanning densitometry. Single drug toxicity was assessed by the MTT test. Each drug was considered toxic at the concentration able to induce a percentage of cell survival above 60%. Results: The treatment with antiretroviral drugs inhibited MMP-9 levels in LPS-activated astrocytes in a dose-dependent manner, while no statistically significant changes of MMP-2 levels were observed. In particular, a statistically significant inhibition of MMP-9 was observed when astrocytes were treated with 25?M EFV (60% of inhibition) or with 50 ?M RAL (40% of inhibition). As assessed by the MTT test, the toxicity of the antiretrovirals ranges from 10 and 50 ?M. In particular, EFV was toxic for astrocytes at the concentration of 25 ?M, MVC at 10 ?M, while DRV and RAL were toxic at the concentration of 50?M. Conclusions: The present results indicate that EFV and RAL directly inhibit MMP-9 levels in LPS-activated astrocytes with mechanisms that are independent from their antiviral activity. The toxic doses of antiretrovirals are much higher than those found in the CSF of HIVpositive patients. Our results highlight some beneficial/deleterious extra-viral effects of the antiretroviral drugs that may be useful to improve the development of new therapeutic strategies for the management of HIV infection.

3254. Lively, S. and L. C. Schlichter (2012). "SC1/hevin identifies early white matter injury after ischemia and intracerebral hemorrhage in young and aged rats." Journal of neuropathology and experimental neurology **71**(6): 480-493.

The progression of white matter damage after ischemic and hemorrhagic strokes can exacerbate the initial injury, but little is known about the processes involved. We show that the antiadhesive matricellular glycoprotein SC1 is a novel early marker of white matter damage in 3 models of acute injury in the rat striatum: transient focal ischemia, intracerebral hemorrhage, and a needle penetration wound. SC1 was restricted to the damaged portions of axon bundles that bordered stroke lesions in young-adult and aged rats. SC1 peaked at 1 and 3 days after intracerebral hemorrhage and at 7 days after ischemia. The SC1-positive bundles usually expressed degraded myelin basic protein and amyloid precursor protein, a marker of axonal injury. At the hematoma edge, SC1 was seen in a few axon bundles that retained myelin basic protein staining. In these bundles, punctate SC1 staining filled individual axons, extended beyond a core of pan-axonal neurofilament and NF200 and was inside or overlapped with myelin basic protein staining when it was present. Aged rats had less SC1 (and amyloid precursor protein) after both types of stroke, suggesting a reduced axonal response. SC1 also labeled amyloid precursor protein-positive axon bundles along the needle penetration tract of saline-injected rats; thus, SC1 appears to characterize damaged striatal white matter damage after multiple types of injury.

3255. Livshits, L. I., et al. (1981). "[Medical rehabilitation of patients with sequelae of war injuries of the nervous system]." Aktual'nye voprosy meditsinskoi reabilitatsii bol'nykh s posledstviiami travm nervnoi sistemy voennogo vremeni.(11): 89-92.

3256. Llompart-Pou, J. A., et al. (2009). "Contrast-enhanced transcranial color sonography in the diagnosis of cerebral circulatory arrest." Transplantation proceedings **41**(5): 1466-1468.

OBJECTIVE: We sought to determine the utility of constrat-enhanced transcranial color sonography (TCCS) in the diagnosis of cerebral circulatory arrest in cases of difficult acoustic window., MATERIALS AND METHODS: From January 2007 to July 2008, we prospectively studied 50 patients who fulfilled clinical criteria of brain death. In all cases, we performed TCCS aiming to insonate both middle cerebral arteries (MCA) and the basilar artery (BA). In those case in which insonation of any vessel was not possible, we repeated the exploration after injecting a 2.5-mL bolus of sulphurhexafluoridedispersion. Afterward, we compared the rate of insonation of the vessels and the number of conclusive studies., RESULTS: The mean patient age was 53.2 +/- 15.9 years. Thirty-two were men (64%). The most frequent neurologic injury was hemorrhagic stroke and traumatic brain injury. Contrast-enhanced TCCS resulted in an increased rate of insonation in both MCA and in BA, and in the number of conclusive studies., CONCLUSIONS: Contrast-enhanced TCCS increased the number of conclusive studies with cerebral circulatory arrest, which minimized the importance of a previous study in cases with a poor acoustic window.

3257. Lobintsev, V. G., et al. (1998). "Gunshot perforating nonpenetrating wound of skull with favourable outcome." Zhurnal Ushnykh Nosovykh i Gorlovykh Boleznei(4): 73-75.

3258. Loes, D. J., et al. (1987). "Pen injury: a rare complication." Pediatric neurology **3**(1): 44-47.

An 18-month-old male sustained an intra-oral injury after falling on a pen. The internal carotid artery was occluded without evident neurologic deficit. The pen tip was surgically removed from the cerebellum.

3259. Lofstrom, J. E., et al. (1946). "The early pneumoencephalographic findings following penetrating wounds of the brain." Radiology **47**: 1-9.

3260. Loggini, A., et al. (2022). "Case Report: Management of Traumatic Carotid-Cavernous Fistulas in the Acute Setting of Penetrating Brain Injury." Frontiers in neurology **12**.

Traumatic carotid-cavernous fistulas (tCCFs) after penetrating brain injury (PBI) have been uncommonly described in the literature with little guidance on optimal treatment. In this case series, we present two patients with PBI secondary to gunshot wounds to the head who acutely developed tCCFs, and we review the lead-up to diagnosis in addition to the treatment of this condition. We highlight the importance of early cerebrovascular imaging as the clinical manifestations may be limited by poor neurological status and possibly concomitant injury. Definitive treatment should be attempted as soon as possible with embolization of the fistula, flow diversion via stenting of the fistula site, and, finally, vessel sacrifice as possible therapeutic options.

3261. Loggini, A., et al. (2021). "Neuroendocrine Dysfunction in the Acute Setting of Penetrating Brain Injury: A Systematic Review." World neurosurgery **147**: 172-180.e171.

BACKGROUND: Data on neuroendocrine dysfunction (NED) in the acute setting of penetrating brain injury (PBI) are scarce, and the clinical approach to diagnosis and treatment remains extrapolated from the literature on blunt head trauma., METHODS: Three databases were searched (PubMed, Scopus, and Cochrane). Risk of bias was computed using the Newcastle-Ottawa Scale, or the methodological quality of case series and case reports, as indicated. This systematic review was registered in PROSPERO (42020172163)., RESULTS: Six relevant studies involving 58 patients with PBI were included. Two studies were prospective cohort analyses, whereas 4 were case reports. The onset of NED was acute in all studies, by the first postinjury day. Risk factors for NED included worse injury severity and the presence of cerebral edema on imaging. Dysfunction of the anterior hypophysis involved the hypothalamic-pituitary-thyroid axis, treated with

hormonal replacement, and hypocortisolism, treated with hydrocortisone. The prevalence of central diabetes insipidus was up to 41%. Most patients showed persistent NED months after injury. In separate reports, diabetes insipidus and hypocortisolism showed an association with higher mortality. The available literature for this review is poor, and the studies included had overall low quality with high risk of bias., CONCLUSIONS: NED seems to be prevalent in the acute phase of PBI, equally involving both anterior and posterior hypophysis. Despite a potential association between NED and mortality, data on the optimal management of NED are limited. This situation defines the need for prospective studies to better characterize the clinical features and optimal therapeutic interventions for NED in PBI.

3262. Loggini, A., et al. (2020). "Management of civilians with penetrating brain injury: A systematic review." Journal of critical care **56**: 159-166.

PURPOSE: There has been a dramatic increase in penetrating gunshot-inflicted civilian penetrating brain injuries (cvPBI). We undertook a systematic review with exclusive focus on the management of cvPBI., METHODS: We explored: (1) cervical spine immobilization, (2) seizure incidence and prophylaxis, (3) infection incidence and antibiotic prophylaxis, (4) coagulopathy (5) vascular complications, and (6) surgical management. We searched PubMed, EMBASE, and Cochrane (1985-2019). The PRISMA guidelines were followed. The Newcastle-Ottawa Scale was employed for qualitative assessment; risk of bias was evaluated based upon the RTI item bank. The full protocol was registered to PROSPERO (CRD42019118877)., RESULTS: The literature is scant, and of overall low quality and high risk of bias. Incidence of c-spine injury with no direct trauma is low; incidence of seizures does not appear to be different from non-penetrating mechanisms; there is no robust data for prophylactic antibiotics; coagulopathy is prevalent and has been independently associated with outcome; there is a high incidence of vascular injuries with traumatic intracranial aneurysms the most common sequelae; neurosurgical decision-making appears largely influenced by operator's assessment of salvageability. Surgery has been associated with decreased mortality., CONCLUSIONS: Limited amount of published work is clinically meaningful; this systematic review identified key knowledge gaps.

3263. Logvinov, I. O., et al. (2014). "GSB-106, a low molecular weight dipeptide analogue of BDNF, protected cells via the TrkB, Akt, Erk 1/2 activation." European Neuropsychopharmacology **24**: S221-S222.

Purpose of study: In the pathogenesis most of neurodegenerative diseases and depression revealed reduction of brain-derived neurotrophic factor (BDNF) as endogenous neuroprotector. It has been shown that BDNF rescues different types of neurons from ischemic, traumatic and toxic brain injury. The particular interest in BDNF is due to its involvement in the pathogenesis of depressions and possible antidepressant activity. The cellular actions of BDNF are mediated through the activation of the TrkB neurotrophin receptors. Pathways activated by BDNF include the Ras/Erk mitogen activated protein kinase (MAPK) pathway, the phosphatidylinositol-3-kinase [PI(3)K]/Akt pathway and PLCg pathway. MAPK pathway implicates in differentiation, neuroprotection, synaptic plasticity and antidepressant effect. Phosphatidylinositol-3-kinase [PI(3)K]/Akt pathway leads to neuroprotection, neuritogenesis, synaptic plasticity, angiogenesis. Unfortunately, the pharmacological application of BDNF is limited because of its rapid degradation in the organism, low ability to penetrate the blood-brain barrier, and undesirable side effects. Therefore, in order to develop neuroprotective and antidepressant drugs, it seems urgent to synthesize low-molecular mimetics of BDNF, which are capable of activating the TrkB receptor signaling pathways and have no disadvantages of fulllength BDNF protein. In Zakusov Institute of Pharmacology Russian Academy of Medical Sciences was synthesized lowmolecular dipeptide analogue of BDNF - GSB-106 [bis(Nmonosuccinyl- L-seryl-L-lysine)hexamethylenediamide]. We have previously shown that GSB-106 had neuroprotective effects in different models of cell damages: oxidative stress, glutamate toxicity or 6-hydroxydopamine-induced toxicity. Also GSB-106 showed the typical for BDNF antidepressant activity in several rodent tests. The objective of this study was to investigate the involvement of TrkB and two signaling pathways: MAPK/ERK1/2 and PI3K/Akt in neuroprotective and antidepressant effects. Methods: Experiments were carried out on hippocampal cell line HT-22. Cells were maintained at 37°C, 5% CO2 in DMEM (Dulbecco's modified Eagle's medium) containing 5% FBS (fetal bovine serum). For experiments cells were passaged into 6-well plates. For this assay, cells were plated at 250×103 cells per well in complete medium. Cultured HT-22 hippocampal neurons were incubated with GSB-106 (10-8M) and BDNF (10-9M) at the 30 s, 5 min, 15 min, 30 min and 60 min time points. For detection phosphorylated TrkB, Akt and Erk 1/2 levels was used Western blot analysis by using specific antibodies against these proteins. Results: BDNF binds to the TrkB receptor, which leads to its dimerization, autophosphorylation, and activation of a number of signal pathways. TrkB activation promotes neuronal survival, differentiation, and synaptic function. We have shown that GSB-

106 caused a significant increase in phosphorylation of TrkB at 30 s and 15 min of exposition HT-22 cells. Two major signaling pathways have been implicated in responses underlying antidepressant effects; the phosphatidylinositol- 3-kinase [PI(3)K]/Akt signaling pathway and the MAPK/ERK signaling pathway. Numerous studies have implicated these two pathways in etiology and treatment of mood disorders. In our experiments GSB-106 indused the activation of Akt and Erk 1/2 signal pathways at the 15 and 60-minute time points in hippocampal neurons line HT-22. Conclusions: Activation of TrkB, Akt, Erk 1/2 may be involved in neuroprotective and antidepressant effects of GSB-106.

3264. Lohmann, G., et al. (1990). "Possible role of steroids and antibiotics in the management of penetrating head injuries." Proceedings of the Western Pharmacology Society **33**: 175-176.

3265. London, S. D., et al. (1993). "Rigid internal fixation techniques for mandibular fractures." Journal of Long-Term Effects of Medical Implants **3**(4): 295-304.

Rigid internal fixation techniques are indicated in all mandibular fractures in which stability is required for healing to occur. Advances in current biotechnology have led to development of biocompatible bone plates and screws that provide a reliable method of producing rigid internal fixation. The benefits of rigid internal fixation are a decrease in maxillomandibular fixation time, improved oral hygiene and nutrition, and maintenance of a patent airway. With adherence to technical details (such as atraumatic screw insertion and the fixation of a well-contoured plate), rigid fixation techniques provide a reliable method for the treatment of mandibular fractures. The use of plates and screws in the management of mandible fractures can be associated with infections and neurosensory disturbances.

3266. Long, G., et al. (2011). "Cranial impalement in a child driving an all-terrain vehicle." Pediatric emergency care **27**(5): 409-410.

BACKGROUND: All-terrain vehicle (ATV) injury is a serious problem in children and adolescents. We report an unusual case of a child with cranial impalement in a rollover ATV crash., CASE: An 8-year-old, reportedly helmeted, was driving an ATV uphill when it rolled over causing cranial impalement of the brake handle just above the left ear. The child was awake and alert at the scene and on arrival in the pediatric emergency department. The child was taken to the operating room where he underwent fiber-optic intubation followed by removal of the brake handle. He was discharged home after 3 days with a normal neurological examination., CONCLUSIONS: All-terrain vehicle injury is an increasing problem in children. This case demonstrates that serious injury can occur even while wearing a helmet. The case demonstrates the dangers associated with children driving or riding ATVs.

3267. Long, T., et al. (2006). "Information sharing: its impact on donor and nondonor families' experiences in the hospital." Progress in transplantation (Aliso Viejo, Calif.) **16**(2): 144-149.

OBJECTIVE: To illustrate the methods used to convey complicated information regarding the critical injury, and death diagnosed by means of brainstem testing, to the next of kin of potential organ donors., DESIGN: 3-year, prospective, longitudinal study., PARTICIPANTS AND SETTING: Forty-three family members who chose to donate their deceased relatives' organs were recruited via 4 transplant coordinating centers, and 3 family members who chose not to donate were recruited via 1 intensive care unit., METHOD: Face-to-face qualitative interviews were carried out with 46 family members of 43 individuals who died between June and December 2000. Family members who agreed to donation were interviewed during and after their next of kin's admission to hospital and 3 to 5 months, 13 to 15 months, and 18 to 26 months after bereavement. Three participants who chose not to donate were interviewed on 1 occasion only. Interviews were audio-recorded, and the transcribed reports were analyzed using a comparative, thematic approach focusing on the detection of similarities and differences between cases., RESULTS: Participants who were offered verbal information supported by complementary methods of communication had (1) a greater understanding of the critical injury sustained by their next of kin, and (2) fewer questions over time regarding brainstem testing., CONCLUSION: Better methods of communicating complicated information are needed, as the sheer load of information shared makes demands of next of kin at a time when they are cognitively and emotionally poorly equipped to respond.

3268. Lonnen, D. M. (1985). "A parotid region foreign body." British dental journal **159**(7): 220-221.

3269. Lopez, F., et al. (2000). "Penetrating craniocerebral injury from an underwater fishing harpoon." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **16**(2): 117-119.

Weapon injuries other than gunshot wounds or low-velocity stab wounds to the head are extremely rare. We report the case of a 6-year-old girl who sustained a penetrating craniocerebral injury after being accidentally shot with an underwater fishing harpoon. This mechanism of injury seems to share characteristics of both high- and low-velocity projectiles. We discuss the management of this unusual injury in a child, remarking that foreign body removal in these cases must be carried out following the original direction of the projectile trajectory. We review the current literature on craniocerebral injuries caused by similar objects, especially those occurring in children.

3270. Lopez Gonzalez, A., et al. (2006). "Penetrating head injury in a paediatric patient caused by an electrical plug." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **22**(2): 197-200.

INTRODUCTION: Penetrating head injuries are rare especially in the paediatric age group. Relatively minor falls over common household objects can cause potentially life-threatening brain injuries., CASE REPORT: We describe a penetrating head injury caused by a household electrical plug in a 6-month-old child. The two rounded pins of the plug were embedded in the posterior parietal area of her head, very close to the cranial midline. There was no neurological deterioration or bleeding. Radiological investigation showed a depressed skull fracture underneath the two pins. One of them came very close to the superior sagittal sinus but there was no evidence of intracranial bleeding. The electrical plug was extracted under general anaesthesia in the operating theatre. The penetrating fracture segments were removed. The sagittal venous sinus was fortunately undamaged., CONCLUSIONS: Household objects like electrical plugs may constitute a risk for children. It may be worthwhile to reconsider the design of electrical plugs.

3271. Lorenz, K. J., et al. (2011). "[Diagnosis and treatment of injuries to the frontal skull base]." Diagnostik und Therapie von Verletzungen der Frontobasis. **59**(8): 791-799.

The role of ENT surgery in the management of anterior skull base defects has become increasingly important in recent years. Transnasal endoscopic surgical techniques and intraoperative navigation enable a minimally invasive approach in a large proportion of patients, thus helping to avoid morbidity typically associated with neurosurgical subfrontal approaches. Whereas traffic accidents and sport injuries are the main causes of anterior skull base trauma in the civilian setting, penetrating injuries caused by gunshots and improvised explosive devices (IEDs) play an increasing role in the military arena and terroristic attacks. Minor injuries to the anterior skull base are usually managed by ENT surgeons. Major injuries, involving the midface or neurocranium, require an interdisciplinary approach including maxillofacial surgeons and neurosurgeons. A centre for head and neck medicine and surgery is an ideal setting for such interdisciplinary teams to provide appropriate care for patients with complex skull base trauma in cooperation with ophthalmologists and interventional neuoradiologists. The present article describes concepts for the treatment of anterior skull base trauma established at the head, neck and skull base center at the Ulm military hospital in Germany.

3272. Lorenzini, M., et al. (1998). "Successful reconstruction of refractory posttraumatic skull base defects with free radial forearm flap." Plastic and reconstructive surgery **102**(6): 2097-2099.

After our experience with two patients who had persistent posttraumatic defects of the anterior skull base, we recommend using a deepithelialized free radial forearm flap for one-stage reconstruction. The flap provides a thin, water-tight barrier between the cranial cavity and the subcranial spaces for effective prevention of cerebrospinal fluid leakage and ascending infection. It is particularly useful when local flap options are not available.

3273. Lorger, M. and B. Felding-Habermann (2011). "Interactions between breast cancer brain metastases and their microenvironment." Clinical and Experimental Metastasis **28**(2): 236.

Twenty to 35% of breast cancer patients present with brain metastases. These patients have an extremely poor prognosis since no efficient therapies are available. Brain lesions are often shielded by the blood- brain barrier which hinders drug penetration. They mostly develop late during a progressive metastatic disease after administration of systemic therapies and clinical data suggest that they are resistant against standard systemic treatments. Furthermore,

the presence of multifocal brain lesions often hinders their complete removal by surgery due to neurotoxicities. Thus, novel therapeutic concepts tailored to overcome these current limitations in the treatment of brain lesions are urgently required. We therefore seek to understand interactions between the brain microenvironment and cancer cells upon their entry into the brain from the blood stream in order to develop therapeutic concepts that might target brain metastases by targeting the supportive tumor microenvironment. Our particular focus is on reactive microglia/macrophages, because we were able to show that these cells accumulate around malignant brain lesions in our models of breast cancer brain metastasis. Reactive microglia/macrophages can be observed around individual cancer cells immediately after their extravasation into the brain parenchyma and remain associated with developing brain lesions. The majority of these cells stain positive for F4/80, a marker of microglia/macrophages, and Gr1, a marker of inflammatory monocytes. This latter observation suggests that brain lesions-associated microglia/macrophages originate from the bone marrow-derived hematopoietic stem cells. We are currently exploring the role of these cells in the initiation and growth of metastatic brain lesions in our animal models of brain metastasis.

3274. Lorinc, P. and J. E. Rosengren (1982). "[Importance of the CT axial projection for the evaluation of pharyngeal injuries]." Die Bedeutung der CT-Axialprojektion fur die Beurteilung der Pharynxschaden. **136**(6): 742-744.

3275. Lorincz, D. and M. Kalman (2020). "No rapid and demarcating astroglial reaction to stab wounds in Agama and Gecko lizards and the caiman Paleosuchus - it is confined to birds and mammals." Histology and histopathology **35**(12): 1455-1471.

The present study proves that rapid and demarcating astroglial reactions are confined to birds and mammals. To understand the function of post-lesion astroglial reaction, the phylogenetical aspects are also to be investigated. Considering the regenerative capabilities, reptiles represent an intermediate position between the brain regeneration-permissive fishes and amphibians and the almost non-permissive birds and mammals. Damage is followed by a rapid astroglial reaction in the mammalian and avian brain, which is held as an impediment of regeneration. In other vertebrates the reactions were usually observed following long survival periods together with signs of regeneration, therefore they can be regarded as concomitant phenomena of regeneration. The present study applies short post-lesion periods comparable to those seen in mammals and birds for astroglial reactions. Two species of lizards were used: gecko (leopard gecko, Eublepharis macularius, Blyth, 1854) and agama (bearded dragon, Pogona vitticeps, Ahl, 1926). The gecko brain is rich in GFAP whereas the agama brain is quite poor in this. Crocodilia, the closest extant relatives of birds were represented in this study by Cuvier's dwarf caiman (Paleosuchus palpebrosus, Cuvier, 1807). The post-lesion astroglial reactions of crocodilians have never been investigated. The injuries were stab wounds in the telencephalon. The survival periods lasted 3, 7, 10 or 14 days. Immunoperoxidase reactions were performed applying anti-GFAP, anti-vimentin and anti-nestin reagents. No rapid and demarcating astroglial reaction resembling that of mammalian or avian brains was found. Alterations of the perivascular immunoreactivities of laminin and beta-dystroglycan as indicators of glio-vascular decoupling proved that the lesions were effective on astroglia. The capability of rapid and demarcating astroglial reaction seems to be confined to mammals and birds and to appear by separate, parallel evolution in them.

3276. Lorkiewicz, W., et al. (2011). "[A murder case from 900 years ago? Analysis of extensive cranial trauma observed in a historical skeleton recovered in central Poland]." Morderstwo sprzed 900 lat? Analiza rozleglych urazow czaszki zaobserwowanych na szkielecie historycznym odkrytym w centralnej Polsce. **57**(3): 101-106.

This work presents the results of study of a human skeleton from the early Middle Ages recovered in Peclawice (province of Lodz), presenting signs of extensive cranial trauma suffered perimortem. The skeleton belonged to a 20-30 year-old male of sturdy build, with prominent bone processes, marked right-side asymmetry of the bones and joints of the upper extremities, and tallness (stature well above average for early medieval times). Except for the skull, the skeleton lacks any pathologic or traumatic lesions. The right side of the skull bears signs of three extensive injuries involving the frontal and parietal bones and the temporomandibular joint. Two of them penetrated deeply into the cranial cavity. The nature and location of the lesions suggests that the axe was used and that the victim was not confronted face-to-face. None of the lesions show any signs of healing. Fragmentation of the facial bones, which were mostly incomplete except for the well-preserved mandible, suggests additional blows to the face. These massive injuries must have been fatal due to damage to the brain and main blood vessels of the neck and thus they were recognized as the cause of death of the individual.

3277. Lough, E. G., et al. (2013). "An unusual case of air rifle pellet migration from the brain to the thoracic spine." The American surgeon **79**(1): E33-34.

3278. Lovrencic-Huzjan, A., et al. (2011). "Transcranial Doppler in brain death confirmation in clinical practice." Ultraschall in der Medizin (Stuttgart, Germany : 1980) **32**(1): 62-66.

PURPOSE: Transcranial Doppler (TCD) can be used as a confirmatory test in brain death. The aim was to present the usefulness of TCD in brain death confirmation., MATERIALS AND METHODS: Forty-four patients with severe brain lesions leading to brain death were treated over a 4-year period. After the clinical diagnosis of brain death was made, the appropriate confirmatory test was chosen according to patient condition, taking into consideration the restrictions of the test protocol. Due to the inconclusive test results, some patients underwent repeat testing., RESULTS: Among 44 patients, 19 had neurotrauma, 11 massive aneurysmal subarachnoidal hemorrhages, 1 arteriovenous subarachnoidal and parenchymal hemorrhage, 12 hypertensive parenchymal hemorrhages, and 1 ischemic stroke. As a primary test, TCD was used in 30, brain scintigraphy in 2, multislice CT angiography (CTA) in 10, and cerebral angiography in 2 patients, and the diagnosis was confirmed in 26, 3, 9 and 2 patients, respectively. Due to inconclusive results CTA was repeated in five patients. In patients in whom TCD was applied, the time to confirm the diagnosis was the shortest, and in most (61 %) cerebral circulatory arrest was confirmed within 2 hours of clinical diagnosis., CONCLUSION: TCD is a favorable confirmatory test for cerebral circulatory arrest in brain death diagnosis.

3279. Lowe, M., et al. (2019). "Monthly variance in UK renal transplantation activity: a national retrospective cohort study." BMJ open **9**(9): e028786.

OBJECTIVE: To identify whether renal transplant activity varies in a reproducible manner across the year., DESIGN: Retrospective cohort study using NHS Blood and Transplant data., SETTING: All renal transplant centres in the UK., PARTICIPANTS: A total of 24 270 patients who underwent renal transplantation between 2005 and 2014., PRIMARY OUTCOME: Monthly transplant activity was analysed to see if transplant activity showed variation during the year., SECONDARY OUTCOME: The number of organs rejected due to healthcare capacity was analysed to see if this affected transplantation rates., RESULTS: Analysis of national transplant data revealed a reproducible yearly variance in transplant activity. This activity increased in late autumn and early winter (p=0.05) and could be attributed to increased rates of living (October and November) and deceased organ donation (November and December). An increase in deceased donation was attributed to a rise in donors following cerebrovascular accidents and hypoxic brain injury. Other causes of death (infections and road traffic accidents) were more seasonal in nature peaking in the winter or summer, respectively. Only 1.4% of transplants to intended recipients were redirected due to a lack of healthcare capacity, suggesting that capacity pressures in the National Health Service did not significantly affect transplant activity., CONCLUSION: UK renal transplant activity peaks in late autumn/winter in contrast to other countries. Currently, healthcare capacity, though under strain, does not affect transplant activity; however, this may change if transplantation activity increases in line with national strategies as the spike in transplant activity coincides with peak activity in the national healthcare system.

3280. Lu, M., et al. (2011). "Dose response effects of phenytoin on attenuation of nonconvulsive seizures caused by penetrating ballistic-like brain injury in rats." Journal of neurotrauma **28**(6): A121.

Acute post-traumatic nonconvulsive seizures (NCS) require prompt intervention. As NCS, they are more difficult to diagnose and more refractory to antiepileptic drug treatments. Phenytoin (PHT) is widely considered as the first choice for seizure treatment in the neurointensive care unit. In this study we evaluated the dose-response effects of PHT to attenuate acute nonconvulsive seizures caused by a penetrating ballistic-like brain injury (PBBI) in rats. Continuous EEG recordings were collected for 72h following PBBI from awake animals. Four doses of PHT (PHT-10/5, PHT-20/10, PHT-40/20, and PHT-60/30, N=15/dose) were tested. Each dose consisted of a loading dose (10, 20, 40, 60 mg/kg i.v. injection) initiated at 30 min after injury followed by a maintenance dose (5, 10, 20, 30 mg/kg, respectively) given at 8h after the loading dose on Day 1 and then twice per day (at 8h intervals) on days 2-3. Overall, 73% of vehicletreated

animals exhibited an average of 7.4 NCS episodes/rat yielding a total NCS duration of 303 ± xx sec/rat during the 72h post-injury period. The onset latency was @27h post-injury. PHT treatments, except for the lowest dose, significantly reduced NCS incidence to 33- 40%. In all PHT treated groups, the NCS episodes and durations were also dose-dependently mitigated, resulting in an average of 6.2-1.8 episodes/rat (267-66 sec/rat) measured from the highest to the lowest doses, with the significant reductions being afforded by the two highest dose regimens. Transient (5-30 min) sedation was also correlated to the escalating doses of PHT, i.e. the higher the dose, the longer the sedation. Since PHT treatment was initiated before NCS occurred, these results indicate that PHT is effective in ameliorating post-traumatic NCS as prophylactic treatment and the PHT-40/20 dose has a better therapeutic index than PHT-60/30 dose because of its similar efficacy but lesser degree of sedation.

3281. Lu, X. C., et al. (2017). "Combination therapy of anti-epileptic drugs against post-traumatic nonconvulsive seizures in rats." Journal of neurotrauma **34**(13): A50.

We previously demonstrated synergistic effects of combination therapy using phenytoin paired with levetiracetam (PHT+LEV) or ethosuximide (PHT+EXM) for mitigating acute post-traumatic nonconvulsive seizures (NCS) induced by penetrating ballistic like brain injury (PBBI) in rats. We also observed sub-additive effects of LEV paired with gabapentin (LEV+GBP). In this study we evaluated two different pairs of combinations of these drugs: EXM+LEV and PHT+GBP, in the PBBI model. All rats received a frontal PBBI and skull EEG electrodes implantation. EXM+LEV were tested at four dose ratios: EXM/LEV: 5.6/6.3, 11.1/12.7, 22.2/25.4, or 44.5/ 50.7 mg/kg. PHT+GBP were tested at five dose ratios: PHT/GBP: 1.8/0.6, 3.6/1.3, 7.2/2.5, 14.5/5.0, or 28.9/10.0mg/kg. Treatments were given intravenously twice/day for three days following the injury. The NCS were detected by continuous EEG recording for 72 h. Similar to previous studies, approximately 65% of PBBIvehicle treated animals showed evidence of post-traumatic NCS within the first 72h following injury. PBBI animals treated with EXM+LEV showed reduced NCS incidence to 33-44% across all dose ratios tested and dose-dependently decreased NCS frequency and duration by 10-84% ($p < 0.05$ at 2 highest dose ratios) and 2- 88% ($p < 0.05$ at 2 highest dose ratios), respectively. However, for PHT+GBP treatments, only the highest dose ratio reduced NCS incidence to 41% and significantly reduced seizure frequency by 78% ($p < 0.05$) and seizure duration by 82% ($p < 0.05$). Isobolographic analysis further indicated that EXM+LEV combination therapy achieved synergism because the observed effects exceeded the expected additive effects, whereas PHT+GBP had sub-additive effects. These results extended our previous findings on AED combinations involving PHT, EXM, and LEV and indicated their favourable interactions when any two pairs were combined at lower dose constituents than their monotherapy doses. On the other hand, similar to the lack of beneficial effects of LEV+GBP combination therapy, PHT+GBP also failed to improve their anti-seizure activities, suggesting that GBP may not be a good candidate for combination therapy against post-traumatic NCS.

3282. Lu, X. C. M., et al. (2018). "Ethosuximide and gabapentin combination failed to achieve synergism against seizures induced by penetrating brain injury." Journal of neurotrauma **35**(16): A85-A86.

Early post-traumatic seizures are one of the major complications of traumatic brain injury. These seizures may lead to elevated intracranial pressure and cerebral metabolic distress, worsening the patients' outcomes. In this study we evaluated combination therapy of ethosuximide (EXM) paired with gabapentin (GBP) to ameliorate posttraumatic non-convulsive seizures induced by a penetrating-ballistic like brain injury (PBBI) in rats. Adult male rats were prepared with skull EEG electrodes 4 days prior to receiving the right frontal PBBI. EEG recording started immediately after the injury and continued for 72 h to detect non-convulsive seizures. EXM+GBP combinations were tested at four dose ratios (EXM/GBP: 5.6/0.6, 11.1/1.3, 22.2/2.5, 44.5/ 5.0) derived from their monotherapy dose-response profiles according to the isobolographic analysis. The individual dose constituents of these two drugs were 2-5 folds lower than their monotherapy effective doses. Treatments were given intravenously twice per day for three days following the PBBI. Compared to vehicle treated control rats, the two high dose ratios of EXM+GBP combination therapy significantly reduced seizure frequency by 46-53% and seizure duration by 58- 61%. They also moderately reduced seizure incidence from 63% in the vehicle treatment group to 56-39%. In these two high dose ratios, the EXM doses were 4-5 folds lower than its monotherapy effective doses. However, isobolographic analysis indicated that the combined treatments of EXM+GBP failed to achieve additivity in 3 of the 4 dose ratios tested, including the two highest dose ratios, because the magnitude of the observed effects failed to reach the expected additive effects. The results of this study confirmed our previous findings in the same PBBI-induced NCS model, which showed that addition of GBP to phenytoin or Levetiracetam as combination therapy also failed to achieve additive effects when the dose constituents were reduced

in the combination In fact, a combination of GBP with these antiepileptic drugs, including EXM, produced potential sub-additive (antagonistic) effects, e.g. the observed effects were lower than the expected additive effects. Thus, these results collectively indicated that simultaneous usage of GBP with other anti-epileptic drugs should be avoided in managing post-traumatic seizures following TBI.

3283. Lu, X. C. M., et al. (2016). "Dose response effects of simvastatin on attenuation of nonconvulsive seizures induced by penetrating ballistic-like brain injury." Journal of neurotrauma **33**: A43.

Simvastatin (SIM) is a 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor commonly used to reduce serum cholesterol. Recently the neuroprotective and anti-seizure effects of SIM have emerged from animals studies. For example, we have demonstrated that intravenous treatment of SIM mitigated cognitive deficits following penetrating ballistic-like brain injury (PBBI). Preclinical studies by others have shown that SIM reduced kainic acid or picrotoxin-induced seizures. A clinical study has also shown that patients treated with statins, including simvastatin, within 3 days after a stroke had a reduced risk of developing post-stroke seizures. In this study, we evaluated the anti-seizure effects of SIM against PBBI induced nonconvulsive seizures (NCS), which were detected by 72 h continuous EEG recordings immediately following the injury. Four doses of SIM (0.001, 0.01, 0.1, or 1.0 mg/kg) were tested intravenously, twice/day for three days, initiated 30min post-injury. Control animals received matching vehicle treatments. The results showed that 73% of vehicle-treated animals exhibited an average of 14.5 NCS episodes/rat, yielding an average accumulative duration of 386.6 sec/rat during the 72 h post-injury period. The onset latency was 26 h post-injury. Compared to the vehicle treatment, SIM manifested anti-seizure activities in a dose-dependent fashion by significantly decreasing NCS frequency to 6.0 ± 9.7 NCS/rat (59%-33% reduction) and shortening total NCS duration to 173-282 sec/rat (55%-27% reduction) at the two does tested. However, the effects of SIM treatment on NCS incidence and onset latency were non-significant. In summary, the findings of this study provide further support on the anti-seizure properties of SIM in a clinically relevant animal model of post-traumatic seizures. Considering the clinical evidence of beneficial effects of SIM on post-stroke seizures, our results are highly encouraging, warranting further support for more advanced preclinical and clinical evaluations of SIM as a potential seizure prophylaxis in patients having suffered severe brain trauma.

3284. Lu, X. C. M., et al. (2012). "Similarities and differences of acute epileptic activities following penetrating ballisticlike brain injury and focal brain ischemia in rats." Journal of neurotrauma **29**(10): A172.

Introduction In this study, we characterized the similarities and differences of nonconvulsive seizures (NCS) and other epileptic events, such as periodic epileptic discharges (PED) and intermittent rhythmic delta activities (IRDA) in rat models of penetrating ballistic-like brain injury (PBBI) and permanent middle cerebral artery occlusion (pMCAO). Methods Rats received either unilateral frontal PBBI (n = 43) or pMCAO (n = 28). Brain activity was monitored continuously by EEG recordings for 72h (PBBI) or 24h (pMCAO). Epileptic activities examined included: NCS, PED, and IRDA. The NCS profile was characterized based on EEG waveform patterns, seizure incidence frequency, duration, and time distribution. The PED and IRDA activities were also characterized based on EEG waveform patterns, but the severity of these activities was rated based on the abundance of their occurrence and their associations with NCS. Results NCS occurred in 70% PBBI rats and 79% pMCAO rats, manifested in three EEG waveforms: Type I-rhythmic high frequency (> 2Hz) spikes, Type II-rhythmic low frequency (∗1Hz) sharp waves, and Type III-arrhythmic (0.5-2 Hz) spikes. Type I seizures resembled clinical EEG patterns of generalized/partial complex seizures and were predominant following both injuries. Types II/III seizures appeared to reflect inter-ictal activities. Overall, NCS occurred more acutely and intensely after pMCAO (latency = 0.6h, frequency = 25 episodes/rat) compared to post- PBBI NCS (latency = 26h, frequency = 10 episodes/rat). The most salient feature that differentiated post-traumatic and postischemic NCS was their time distribution. After pMCAO, > 50% seizures occurred within the first 3h of injury, whereas after PBBI NCS occurred sporadically (0-5% per hour) throughout the 72h recording period. In both models, severity of PEDs was positively correlated to the severity of Type I seizures. But IRDA appeared to be an independent index, not predictive of other epileptic events. Conclusions This study provided comprehensive comparisons of post-traumatic and post-ischemic epileptic profiles. The identification of the similarities and differences across a broad spectrum of epileptic events may lead to differential strategies for post-traumatic/stroke seizure interventions, e.g. treating post-ischemic seizures more aggressively during the acute phase of injury, and treating post-traumatic seizures more selectively when time allows for referencing other epileptic activities.

3285. Lu, X. C. M., et al. (2016). "Synergistic effects of phenytoin and levetiracetam combination therapy on attenuation post-traumatic nonconvulsive seizures." Journal of neurotrauma **33**: A105-A106.

Post-traumatic seizures during the emergent state of traumatic brain injury (TBI) are deemed detrimental to the recovery of TBI patients. Phenytoin (PHT) and levetiracetam (LEV) are the commonly prescribed drugs as prophylaxis. Although LEV has become more favorable than PHT owing to its improved safety profile, many patients are still intractable to the monotherapy of either drug. In this study we applied the isobolographic approach to evaluate PHT + LEV combination therapy against penetrating ballistic-like brain injury (PBBI) induced nonconvulsive seizures (NCS) in rats, aimed at achieving synergism with properly paired dose ratios of the two drugs. NCS were induced by PBBI and detected by EEG recording for 72 h. PHT and LEV were tested at the following dose ratios (PHT/LEV): 1.8/6.3, 3.6/12.7, 7.2/25.4, or 14.5/50.7 mg/kg, which were derived from previous monotherapy results of each drug. Treatments were given intravenously twice/day for three days. Control animals received matching vehicle treatments. The results showed that except for the lowest dose ratio, PHT + LEV combination therapy significantly reduced NCS frequency and total seizure duration by 61%-84% across the three high dose ratios (as compared to vehicle treatments). The highest dose ratio also significantly reduced NCS incidence from 65% (Vehicle) to 25% and delayed NCS latency from 39 h (vehicle) to 57 h post-injury. The dose equivalent analysis of the isobolographic design indicated an achievement of synergism because the observed effects across all dose ratios exceeded the expected additive effects. Compared to our previous results of a PHT or LEV monotherapy derived from the identical TBI, the combined treatments of PHT + LEV outperformed the monotherapy of each individual drug by achieving statistically defined synergism. Critically, the doses of each drug used in combination were 2-3 fold lower than the monotherapy doses required of each drug, which may alleviate the safety concerns of these drugs used in TBI patients.

3286. Lu, X.-C. M., et al. (2020). "Post-Traumatic Epilepsy and Seizure Susceptibility in Rat Models of Penetrating and Closed-Head Brain Injury." Journal of neurotrauma **37**(2): 236-247.

Traumatic brain injury (TBI) carries a risk of developing post-traumatic epilepsy (PTE). Currently, animal models that replicate clinical PTE (delayed spontaneous and recurrent seizures) are limited, which hinders pre-clinical research. In this study, we used two rat models of penetrating ballistic-like brain injury (PBBI) and closed-head injury (CHI) to induce spontaneous seizures and also measure changes in seizure susceptibility. In the PBBI model, two trajectories (frontal and lateral) and two injury severities for each trajectory, were evaluated. In the CHI model, a single projectile impact to the dorsal/lateral region of the head was tested. Continuous video-electroencephalographic (EEG) recordings were collected for 10 days at 1 or 6 month(s) post-injury. After EEG recording, all rats were given a sub-convulsant dose of pentylenetetrazole (PTZ) to challenge the seizure susceptibility. The video-EEG recording did not detect PTE following the PBBI. Only one CHI rat demonstrated persistent and recurrent non-convulsive seizures detected at 6 months post-injury. However, after PTZ challenge, 50-100% of the animals across different TBI groups experienced seizures. Seizure susceptibility increased over time from 1 to 6 months post-injury across the majority of TBI groups. Injury severity effects were not apparent within the PBBI model, but were evident between PBBI and CHI models. These results demonstrated the difficulties in detecting delayed spontaneous post-traumatic seizures even in a high-risk model of penetrating brain injury. The PTZ-induced increase in seizure susceptibility indicated the existence of vulnerable risk of epileptogenesis following TBI, which may be considered as an alternative research tool for pre-clinical studies of PTE.

3287. Lu, X.-C. M., et al. (2017). "Combination therapy of levetiracetam and gabapentin against nonconvulsive seizures induced by penetrating traumatic brain injury." The journal of trauma and acute care surgery **83**(1 Suppl 1): S25-S34.

BACKGROUND: Posttraumatic seizures are a medical problem affecting patients with traumatic brain injury. Yet effective treatment is lacking owing to the limitations of antiepileptic drugs (AEDs) applicable to these patients., METHODS: In this study, we evaluated the dose-response efficacy of levetiracetam (12.5-100.0 mg/kg) and gabapentin (1.25-25.0 mg/kg) administered either individually or in pairs at fixed-dose ratios as a combination in mitigating posttraumatic nonconvulsive seizures induced by severe penetrating ballistic-like brain injury (PBBI) in rats. Seizures were detected by continuous electroencephalogram (EEG) monitoring for 72 hours postinjury. Animals were treated twice per day for 3 days by intravenous injections., RESULTS: Both levetiracetam (25-100 mg/kg) and gabapentin (6.25-25 mg/kg) significantly reduced PBBI-induced seizure frequency by 44% to 73% and 61% to 69%, and seizure duration by 45% to 64% and 70% to 78%, respectively. However, the two drugs manifested different dose-response profiles. Levetiracetam attenuated seizure activity in a dose-dependent fashion, whereas the beneficial effects of gabapentin plateaued across the three highest doses tested. Combined administration of levetiracetam and gabapentin mirrored

the more classic dose-response profile of levetiracetam monotherapy. However, no additional benefit was derived from the addition of gabapentin. Furthermore, isobolographic analysis of the combination dose-response profile of levetiracetam and gabapentin failed to reach the expected level of additivity, suggesting an unlikelihood of favorable interactions between these two drugs against spontaneously occurring posttraumatic seizure activities at the particular set of dose ratios tested., CONCLUSION: This study was the first attempt to apply isobolographic approach to studying AED combination therapy in the context of spontaneously occurring posttraumatic seizures. Despite the failure to achieve additivity from levetiracetam and gabapentin combination, it is important to recognize the objectivity of the isobolographic approach in the evaluation of AED combination therapy against seizures directly associated with brain injuries.

3288. Lu, X.-C. M., et al. (2009). "NNZ-2566, a glypromate analog, improves functional recovery and attenuates apoptosis and inflammation in a rat model of penetrating ballistic-type brain injury." Journal of neurotrauma **26**(1): 141-154.

Glycine-proline-glutamate (GPE) is an N-terminal tripeptide endogenously cleaved from insulin-like growth factor-1 in the brain and is neuroprotective against hypoxic-ischemic brain injury and neurodegeneration. NNZ-2566 is an analog of GPE designed to have improved bioavailability. In this study, we tested NNZ-2566 in a rat model of penetrating ballistic-type brain injury (PBBI) and assessed its effects on injury-induced histopathology, behavioral deficits, and molecular and cellular events associated with inflammation and apoptosis. In the initial dose-response experiments, NNZ-2566 (0.01-3 mg/kg/h x 12 h intravenous infusion) was given at 30 min post-injury and the therapeutic time window was established by delaying treatments 2-4 h post-injury, but with the addition of a 10- or 30-mg/kg bolus dose. All animals survived 72 h. Neuroprotection was evaluated by balance beam testing and histopathology. The effects of NNZ-2566 on injury-induced changes in Bax and Bcl-2 proteins, activated microgliosis, neutrophil infiltration, and astrocyte reactivity were also examined. Behavioral results demonstrated that NNZ-2566 dose-dependently reduced foot faults by 19-66% after acute treatments, and 35-55% after delayed treatments. Although gross lesion volume was not affected, NNZ-2566 treatment significantly attenuated neutrophil infiltration and reduced the number of activated microglial cells in the peri-lesion regions of the PBBI. PBBI induced a significant upregulation in Bax expression (36%) and a concomitant downregulation in Bcl-2 expression (33%), both of which were significantly reversed by NNZ-2566. Collectively, these results demonstrated that NNZ-2566 treatment promoted functional recovery following PBBI, an effect related to the modulation of injury-induced neural inflammatory and apoptotic mechanisms.

3289. Lu, X.-C. M., et al. (2011). "Electrocortical pathology in a rat model of penetrating ballistic-like brain injury." Journal of neurotrauma **28**(1): 71-83.

Traumatic brain injury (TBI) causes severe disruption of cerebral electrical activity and electroencephalography (EEG) is emerging as a standard tool to monitor TBI patients in the acute period of risk for secondary injuries. However, animal studies of EEG pathology in the context of TBI are surprisingly sparse, largely because of the lack of real-time continuous EEG (cEEG) monitoring in animal TBI models. Here, we performed long-term EEG monitoring to study nonconvulsive seizures (NCS), periodic epileptiform discharges (PED), and EEG power spectra following three injury severity levels in a rat model of penetrating ballistic-like brain injury (PBBI). EEG signals were recorded continuously from bilateral hemispheres of freely behaving rats for 72 h and for 2 h on days 7 and 14 after the injury. We report that the incidence of NCS and PED positively correlated with the injury severity, where 13%, 39%, and 59% of the animals exhibited NCS, and 0%, 30%, and 65% of the animals exhibited PED following 5%, 10% and 12.5% PBBI, respectively. Similar correlations existed for the number of NCS and PED events and their duration. NCS and PED occurred either independently or in tandem. Longer NCS durations were associated with larger lesion volumes. Significant EEG slowing evidenced by the EEG power shift toward the delta frequency band (0.5-4 Hz) occurred within 2 h after PBBI, which resolved over time but persisted longer after greater injury severity. In contrast, decreases in higher frequency power (i.e., 30-35 Hz) remained depressed throughout 14 days. This is the first long-term cEEG study of the acute injury phase in a rat model of severe TBI, demonstrating common occurrences of clinically observed electrocortical pathology, such as NCS, PED, and cortical slowing. These EEG pathologies may serve as critical care biomarkers of brain injury, and offer clinically relevant metrics for studying acute therapeutic interventions.

3290. Lu, X.-C. M., et al. (2013). "Similarities and differences of acute nonconvulsive seizures and other epileptic activities following penetrating and ischemic brain injuries in rats." Journal of neurotrauma **30**(7): 580-590.

The similarities and differences between acute nonconvulsive seizures (NCS) and other epileptic events, for example, periodic epileptiform discharges (PED) and intermittent rhythmic delta activities (IRDA), were characterized in rat models of penetrating and ischemic brain injuries. The NCS were spontaneously induced by either unilateral frontal penetrating ballistic-like brain injury (PBBI) or permanent middle cerebral artery occlusion (pMCAO), and were detected by continuous electroencephalogram (EEG) monitoring begun immediately after the injury and continued for 72 h or 24 h, respectively. Analysis of NCS profiles (incidence, frequency, duration, and time distribution) revealed a high NCS incidence in both injury models. The EEG waveform expressions of NCS and PED exhibited intrinsic variations that resembled human electrographic manifestations of post-traumatic and post-ischemic ictal and inter-ictal events, but these waveform variations were not distinguishable between the two types of brain injury. However, the NCS after pMCAO occurred more acutely and intensely (latency=0.6 h, frequency=25 episodes/rat) compared with the PBBI-induced NCS (latency=24 h, frequency=10 episodes/rat), such that the most salient features differentiating post-traumatic and post-ischemic NCS were the intensity and time distribution of the NCS profiles. After pMCAO, nearly 50% of the seizures occurred within the first 2 h of injury, whereas after PBBI, NCS occurred sporadically (0-5%/h) throughout the 72 h recording period. The PED were episodically associated with NCS. By contrast, the IRDA appeared to be independent of other epileptic events. This study provided comprehensive comparisons of post-traumatic and post-ischemic epileptic profiles. The identification of the similarities and differences across a broad spectrum of epileptic events may lead to differential strategies for post-traumatic and post-stroke seizure interventions.

3291. Lu, X.-C. M., et al. (2016). "Comprehensive Evaluation of Neuroprotection Achieved by Extended Selective Brain Cooling Therapy in a Rat Model of Penetrating Ballistic-Like Brain Injury." Therapeutic hypothermia and temperature management **6**(1): 30-39.

Brain hypothermia has been considered as a promising alternative to whole-body hypothermia in treating acute neurological disease, for example, traumatic brain injury. Previously, we demonstrated that 2-hours selective brain cooling (SBC) effectively mitigated acute (<=24 hours postinjury) neurophysiological dysfunction induced by a penetrating ballistic-like brain injury (PBBI) in rats. This study evaluated neuroprotective effects of extended SBC (4 or 8 hours in duration) on sub-acute secondary injuries between 3 and 21 days postinjury (DPI). SBC (34degreeC) was achieved via extraluminal cooling of rats' bilateral common carotid arteries (CCA). Depending on the experimental design, SBC was introduced either immediately or with a 2- or 4-hour delay after PBBI and maintained for 4 or 8 hours. Neuroprotective effects of SBC were evaluated by measuring brain lesion volume, axonal injury, neuroinflammation, motor and cognitive functions, and post-traumatic seizures. Compared to untreated PBBI animals, 4 or 8 hours SBC treatment initiated immediately following PBBI produced comparable neuroprotective benefits against PBBI-induced early histopathology at 3 DPI as evidenced by significant reductions in brain lesion volume, axonal pathology (beta-amyloid precursor protein staining), neuroinflammation (glial fibrillary acetic protein stained-activated astrocytes and rat major histocompatibility complex class I stained activated microglial cell), and post-traumatic nonconvulsive seizures. In the later phase of the injury (7-21 DPI), significant improvement on motor function (rotarod test) was observed under most SBC protocols, including the 2-hour delay in SBC initiation. However, SBC treatment failed to improve cognitive performance (Morris water maze test) measured 13-17 DPI. The protective effects of SBC on delayed axonal injury (silver staining) were evident out to 14 DPI. In conclusion, the CCA cooling method of SBC produced neuroprotection measured across multiple domains that were evident days/weeks beyond the cooling duration and in the absence of overt adverse effects. These "proof-of-concept" results suggest that SBC may provide an attractive neuroprotective approach for clinical considerations.

3292. Lu, X.-C. M., et al. (2015). "Dual Therapeutic Effects of C-10068, a Dextromethorphan Derivative, Against Post-Traumatic Nonconvulsive Seizures and Neuroinflammation in a Rat Model of Penetrating Ballistic-Like Brain Injury." Journal of neurotrauma **32**(20): 1621-1632.

Post-traumatic seizures can exacerbate injurious outcomes of severe brain trauma, yet effective treatments are limited owing to the complexity of the pathology underlying the concomitant occurrence of both events. In this study, we tested C-10068, a novel deuterium-containing analog of (+)-N-methyl-3-ethoxymorphinan, in a rat model of penetrating ballistic-like brain injury (PBBI) and evaluated the effects of C-10068 on PBBI-induced nonconvulsive seizures (NCS), acute neuroinflammation, and neurofunctional outcomes. NCS were detected by electroencephalographic

monitoring. Neuroinflammation was evaluated by immunohistochemical markers, for example, glial fibrillary acidic protein and major histocompatibility complex class I, for activation of astrocytes and microglia, respectively. Neurofunction was tested using rotarod and Morris water maze tasks. Three infusion doses of C-10068 (1.0, 2.5, and 5.0 mg/kg/h x 72 h) were tested in the antiseizure study. Neuroinflammation and neurofunction were evaluated in animals treated with 5.0 mg/kg/h x 72 h C-10068. Compared to vehicle treatment, C-10068 dose dependently reduced PBBI-induced NCS incidence (40-50%), frequency (20-70%), and duration (30-82%). The most effective antiseizure dose of C-10068 (5.0 mg/kg/h x 72 h) also significantly attenuated hippocampal astrocyte activation and perilesional microglial reactivity post-PBBI. Within C-10068-treated animals, a positive correlation was observed in reduction in NCS frequency and reduction in hippocampal astrocyte activation. Further, C-10068 treatment significantly attenuated astrocyte activation in seizure-free animals. However, C-10068 failed to improve PBBI-induced motor and cognitive functions with the dosing regimen used in this study. Overall, the results indicating that C-10068 exerts both potent antiseizure and antiinflammatory effects are promising and warrant further investigation.

3293. Lu, X. M., et al. (2014). "A combination therapy of phenytoin and ethosuximide improved therapeutic benefits against post-traumatic nonconvulsive seizures." Journal of neurotrauma **31**(12): A77-A78.

Previously we reported that treatment with phenytoin (PHT) or ethosuximide (EXM) dose-dependently attenuated post-traumatic nonconvulsive seizures (NCS) induced in rats by penetrating ballistic-like brain injury (PBBI). The efficacious monotherapy dose ranges of the two drugs were identified to be 20-30 mg/kg (PHT) and 125-187.5 mg/kg (EXM), but moderate-severe sedation resulted. In this study isobolographic analysis was used to construct fixed dose ratios for the combination of PHT and EXM to determine if combined treatments could improve anti-seizure efficacy. All rats received frontal PBBI and were immediately subjected to postinjury EEG/video monitoring for 72 h for seizure detection. PHT and EXM were tested in pairs at the following fixed dose ratios: 1.8/ 5.5, 3.6/11.1, 7.2/22.2, or 14.4/44.4 mg/kg (PHT/EXM) and the treatments were given intravenously twice/day for three consecutive days, initiated 30 min post-injury. Control animals received matching vehicle treatments. Outcome measures included NCS incidence, frequency, duration, and onset latency. The results showed that among the four dose ratios tested, the highest dose ratio (14.4/44.4 mg/kg) significantly reduced the overall incidence of NCS from 69% (vehicle group) to 29% (PHT +EXM group), decreased NCS frequency by 80% (Vehicle: 14.3±5.5 NCS episodes/rat vs. PHT + EXM: 2.8±1.3 episodes/rat), and shortened NCS cumulative duration by 84% (Vehicle: 502.8±277 sec/rat vs. PHT/EXM: 82.5±38.1 sec/rat). The PHT +EXM combination treatment also significantly delayed onset latency of NCS from 20±4.4 h post PBBI (vehicle) to 53±7.9 h (PHT + EXM). More importantly, compared to the effective monotherapy doses of PHT and EXM as mentioned above, the PHT +EXM combination therapy proved to be equally efficacious without overt sedation using 28% less PHT and 64% less EXM, which resulted in an additive effect as defined by the isobolographic analysis. This study supports the idea that combination therapy enhances the effectiveness of the drug constituents and provides improved therapeutic benefits by limiting potential side effects of individual drugs.

3294. Lubbe, J. H. and C. H. Badenhorst (1986). "[Computed tomographic proof of intracranial air bubbles after chest trauma. A case report]." Rekenaartomografiese bewys van intrakraniale lug na borskastrouma. 'n Gevalbespreking. **69**(10): 639-640.

A pulmonary bronchovenous fistula is postulated as the possible cause of cerebral air embolism in a case of left-sided hemiplegia after penetrating chest trauma. The possible mechanisms underlying the clinical picture, the consequences of cerebral air embolism and the management are briefly described.

3295. Lubeck, D. (1988). "Penetrating ocular injuries." Emergency medicine clinics of North America **6**(1): 127-146.

Penetrating ocular and orbital trauma present the emergency medicine physician with ongoing challenges. A suspicion of their occurrence with understanding and prompt recognition of presenting signs ultimately will give the patient the best possible visual outcome.

3296. Lubinu, F., et al. (1985). "Survival after bullet wounds to the head." Minerva Medicolegale e Archivio di Antropologia Criminale **105**(3): 103-109.

3297. Lucas, J. W., et al. (1975). "Management of shotgun wound of the symphysis." Journal of oral surgery (American Dental Association : 1965) **33**(8): 622-628.

3298. Lucas, R. M. and D. Mitterer (1990). "Pneumatic firearm injuries: trivial trauma or perilous pitfalls?" The Journal of emergency medicine **8**(4): 433-435.

This report describes an injury due to a pneumatic firearm. Though powder firearm injuries are generally considered serious, pneumatic weapon injuries are often viewed as minor or insignificant trauma. Children and adolescents primarily wield these weapons contributing to their "harmless" aura. However, dramatic increases in muzzle and impact velocities have transformed the newer generation of pneumatic firearms into formidable weapons. Consequently, the literature is replete with increasing incidences of serious injury due to pneumatic weapons.

3299. Luderwald, S., et al. (2008). "[Suicidal gunshot to the nape from a small-bore rifle]." Suizid durch Gewehrschuss in den Nacken. **221**(1-2): 36-42.

A 55-year-old man was found dead on the bed lying on his side in a pool of blood with a bullet entrance hole in the nape. Behind his body, a semi-automatic rifle Remington Nylon, cal. .22 LR, was detected. As the gunshot entrance site was rather unusual for suicide, a forensic autopsy was performed, which showed a contact shot to the nape with the bullet path running upward to the left frontal area. The man had been treated with citalopram for delusional depression, so that a suicidal act seemed plausible, and the autopsy and criminalistic findings were also compatible with this assumption. A remarkable fact of the present case is that a long firearm had been used. Reports on suicidal shots to the nape are comparatively rare in the medicolegal literature and usually refer to pistols or revolvers.

3300. Ludlow, C. L., et al. (1986). "Brain lesions associated with nonfluent aphasia fifteen years following penetrating head injury." Brain : a journal of neurology **109 (Pt 1)**: 55-80.

Men who sustained penetrating head injuries resulting in nonfluent aphasia within six months following injury, were examined fifteen years later and classified into two groups, 13 with persistent nonfluent aphasia, and 26 without symptoms of aphasia. Relative to a normal control group on a comprehensive battery of speech and language tests, the chronic nonfluent aphasics demonstrated syntactic processing deficits in all language modalities, with only mild or no impairment in other language faculties. The recovered group demonstrated deficits only in written expressive syntax. The CT lesions of the two groups differed in the extent of left hemisphere lesion volume and the degree of posterior and deep lesion extension within the left hemisphere. The nonrecovered group did not have greater right hemisphere damage. Broca's area was equally involved in 77 per cent of patients in both groups. All patients in the nonrecovered group had posterior extension of their lesions in Wernicke's area with some involvement of the underlying white matter and basal ganglia in the left hemisphere.

3301. Ludlow, C. L., et al. (1987). "Site of penetrating brain lesions causing chronic acquired stuttering." Annals of neurology **22**(1): 60-66.

Ten subjects exhibited acquired stuttering that had persisted for 10 to 15 years following penetrating missile wounds sustained during the Vietnam War. None had a history of developmental or chronic adult stuttering. In comparison with other head-injured subjects and normal control subjects, the subjects with acquired stuttering had significant deficits in skilled rapid hand movements and oral and speech movements, suggesting a motor control disorder. The identified brain lesions of the acquired stuttering group were on the right in 5 subjects, on the left in 4, and bilateral in 1. The internal and external capsules, the frontal white matter, and the striatum were more frequently involved in the acquired stuttering group than in other head-injured subjects (p less than or equal to 0.05). This speech rhythm and rate disorder was not associated with evident cortical lesions in either hemisphere but with predominantly unilateral lesions of the subcortical pyramidal and extrapyramidal systems.

3302. Ludwig, C. A., et al. (2019). "Traumatic chorioretinitis sclopetaria: Risk factors, management, and prognosis." American Journal of Ophthalmology Case Reports **14**: 39-46.

Purpose: To describe new cases of sclopetaria and evaluate the risk factors, management, and visual prognosis of all reported cases in the literature. Observations: We performed a retrospective, observational case series. This study included six cases (median age 23, interquartile range 33) of sclopetaria. Additionally, literature searches were conducted in the PubMed and Cochrane Library databases to uncover risk factors associated with all published cases of sclopetaria. Main outcome measure was best corrected visual acuity (BCVA) worse than 20/20. Sixty-seven cases (71 eyes) of sclopetaria have been reported, of which 59 cases (61 eyes) met inclusion criteria in this study. Most were young (median age 19.5 years) men (51/59, 88.1%). Thirty-seven eyes were observed while 24 underwent immediate surgery including six pars plana vitrectomies and three scleral buckles. Compared to initial presentation, BCVA improved in 31/48 (64.6%) eyes, remained stable in 12/48 eyes (25.0%), and worsened in 5/48 eyes (10.4%). Ten patients (16.4%) achieved a final BCVA of 20/20 with median follow up time of seven months. In a multivariate model, location of sclopetaria in the macula, temporal retina, or immediate orbital foreign body removal predicted poor final BCVA with an area under receiver operating characteristic curve of 0.767. Conclusions and importance: Traumatic chorioretinitis sclopetaria is rare, but reports have increased dramatically over the past two decades. While pars plana vitrectomy may be required for the management of retinal detachments and non-clearing vitreous hemorrhage, close observation is appropriate in most cases. Visual prognosis is poor with most patients attaining 20/200 vision or worse.

3303. Luef, S. M., et al. (2016). "Trends in weapon-related injuries from violence in Odense Municipality, Denmark 1991-2009." Danish medical journal **63**(11).

INTRODUCTION: The aim of this study was to examine the development in incidence rates and the severity of weapon-related physical interpersonal violence in Odense Municipality, Denmark from 1991 to 2009., METHODS: All victims of physical interpersonal violence with weapon-related injuries treated at the Emergency Department in the 1991-2009 period at Odense University Hospital, Denmark, and/or subjected to medico-legal autopsy at the Institute of Forensic Medicine in the 1991-2009 period at the University of Southern Denmark were included. Incidence rates were estimated following stratification by gender and age. The development in the incident rates was examined., RESULTS: Overall, 2,957 victims were included. The overall incidence rate was 8.5 per 10,000 population/year (14.6 and 2.7 for males and females, respectively). The rates did not change significantly in the study period. Most victims were injured with bottles/glass and blunt weapons (44.8% versus 28.2%), whereas 24% were injured with sharp weapons and 3% with firearms. Most lesions were sustained to the head/neck (56.1%) and to the upper limbs (26.2%). A total of 182 (6.1%) victims had lesions that were considered severe. The mortality rate was 4.8 per 1,000 victims in males and 29.1 per 1,000 victims in females. More than half (57%) of the homicides were caused by lesions due to sharp weapons., CONCLUSION: Weapon-related injuries are rare in the Odense Municipality. The incidence rate of weapon-related violence did not increase in the study period. Additionally, no evidence of an increased proportion of severe injuries was found. Women had a seven-fold higher mortality than males., FUNDING: none., TRIAL REGISTRATION: not relevant.

3304. Lujan, M., et al. (2019). "Neural stem cell transplantation mitigates penetrating ballistic-like brain injury (PBBI) induced motor deficit." Journal of neurotrauma **36**(13): A77.

Penetrating traumatic brain injury (PTBI) is associated with poor neurological outcomes. No restorative treatments are currently available. Cell replacement via neural stem cell transplantation is a putative therapeutic approach based on preclinical studies. Previous studies from our group established (i) durable engraftment of human fetal NSC (hNSC; Neuralstem Inc.), FDA approved for use in clinical trials, (ii) optimal location and injury-transplant interval. This study tests the hypothesis that engraftment and PTBI deficit amelioration will be cell dose dependent. Fifty adult male Sprague Dawley rats were randomized to five groups (10 per group). Unilateral PTBI was induced by rapid inflation of a balloon on a perforated probe stereotactically inserted through the right frontal lobe in 30 rats. Pair of injured and uninjured (Sham) to receive either 160,000 cells/rat (0.16M)- low dose or 1,600,000 cells/rat (1.6M) - high dose of hNSCs intracerebrally in PTBI perilesion. The injured group with vehicle injection served as negative control. Animals were immunosuppressed and assessed on 'GridWalk' for motor ability pre transplantation and 12 weeks post transplantation. The mean left front foot faults pre transplant were 23.2±3.34 (n= 30). At 12 weeks post transplantation, vehicle, low and high cell dose group LFF were 25.6±2.386 (n= 10), 13±0.948 (n= 5) and 21.2±3.917 (n= 5) respectively. One-way ANOVA revealed statistical significant differences only between pre transplant and 12 week low dose group (PTBI +0.16M 12wk) with a mean difference of 10.2 and p value 0.0016. GFP cell count based engraftment was not significantly different for a given cell doses between groups. Thus a cell dose dependent therapeutic effect in conjunction with previous data collectively support the notion that hNSC transplants preserve motor function. Follow up

studies in gyrencephalic TBI models with appropriate cell dose would help arrive at appropriate cell dose for a human application.

3305. Lund, J. R., et al. (2021). "Computed tomographic assessment of brain tissue disruption and skull damage in equine cadaveric heads caused by various firearm-ammunition combinations applied as potential gunshot methods for euthanasia of horses." American journal of veterinary research **82**(1): 28-38.

OBJECTIVE: To evaluate with CT the characteristics of brain tissue disruption and skull damage in cadaveric heads of adult horses caused by each of 6 firearm-ammunition combinations applied at a novel anatomic aiming point., SAMPLE: 53 equine cadaveric heads., PROCEDURES: Heads placed to simulate that of a standing horse were shot with 1 of 6 firearm-ammunition combinations applied at an aiming point along the external sagittal crest of the head where the 2 temporalis muscles form an inverted V. Firearm-ammunition combinations investigated included a .22-caliber long rifle pistol firing a 40-grain, plated lead, solid-core or hollow-point bullet (HPB); a semiautomatic 9-mm pistol firing a 115-grain, jacketed HPB; a semiautomatic .223-caliber carbine firing a 55-grain, jacketed HPB; a semiautomatic .45-caliber automatic Colt pistol firing a 230-grain, jacketed HPB; and a 12-gauge shotgun firing a 1-oz rifled slug. Additional heads placed in a simulated laterally recumbent position were shot with the semiautomatic 9-mm pistol-HPB combination. All heads underwent CT before and after being shot, and images were evaluated for projectile fragmentation, skull fracture, and cerebrum, cerebellum, and brainstem disruption., RESULTS: Computed tomography revealed that all firearm-ammunition combinations caused disruption of the cerebrum, cerebellum, and brainstem that appeared sufficient to result in instantaneous death of a live horse. Hollow-point ammunition was as effective as solid-core ammunition with regard to brain tissue disruption. Brain tissue disruption was not affected by head positioning., CONCLUSIONS AND CLINICAL RELEVANCE: Results indicated that the examined firearm-ammunition combinations, when applied at a novel aiming point, appear to be reasonable options for euthanasia of horses.

3306. Lundstrom, M. and L. Frisen (1975). "Evolution of descending optic atrophy. A case report." Acta ophthalmologica **53**(5): 738-746.

Fundus changes following severe trauma to the intracranial optic nerve were followed by means of serial fundus photography. The eye was completely blind. Little change was seen during the first 4 weeks. The retinal nerve fibre layer disappeared gradually during weeks 4 to 8. At the same time the retinal vessels turned narrow, and vascular pseudo-sheathing appeared close to the optic disc. Disc pallor was not maximal until the 12th week, when the peripapillary retina also had acquired a mottled appearance.

3307. Lundy, C. T., et al. (2010). "Outcome and cost of childhood brain injury following assault by young people." Emergency medicine journal : EMJ **27**(9): 659-662.

INTRODUCTION: Media interest in inter-juvenile violence in the UK has emphasised to clinicians the lack of data on medical outcomes following injury. A study was undertaken to examine the incidence of childhood head injury in a large trauma centre serving an inner city multiethnic community. The aim was to establish the physical and financial cost of survival with a head injury following inter-juvenile assault., METHODS: All children aged 8-16 years attending King's College Hospital, London (KCH) because of a head injury were identified restrospectively. The case notes of those admitted to the neurosurgical and neurorehabilitation service with a head injury between 1 August 2006 and 30 September 2008 were reviewed., RESULTS: A total of 1126 children attended KCH with a head injury. Eight boys required admission for treatment of a head injury following alleged inter-juvenile assault. The mechanisms of brain injury included a penetrating knife wound, assault with a bottle and physical assault. One child died following admission as a result of his brain injury. Complete neurological outcome data were available on six cases. Three had a hemiplegia, four had speech and language difficulties, two had visual impairment, five had behavioural changes and five had cognitive difficulties., CONCLUSIONS: This study demonstrates the serious consequences of inter-juvenile assault. Survival can be associated with neurological and psychological deficits. The cost to the health service is substantial. Further work is required to establish the long-term needs of these children.

3308. Lunetta, P., et al. (2002). "Suicide by intracerebellar ballpoint pen." The American journal of forensic medicine and pathology **23**(4): 334-337.

Self-inflicted eye injuries among psychiatric patients are relatively common. Transorbital penetrating traumas are more rare but if undiagnosed may cause lethal intracranial lesions. We report a fatal case of a 25-year-old schizophrenic man who introduced a plastic ballpoint pen through his right orbit up to the cerebellum. The computed tomography findings were misinterpreted as a penetrating track from a bullet. The patient died 4 days after the trauma, and the causative object was identified only at autopsy. When no precise information about an apparently trivial ocular trauma is available, clinicians and investigators must adequately consider, especially in psychiatric patients, the possibility of an intracranial penetrating lesion.

3309. Lunsford, L. D., et al. (1977). "Cranial computed tomographic demonstration of intracranial penetration by an orbital foreign body." Neurosurgery **1**(1): 57-59.

A 9-year-old boy suffered intracerebral penetration by a stick driven into his right orbit. Diagnosis was obtained by cranial computed tomography (CT), and this test directed appropriate immediate surgical intervention. Combined orbital exploration and craniotomy was followed by a gratifying recovery. The importance of CT in orbital and possible intracranial trauma is stressed.

3310. Luo, D., et al. (2021). "Lincs dataset-based repositioning of dutasteride as an anti-neuroinflammation agent." Brain Sciences **11**(11).

Neuroinflammation is often accompanied by central nervous system (CNS) injury seen in various CNS diseases, with no specific treatment. Drug repurposing is a strategy of finding new uses for approved or investigational drugs, and can be enabled by the Library of Integrated Networkbased Cellular Signatures (LINCS), a large drug perturbation database. In this study, the signatures of Lipopolysaccharide (LPS) were compared with the signatures of compounds contained in the LINCS dataset. To the top 100 compounds obtained, the Quantitative Structure-Activity Relationship (QSAR)based tool admetSAR was used to identify the top 10 candidate compounds with relatively high blood–brain barrier (BBB) penetration. Furthermore, the seventh-ranked compound, dutasteride, a 5α-reductase inhibitor, was selected for in vitro and in vivo validation of its anti-neuroinflammation activity. The results showed that dutasteride significantly reduced the levels of IL-6 and TNF-α in the supernatants of LPS-stimulated BV2 cells, and decreased the levels of IL-6 in the hippocampus and plasma, and the number of activated microglia in the brain of LPS administration mice. Furthermore, dutasteride also attenuated the cognitive impairment caused by LPS stimulation in mice. Taken together, this study demonstrates that the LINCS dataset-based drug repurposing strategy is an effective approach, and the predicted candidate, dutasteride, has the potential to ameliorate LPSinduced neuroinflammation and cognitive impairment.

3311. Luo, P. and Z. Fei (2015). "Twisted steel-induced penetrating head injury." Neurology **84**(18): 1909.

3312. Luo, W., et al. (2012). "Penetrating brain injury caused by nail guns: two case reports and a review of the literature." Brain injury **26**(13-14): 1756-1762.

BACKGROUND: To the best of the authors' knowledge, there are few case reports of penetrating brain injuries (PBI) caused by nail guns and these have usually involved incomplete penetration of the skull. Complete penetration of a nail into the intracranial cavity is extremely rare., CASE STUDY: Here, two such cases are presented. In the first, the nail entered through the right temporal bone, lodged in the right temporal lobe and was removed via craniotomy with intra-operative ultrasound guidance. In the second, the nail destroyed the left parietal bone, damaged the left internal capsule and lodged in the left temporal lobe near the left petrous apex and the brain stem. According to the latest literature retrieval, this is the first reported case of nail-gun injury to the internal capsule. The position of the nail precluded removal without further neurologic damage. Treatment strategies designed to optimize outcome, with or without surgery, and possible complications are discussed in this report.

3313. Lupariello, F., et al. (2018). "Staged crime scene determination by handling physical and digital evidence: Reports and review of the literature." Forensic science international **288**: 236-241.

Geberth in 2006 stated that "staging is a conscious criminal action on the part of an offender to thwart an investigation." In the present paper two crime scenes staged by handling digital evidence are reported. The first case involves a 50-year-old woman who had been living with the offender for three years before he murdered her at the end of their relationship. He staged the scene as a sex-related crime committed by an unknown perpetrator. The second case concerns a young woman who was found dead in Southern Italy in January 2004 with a gunshot on the forehead. The boyfriend, responsible for the murder, had staged the crime scene as a suicide. Three years earlier in Germany, he had also murdered the victim's mother. In both cases, the correlation of physical and digital forensic evidence was crucial in the definition of the manner of death.

3314. Lustenberger, T., et al. (2010). "Time course of coagulopathy in isolated severe traumatic brain injury." Injury **41**(9): 924-928.

BACKGROUND: Time aspects of coagulopathy following severe traumatic brain injury (sTBI) are ill defined throughout the literature. Thus, the aim of this study was to evaluate the time course of coagulopathy following isolated sTBI and its relationship to in-hospital outcomes., METHODS: Retrospective analysis of patients sustaining isolated sTBI (head AIS 3, extracranial injuries AIS < 3). TBI coagulopathy was defined as thrombocytopenia and/or elevated international normalised ratio (INR) and/or prolonged activated partial thromboplastin time (aPTT). Incidence, onset and duration of sTBI-coagulopathy and its impact on morbidity and mortality were analysed., RESULTS: Overall, 45.7% (n = 127) of the 278 patients included developed coagulopathy. Coagulopathy occurred 23.1 +/- 2.2 h [range: 0.1-108.2 h (0-4.5 days)] post-admission with a mean duration of 68.0 +/- 7.4 h[range: 2.6-531.4 h (0.1-22.1 days)]. The time interval to onset of coagulopathy decreased significantly with increasing head injury severity (p = 0.015). Early coagulation abnormalities occurring within 12 h of admission along with markers of devastating head injury including head AIS 5, penetrating injury mechanism, subdural hematoma, and a low GCS on admission proved to be independent risk factors for mortality., CONCLUSIONS: The sTBI-associated coagulopathy may ensue as late as 5 days after injury with a prolonged duration (>72 h) in 30% of patients. Early coagulopathy occurring within 12 h after injury is a marker of increased morbidity and poor outcomes. Pertinent prolonged screening of this sequela is warranted.

3315. Lux, C., et al. (2014). "Identification of gunshots to the head by detection of RNA in backspatter primarily expressed in brain tissue." Forensic science international **237**: 62-69.

Traces of backspatter recovered from the inside of the barrel of a gun that was used to deliver suicidal or homicidal contact shots may be a source of valuable forensic evidence and first systematic investigations of the persistence of victim DNA from inside firearms have been presented. The aim of the present study was to include victim RNA in such analyses to determine the origin of tissues in addition and parallel to standard DNA profiling for forensic identification purposes. In a first step, suitable mRNA (C1orf61) and micro-RNAs (miR-124a and miR-124*) that are primarily expressed in brain tissue were selected from potential candidates and confirmed using quantitative PCR (qPCR). Secondly, a co-extraction procedure for RNA and DNA was established and brain differentiability of the selected RNAs was demonstrated via qPCR using samples from experimental shots at ballistic models. In a third step, this procedure was successfully applied to analyse samples from real casework comprising eight cases of suicidal contact shots. In this pilot study, we are first to report the possibility of co-extracting mRNA, miRNA and DNA from ballistic trace samples collected from the inside of firearms and we demonstrate that RNA and DNA based analyses can be performed in parallel to produce informative and highly complementary evidence.

3316. L'Vovich, A. I. (2000). "[The descending cortical pathways of the frontal lobe to the nuclei of the hypothalamic mamillary bodies in human craniocerebral trauma]." Niskhodiashchie puti kory lobnoi doli k iadram sostsevidnykh tel gipotalamusa pri cherepno-mozgovoi travme cheloveka. **117**(2): 41-45.

Structural organization of conducting ways of the frontal lobe cortex to hypothalamic nuclei was studied in sections of brain from 5 patients who died in short terms after craniocerebral trauma and during the experiment in 5 macaque rhesus monkeys with unilateral destruction of different cortical fields of frontal area. Series of brain sections were processed using silver nitrate impregnation after Bielschowsky [correction of Bilshovsky] with counterstaining of nuclear structures after Kavamura with cresyl violet. The presence of direct corticohypothalamic ways from the cortex of

the orbital surface of inferior (field 47 and its subfields) and superior (field 11) frontal gyri and frontal pole (field 10) to nuclei of mamillary complex and lateral hypothalamus was established. Direct frontomamillary ways from these cortical areas terminate basically in medial mamillary nucleus. In monkey direct frontomamillary ways were distinguished in the cortex of field 47. In man widening of the area where corticohypothalamic ways arise is connected with progressive development of the telencephalic cortex and phylogenetically new formation of hypothalamus--mamillary bodies.

3317. Lyberg, T. and O. A. Olstad (1991). "The vascularized fibular flap for mandibular reconstruction." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **19**(3): 113-118.

Vascularized fibular bone grafts have advantages over other bone grafts in the restoration of the contour and function of defective mandibles. The fibular graft can be tailored to fit even major mandibular defects; in combination with preformed temporomandibular joint prostheses total mandibular reconstruction can be performed in a single procedure. The fibular transplant is considered ideal for the insertion of implants to support dental suprastructures to obtain maximal oral rehabilitation. We have used fibular grafts in eight cases for primary or secondary reconstruction of a variety of mandibular defects resulting from cancer, chronic osteomyelitis or gunshot injuries. The results have been most encouraging with respect to function and cosmetic appearance. There have been no transplant failures and minimal donor site complications.

3318. Lydiatt, D. D., et al. (1987). "Problems in evaluation of penetrating foreign bodies with computed tomography scans: report of cases." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **45**(11): 965-968.

Computed tomography is the best radiologic modality available in the evaluation of penetrating injuries to the soft tissues. The technique is the best available when the foreign body has a density similar to the surrounding tissues. Limitations of CT scanning include difficulty in identifying small foreign bodies, objects with densities similar to surrounding structures, and detecting vascular injury. Interpretation of postoperative changes is also difficult. Two cases have been presented to illustrate the advantages, and limitations of CT scanning in penetrating soft tissue trauma.

3319. Lyson, T., et al. (2013). "Transnasal endoscopic removal of intraorbital wooden foreign body." Journal of neurological surgery. Part A, Central European neurosurgery **74 Suppl 1**: e100-103.

INTRODUCTION: Traditionally retrobulbar lesions localized in the medial part of the orbit are removed using rather extensive extracranial approaches. A few cases were recently reported in which lesions of a certain type were removed using a transnasal endoscopic approach. We describe a patient in whom we managed to remove a sizable piece of wood from the orbit endoscopically after two former unsuccessful attempts., CASE REPORT: A 30-year-old male with a wooden foreign body localized medially behind the globe was operated on 5 days after trauma. His vision was preserved but motility of the eye globe was heavily restricted. An endoscopic transnasal, transethmoidal approach with neuronavigated tools was used to remove the foreign body successfully, using a "bimanual technique." The patient was discharged on day 1 postoperatively with intact vision. Movement restriction gradually resolved, and after 2 weeks he recovered completely., CONCLUSION: Foreign bodies localized close to the medial wall of the orbit can be safely removed using an endoscopic transnasal approach. The use of neuronavigation is essential for the precision, safety, and effectiveness of the procedure. Copyright Georg Thieme Verlag KG Stuttgart . New York.

3320. Lyson, T., et al. (2014). "Endoscopic transconjunctival surgical approach to intraconal space of the orbit: first clinical experience." Neurologia i neurochirurgia polska **48**(4): 248-253.

BACKGROUND AND PURPOSE: Recently, a transconjunctival, endoscope-assisted (TEA) approach to the medial intra-orbital space was developed based on cadaver preparations, with an ultimate goal of minimizing disturbances of the anatomic structures of the orbit. However, no report on clinical validation of this promising technique was published thus far. We present our experiences with the TEA approach in two patients., MATERIAL AND METHODS: In emergency conditions, we approached the lateral retrobulbar space of a 42-year-old male through a 180degree incision close to the corneal limbus; a scrap of metal, which had perforated the globe and resided at its posterior wall, was removed endoscopically. Moreover, we used the TEA approach to remove a tumor from the upper intraconal space in a 63-year-old woman., RESULTS: In both patients the surgical goal was achieved with no muscle transection and without additional

morbidity and complications., CONCLUSIONS: Our experiences with TEA approach suggest that the procedure is clinically feasible, produces no co-morbidity and yields good functional and cosmetic results. As a result, the whole circumference of the retrobulbar space can be conveniently explored.

3321. Ma, H. M., et al. (2015). "An oxytocin gene polymorphism affects social outcome after traumatic brain injury." PM and R **7**(9): S93-S94.

Objective: To assess the effects of patient oxytocin gene polymorphisms on caregiver burden. Design: A prospective study of combat veterans with penetrating traumatic brain injury (pTBI) enrolled in Phases 2 and 3 of the Vietnam Head Injury Study (VHIS). Setting: Outpatient evaluation of American combat veterans with pTBI injured between 1967-1970. Questionnaires, including the Katz Adjustment Scale (KAS), were mailed to the patients' primary caregivers in 1985-1986. Blood samples were collected during Phase 3 (2003-2006). Participants: 131 combat veterans with pTBI and their caregivers (completed the KAS in 1985-1986). Interventions: Not applicable Main Outcome Measures: KAS subscales: R1 measures psychiatric symptoms; R2 indicates how frequently subjects participate in 16 socially expected activities; R3 measures caregiver expectations of subject participation in R2 activities; R4 measures the frequency of subjects' involvement in 23 leisure activities; R5 measures caregiver satisfaction with subject participation in R4 activities. Oxytocin single nucleotide polymorphisms tested in combat veterans with pTBI included rs7632287, rs53576, and rs2254298 (A to G), as well as rs1042778 (G to T). Results or Clinical Course: There was a significant difference in R2 between oxytocin rs7632287 AG (mean 34) and G (mean 38, P=.011). Subjects with G (a polymorphism that is known to be associated with pair-bonding relationships) compared to the AG polymorphism participated significantly more in household activities. There was also a significant difference in R4 between oxytocin rs2254298 AG (mean 38) and G (mean 43, P=.024). Subjects with the G polymorphism (associated with emotion and amygdala size) participated more in leisure activities. Having the A allele at either location did not significantly effect caregiver ratings on R2 or R4. None of the other KAS subscales were significantly affected by oxytocin gene expression. Conclusion: Genetic endowment can affect social integration after brain injury and should be considered as part of an individually tailored approach to rehabilitation intervention.

3322. Ma, J., et al. (2012). "Transocular removal of a retrobulbar foreign body and internal patch of the posterior exit wound with autologous tenon capsule." Archives of ophthalmology (Chicago, Ill. : 1960) **130**(4): 493-496.

A case of perforating ocular injury with a retrobulbar foreign body and a large full-thickness posterior pole defect near the optic disc was scheduled for vitrectomy after primary corneal suturing. Because it was difficult to remove the retrobulbar foreign body by orbitotomy and perform the outside suture, the retrobulbar foreign body was removed through the posterior hole by a transocular approach, and an autologous Tenon capsule flap was used to internally patch the large full-thickness posterior pole defect, thus enabling silicon tamponade. After 3 months of follow-up, there was no immune response around the patch. The retina remained mostly attached with a maintained peripheral visual field, normal intraocular pressure, and good cosmetic appearance. This surgical technique may be valuable in patients with a perforating retrobulbar foreign body and a large full-thickness posterior pole defect.

3323. Ma, Y., et al. (2020). "Methotrexate plus idarubicin improves outcome of new diagnosed primary central nervous system lymphoma patients." HemaSphere **4**: 1012.

Aims: Primary central nervous system lymphoma (PCNSL) is a rare subtype of non-Hodgkin's lymphoma. Although approximately 90% of PCNSL are pathologically diffuse large B cell lymphoma (DLBCL), the prognosis of PCNSL is much worse than other extranodal DLBCLs. Conventionally, methotrexate (MTX)-based chemotherapy has been a first-line choice for newly diagnosed PCNSL, while MTX combined with other medications may improve therapeutic outcomes such as cytarabine (Ara-C), idarubicin (IDA), and temozolomide. These medications have been selected based on their capability to penetrate the blood-brain barrier (BBB) and their efficacy against systemic lymphomas. However, the precise superiority of these polychemotherapies remains to be determined. Therefore, in this study, we assessed MTX together with IDA as first-line regimens for newly diagnosed CNS lymphoma in patients. Methods: We established a prospective cohort of PCNSL patients (18-65y) newly diagnosed between 30th June 2016 and 30th June 2019. Patients were randomly separated in two group: MTX only group and MTX/IDA group. In MTX only group, patients were treated with MTX 8g/m2 on day 1, while in MTX/IDA group patients were treated with IDA 10mg/m2 on day 2 flowing with MTX

8g/m2 on day 1. Treatments were repeated every 3 weeks except in case of progression and/or unacceptable toxicity or patient refusal. The last follow-up was conducted on 1st December 2020. The Kruskal-Wallis and Mann-Whitney U tests were used for quantitative parameters and the X2 square test was used for non-quantitative parameters. Univariate analysis was performed using log-rank test, and survival distributions were analyzed by the Kaplan-Meier curve and log-rank test. Multivariate analysis was done by Cox regression model. Results: A total of 47 newly diagnosed PCNSL patients were enrolled, including 27 patients in MTX only group and 20 patients in MTX/IDA group. There were no significant differences between two groups including gender, age, ECOG and other clinical characteristics. Complete remission (CR) rate was identified in 60% of patients in the IDA/MTX group and 51.85% of patients who received MTX only. Overall response (ORR) rate was 65% in the IDA/MTX group and 66.67% in the MTX only group. Median progression-free survival (PFS) in MTX/IDA group and MTX only group was 9.9 months and 10.9 months, respectively (P = 0.75). Median OS was not reached (NR) in the IDA/MTX group and 24.3 months in the MTX group (P = 0.21). There were no significant differences in adverse effects between two groups. Multivariate analysis of COX model showed only number of lesion in brain was independent factors for OS and PFS between MTX/IDA group and MTX only group. Summary/Conclusion: For newly diagnosed PCNSL patients with multiple lesions in brain, MTX/IDA showed better OS and PFS than MTX only as first-line treatment. (Figure Presented) .

3324. Mabrouk, A., et al. (2014). "Incidence, etiology, and patterns of maxillofacial fractures in Ain-Shams University, Cairo, Egypt: A 4-year retrospective study." Craniomaxillofacial Trauma and Reconstruction **7**(3): 224-232.

Although there is a worldwide increase in maxillofacial trauma incidence; the pattern and etiology of these injuries varies from one country to another depending on socioeconomic, cultural, and environmental factors. This study aims to realize the epidemiological characteristics of maxillofacial fractures in our department. A retrospective cross-sectional study of all facial trauma patients admitted to our department during 2009 to 2012. Patients' data including gender, age, etiology of trauma, the pattern and demographic distribution of fractures of maxillofacial skeleton, and associated injuries were analyzed and compared with previously published data. The chi-square test was used with a p value of less than 0.05, which was considered statistically significant. There is a significant increase in maxillofacial fractures incidence in the past 2 years than former ones. There is a male predominance with highest incidence in the age group of 20 to 40 years. Road traffic accident is the most common etiological factor followed by violence. There is increase in mandibular fracture incidence compared with midface. The significant increased incidence of maxillofacial fracture due to motor car accidents and assaults in the past 2 years reflects a behavioral change within the community.

3325. MacAulay, L. E., et al. (2009). "Effects of decomposition on gunshot wound characteristics: under cold temperatures with no insect activity." Journal of forensic sciences **54**(2): 448-451.

Information on gunshot wound characteristics has been well documented; however, there is little documented information on the effects of decomposition or environmental conditions on gunshot wound characteristics. This study was conducted in order to determine if decomposition would obscure or alter the physical surface characteristics of gunshot wounds when exposed to a low temperature environment. The study was conducted from November 2005 to January 2006 in Nova Scotia, Canada in forested and exposed environments, with air temperatures between -10 degrees C and +10 degrees C. Pigs were used as human models and were shot six times each at three different ranges (contact, 2.5 cm, and 1.5 m). Gunshot wound characteristics persisted until the wounds were covered with ice and snow, after which changes were observed. The changes were recognized as being unique to the different ranges of gunshots and it was concluded that changes due to decomposition under the conditions tested would not affect the collection and interpretation of gunshot wound evidence.

3326. MacAulay, L. E., et al. (2009). "Effects of decomposition on gunshot wound characteristics: under moderate temperatures with insect activity." Journal of forensic sciences **54**(2): 443-447.

Previous studies document characteristics of gunshot wounds shortly after they were inflicted. This study was conducted to determine if the early stages of decomposition obscure or alter the physical surface characteristics of gunshot wounds, thereby affecting the quantity and quality of information retrievable from such evidence. The study was conducted in August and September, 2005 in Nova Scotia, Canada in forested and exposed environments. Recently killed pigs were used as research models and were shot six times each at three different ranges (contact, 2.5 cm, and 1.5

m). Under these test conditions, the gunshot wounds maintained the characteristics unique to each gunshot range and changes that occurred during decomposition were not critical to the interpretation of the evidence. It was concluded that changes due to decomposition under the conditions tested would not affect the collection and interpretation of gunshot wound evidence until the skin was degraded in the late active or advanced decay stage of decomposition.

3327. Macdonald, M. E., et al. (2008). "Signs of life and signs of death: brain death and other mixed messages at the end of life." Journal of child health care : for professionals working with children in the hospital and community **12**(2): 92-105.

Brain death is a medical, legal and cultural category constructed to fill an important need created by evolving medical technologies and practices. However, managing life and death via organ transplants and brain death criteria is not without controversy; there remains much confusion and ambivalence in both lay and medical populations regarding both organ donation and the diagnostic category of brain death. By way of a case study of cranial trauma taken from a larger study of bereaved parents, this article discusses how, from a parent's perspective, brain death and organ donation are neither morally nor medically straightforward concepts. The case study presented in this article demonstrates the necessity for more research and clinical training in communication issues regarding brain death and end-of-life care with families in critical care situations.

3328. Macdonald, R. L., et al. (2003). "Randomized, pilot study of intermittent pneumatic compression devices plus dalteparin versus intermittent pneumatic compression devices plus heparin for prevention of venous thromboembolism in patients undergoing craniotomy." Surgical neurology **59**(5): 363-364.

BACKGROUND: Unfractionated heparin and the low molecular weight heparin, dalteparin, are used for prophylaxis against venous thromboembolism in patients undergoing craniotomy. These drugs were compared in a randomized, prospective pilot study comparing intermittent pneumatic compression devices plus dalteparin to intermittent pneumatic compression devices plus heparin., METHODS: One hundred patients undergoing craniotomy were randomly allocated to receive perioperative prophylaxis with subcutaneous (SC heparin, 5000 units every 12 hours, or dalteparin, 2,500 units once a day, begun at induction of anesthesia and continued for 7 days or until the patient was ambulating. Entry criteria were age over 18 years, no deep vein thrombosis (DVT) preoperatively as judged by lower limb duplex ultrasound and no clinical evidence of pulmonary embolism preoperatively. Patients with hypersensitivity to heparin, penetrating head injury or who refused informed consent were excluded. Patients underwent a duplex study 1 week after surgery and 1 month clinical follow-up. All patients were treated with lower limb intermittent pneumatic compression devices., RESULTS: There were no differences between groups in age, gender, and risk factors for venous thromboembolism. There were no differences between groups in intraoperative blood loss, transfusion requirements or postoperative platelet counts. Two patients receiving dalteparin developed DVT (one symptomatic and one asymptomatic). No patient treated with heparin developed DVT and no patient in either group developed pulmonary embolism. There were two hemorrhages that did not require repeat craniotomy in patients receiving dalteparin and one that did require surgical evacuation in a patient treated with heparin. Drug was stopped in two patients treated with dalteparin because of thrombocytopenia. None of these differences were statistically significant., CONCLUSION: There was no significant difference in postoperative hemorrhage, venous thromboembolism or thrombocytopenia between heparin and dalteparin. The results suggest that, given the small sample size of this trial, both drugs appear to be safe and the incidence of venous thromboembolism by postoperative screening duplex ultrasound appears to be low when these agents are used in combination with intermittent pneumatic compression devices.

3329. Macdonald, R. L., et al. (1999). "Safety of perioperative subcutaneous heparin for prophylaxis of venous thromboembolism in patients undergoing craniotomy." Neurosurgery **45**(2): 245-242.

OBJECTIVE: To determine whether perioperative subcutaneous heparin is safe to use for patients undergoing craniotomy and to determine the incidence of venous thromboembolism in patients undergoing craniotomy., METHODS: Perioperative prophylaxis with subcutaneous heparin, 5000 U every 12 hours, was begun at induction of anesthesia for craniotomy and continued for 7 days postoperatively or until the patient was ambulating. Entry criteria to the study included patient age over 18 years and no evidence of deep vein thrombosis (DVT) preoperatively as judged by lower limb duplex ultrasound. Patients were excluded if they had duplex evidence of DVT or clinical evidence of pulmonary embolus (PE) preoperatively, had hypersensitivity to heparin or related products, had sustained a

penetrating head injury, or refused informed consent. Any patient undergoing craniotomy was eligible, including patients with a ruptured aneurysm or arteriovenous malformation and those with spontaneous intracranial hemorrhage. Patients underwent duplex study 1 week after surgery and 1 month of clinical follow-up. Records were also kept on 68 nonstudy patients who refused consent. All patients were treated with lower limb pneumatic compression devices., RESULTS: One hundred six patients were treated. No differences were noted between study and nonstudy patients in some individual risk factors for DVT or PE, such as obesity, smoking, paralysis, infection, pregnancy or postpartum state, varicose veins, heart failure, or previous DVT or PE. Significantly more (43 of 106) patients in the study group had a history of risk factors for DVT or PE, particularly malignancy, however, compared with nonstudy patients (20 of 68 patients; chi2, P < 0.01). There were no differences between groups in intraoperative blood loss, transfusion requirements, or postoperative platelet counts. Four clinically significant hemorrhages occurred during surgery in patients receiving heparin. Three resulted from intraoperative aneurysm rupture and one from intraventricular bleeding during resection of an arteriovenous malformation. These events were believed to be related to known complications of these operations, not to heparin. Of the study patients, two developed symptomatic DVT and one developed a nonfatal PE during the 1-month postoperative period. One additional study patient developed DVT below the popliteal veins, which was not treated. Four study patients developed DVT 1 to 2 months after surgery. In nonstudy patients, three developed DVT and two developed PE (one fatal, one nonfatal)., CONCLUSION: Perioperative heparin may be safe to administer to patients undergoing craniotomy, but a larger study is needed to demonstrate efficacy.

3330. MacEwen, C. J. and G. Fullarton (1986). "A penetrating orbitocranial stab wound." The British journal of ophthalmology **70**(2): 147-149.

An unusual case of intracranial penetration of a bread knife through the orbit is described. Despite the proximity of the blade to the internal carotids, the optic nerves and chiasm, and the pituitary the patient survived with only a minimal field defect affecting the eye opposite to the entry site; otherwise no neurological or endocrine deficit was evident.

3331. MacFarlane, C. (1999). "Management of gunshot wounds: the Johannesburg experience." International surgery **84**(2): 93-98.

The Johannesburg hospitals see large numbers of gunshot wounds and there is, therefore, considerable experience in their management. Historically, management has been dictated by experimental theories of wounding mechanisms. More modern work has indicated that some of these theories have been somewhat misleading, and some traditional means of management have changed. The basic military surgical lessons of the excision of dead tissue, delayed primary suture remain valid, it is the understanding of tissue damage and the more logical response which has changed. It is the wound as encountered which is managed, irrespective or the theoretical velocity of the bullet. The Johannesburg practice is outlined with regard to regions of the body, with discussion of, among others, the conservative management of gunshot wounds of the abdomen, primary repair of the colon, non operative management of certain limb wounds. The practice is summarised, based on considerable experience and the logistic implications of large numbers and may be useful to surgeons less experienced in gunshot wound management.

3332. MacGregor, A. J., et al. (2011). "Injury-specific correlates of combat-related traumatic brain injury in Operation Iraqi Freedom." The Journal of head trauma rehabilitation **26**(4): 312-318.

BACKGROUND: The prevalence of traumatic brain injury (TBI) has increased during the wars in Iraq and Afghanistan compared with 20th century military conflicts. The aim of this study was to elucidate injury-specific correlates of combat-related TBI that have yet to be clearly defined., PARTICIPANTS: Predominately Marine US service members who sustained brain injuries in Iraq between March 2004 and April 2008 identified from clinical records completed in the theater of combat operations (n = 2074)., MAIN OUTCOME MEASURES: Severity of TBI was classified as mild, moderate, or severe. Injury-specific factors, such as injury mechanism and type, were abstracted from the clinical records and were compared with severity of TBI., RESULTS: Of all TBIs observed in the sample, 89% were mild. Higher severity of TBI was associated with an increased likelihood of sustaining the injury by gunshot and a lower likelihood of helmet use. Improvised explosive devices were associated with a preponderance of mild TBIs, and frequency of injuries in locations in addition to the head was highest among those with moderate and severe TBIs. Concomitant injuries to the spine/back were associated with blast injury mechanisms., CONCLUSIONS: Most incidents of TBI occurring during

Operation Iraqi Freedom are mild in severity and a result of blast mechanisms. Multiple injuries were common, particularly as severity of TBI increased. Further research is needed to determine effects of combat-related TBI on rehabilitative and adverse health outcomes.

3333. Mackenzie, D. J., et al. (1993). "Fatal cerebral gunshot wounds: factors influencing organ donation." The American surgeon **59**(11): 764-768.

Patients with clinical brain death following head injury are important potential cadaveric organ donors. We analyzed our series of cranial gunshot wounds with particular attention to the frequency and patterns of organ donation after fatal injuries. Sixty-six patients with gunshot wounds to the head, including 59 with intracranial involvement (43 male, average age 26 years) were seen during a 4-year period. Injuries were limited to the head in 50 of 59 patients. Overall mortality was 66 per cent. Predictors of mortality included Glasgow Coma Scale (GCS) of six or less (93%), self-inflicted gunshot wounds (75%), and computed tomography (CT) findings of bihemispheric injury (87%) or ventricular injury (82%). Of the 39 patients who died, 28 met standard criteria for brain death, and nine of these went on to organ procurement. Thirteen families refused donation, and six patients were not harvested for reasons including old age, pregnancy, suspicion of AIDS, coroner refusal, and failure to pursue consent. Principles essential to maximal organ retrieval include: 1) Recognition that patients suffering cerebral gunshot wounds represent potential organ donors and that certain factors are predictive of mortality; 2) Critical care/trauma team approach with standardized management and timely declaration of brain death; 3) Early search for family members and prompt notification of organ procurement agencies; 4) Sensitivity to cultural issues influencing donation; and 5) Programs to increase public awareness of organ donation.

3334. Mackenzie, D. W., et al. (1988). "Meningitis caused by Absidia corymbifera." The Journal of infection **17**(3): 241-248.

A 56-year-old man developed mucormycotic meningitis caused by Absidia corymbifera and which followed a penetrating head injury. Antibodies to it were detected in the cerebrospinal fluid at titres higher than those found in the serum, thereby suggesting local production of antibody in the subarachnoid space.

3335. MacKenzie, K. A. and J. P. Lee (2011). "Review of outcome after repair of avulsion of the superior oblique tendon." Journal of AAPOS **15**(1): e24.

Introduction: To report the clinical characteristics and surgical outcome of patients undergoing repair of the superior oblique tendon, following traumatic avulsion. Methods: Review of 3 cases identified over the past 10 years. Results:We report on three patients, 2 male and 1 female, with a mean age of 11 years (range, 8 to 17) at the time of injury. All the patients presented with an ipsilateral superior oblique palsy following a penetrating injury to the supero-medial orbital area caused by dog-bite, metal hook and a ski pole. We explored the superior oblique tendon, which we found typically attached to sclera nasal to the superior rectus muscle. It was mobilised and brought under the superior rectus and sutured to the sclera, without complication. The delay from injury to surgery ranged from 8 months to 26 months. In all cases the initial superior oblique underaction (-2,5. -3, -3) improved post-surgery (-2, -1, -1), respectively. Despite all 3 patients demonstrating an abnormal head posture only 2 had demonstrable binocular functions pre and post operatively. Post-surgery, one patient underwent a combined recess-resect procedure to the contralateral inferior rectus, whilst another is considering an inverse Knapp procedure. Discussion: Injury to the trochlear area usually causes acquired Brown syndrome. These patients frequently have an associated superior oblique palsy, described by Knapp as having “canine-tooth syndrome”. However our series only presented with a superior oblique palsy, this may be due to the localisation of the injury. Conclusions: The superior oblique tendon was successfully reattached without complication.

3336. Mackerle, Z. and P. Gal (2009). "Unusual penetrating head injury in children: personal experience and review of the literature." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **25**(8): 909-913.

INTRODUCTION: A penetrating head injury belongs to the most severe traumatic brain injuries, in which communication can arise between the intracranial cavity and surrounding environment., DISCUSSION: The authors

present a literature review and typical case reports of a penetrating head injury in children. The list of patients treated at the neurosurgical department in the last 5 years for penetrating TBI is briefly referred. Rapid transfer to the specialized center with subsequent urgent surgical treatment is the important point in the treatment algorithm. It is essential to clean the wound very properly with all the foreign material during the surgery and to close the dura with a water-tight suture. Wide-spectrum antibiotics are of great use. In case of large-extent brain damage, the use of anticonvulsants is recommended., CONCLUSION: The prognosis of such severe trauma could be influenced very positively by a good medical care organization; obviously, the extent of brain tissue laceration is the limiting factor.

3337. Mackersie, R. C., et al. (1991). "Organ procurement in patients with fatal head injuries. The fate of the potential donor." Annals of surgery **213**(2): 143-150.

A 46-month, retrospective review of all victims of fatal head injury at a level 1 trauma center was undertaken to estimate donor organ availability, determine causes of procurement failure, and analyze the functional results of organs transplanted from this group of donors. Causes of procurement failure in 126 patients who died principally from their head injuries included failure of initial resuscitation (14%), ineligibility (28%), failure of physiologic support (14%), and denial of consent (20%). Of 73 eligible donors, 29 (41%) were able to donate one or more vascular organs (heart, liver, kidney). In only one instance was an eligible donor not appropriately identified as such. Failure of physiologic support to prevent early death (25%), and denial of consent (34%) were found to be the two major, potentially remediable causes of procurement failure in this series. Based on this data, an estimated 29 patients/million population/year will survive initially and meet all eligibility requirements for organ donation. Data on 47 kidneys transplanted from the donor group demonstrated a 77% overall graft survival rate at a follow-up period averaging 23 months. Prolonged donor hypotension, but not the use of high-dose vasopressors, adversely affected allograft survival. The current limitations of organ procurement in victims of fatal head injury stem from a limited ability to maintain cardiopulmonary function long enough for the procurement process to be completed and a high overall rate (46%) of denial of consent for organ harvest by next of kin.

3338. Macmillan, M. (2000). "Restoring Phineas Gage: a 150th retrospective." Journal of the history of the neurosciences **9**(1): 46-66.

September 13 1998 marked the 150th anniversary of the accident to Phineas Gage, one of the most famous cases of survival after massive injury to the brain, and certainly the most famous case of personality change after brain damage. For this article a sample of the current literature about Gage was examined. It was found that although his case is mentioned in about 60% of introductory textbooks in psychology, there is a good deal of inaccuracy in what has been written about him. Similar inaccuracy was found in a smaller sampling of the psychiatric, medical, physiological, linguistic, and general neuroscientific literature. The main basis of the inaccuracies is an ignorance or disregard of what is contained in the primary sources about Gage, coupled with a tendency to attribute to him characteristics that belong to other cases of frontal damage. The errors and their bases are discussed in an endeavour to restore the picture of Gage to its original state. The paper includes an Appendix of verbatim quotations from the primary sources that can be compared with the later, inaccurate renditions.

3339. Madaan, P., et al. (2019). "Neurocognitive outcomes and their diffusion tensor imaging (DTI) correlates in children with mild traumatic brain injury (MTBI)." Neurology **92**(15).

Objective: To study the neurocognitive outcomes and their DTI correlates in children (aged 6- 16 years) with mTBI at three months post injury. Background: mTBI is the commonest TBI in children. Persistent deficits after “mild” TBI can lead to significant functional disability; hence these should be evaluated. Design/Methods: This prospective analysis included 74 children with mTBI(M:F=52:22; mean age:9.5(±2.7)years). Wechsler's Intelligence Scale for children-Indian adaptation(WISC-IV), Child Behavioral Checklist(CBCL) and Children's Sleep Habit Questionnaire(CSHQ) were administered for 57 cases (at 3 months post injury) and controls of similar age. DTI (1.5 T scanner; Siemens, Erlangen, Germany), done within 7days of injury, were processed for mean diffusivity(MD) and fractional anisotropy(FA) for various Region of Interest (ROI) which were correlated with IQ and various indices. Results: All the patients had non-penetrating craniocerebral trauma. Common causes of mTBI were accidental falls(65%) and Road traffic accident(26%). Presenting features were loss of consciousness(53%), confusion/disorientation(47%) and post-traumatic amnesia(10%). Other clinical features in acute phase included drowsiness(86%), headache(78%), balance problems(62%), nausea(47%),

fatigue(45%), vomiting(35%), ENT bleed(12%), Sensitivity to sound/ light(12%) etc. Neuroimaging abnormalities were seen in 9 patients (12%). At 3months post-injury, Cases performed poorly in terms of Full scale IQ, Perceptual Reasoning Index and Processing Speed Index as compared to typically developing controls of similar age. Based on CBCL, 17% children with mild TBI had internalizing behavioural problems (in borderline and clinical range) in comparison to 4% controls. Prevalence of poor sleepers in mild TBI cohort and typically developing controls was 12.3% and 2%. Headache, reduced attention span, shortness of temper and fatigue were common post concussion symptoms. There was a positive co relation between Right Arcuate fasciculus MD (short term) and VCI (0.289) and PSI (0.299) Conclusions: Mild TBI is not that mild with neurobehavioral problems persisting beyond the acute phase of injury.

3340. Madathil, S. K., et al. (2017). "Penetrating ballistic-like brain injury activates neurogenic niches in adult rats." Journal of neurotrauma **34**(13): A137.

Active proliferative response is a common occurrence following traumatic brain injury (TBI) and contributes to both gliogenesis and neurogenesis. While post-injury neurogenesis stimulates neurorepair, gliogenesis may cause neuroinflammation that may be detrimental to reparative processes. To design strategies that promote neurorepair, we need to understand the changes in post-traumatic neurogenesis. Here we examined the effects of penetrating ballistic-like brain injury (PBBI) on immature neuronal population in two important neurogenic niches of the adult brain viz., forebrain sub-ventricular zone (SVZ) and hippocampal sub-granular zone (SGZ). Rats were subjected to PBBI (n = 6/time point) or sham craniotomy (n = 6/time-point). To capture proliferating cells, rats were injected with BrdU (50mg/kg) for 7 days and were euthanized at 10 day post-injury. Doublecortin (DCX) immunolabeling was used to identify immature neurons and BrdU/DCX double-labelling was performed to identify newborn immature neurons. Quantification of immunolabelled cells was done using a fluorescence microscope equipped with multi-channel filter set. To understand forebrain neurogenesis, total immature neurons and BrdU positive newborn immature neurons were counted separately in ipsilateral SVZ, striatum, subcortical white matter (SCWM) and cortex. In the hippocampus, DCX positive and Brdu/DCX co-labelled cells were counted from SGZ. DCX positive neurons and BrdU/DCX co-labelled newborn immature neurons were found in both SVZ and SGZ, regardless of the injury status. However, PBBI appeared to enhance the production of newborn neurons in both SVZ and SGZ areas. Furthermore, PBBI significantly enhanced the migration of newborn neurons from SVZ towards striatum, SCWM and cortex ($p < 0.05$ compared to sham). In the hippocampal SGZ, PBBI did not alter the total number immature neurons however, increased the number of BrdU/DCX co-labelled newborn neurons ($p < 0.05$ compared to sham). Overall, our results indicate an activation of neurogenesis in two major neurogenic niches of the adult rat brain following PBBI. Our findings also show that these newborn neurons can migrate to areas of injury, purportedly to modulate neurorepair. Further studies will characterize the anatomical integration of newborn neurons and their role in mediating functional recovery.

3341. Madathil, S. K., et al. (2019). "Widespread dendritic pathology is evident following severe penetrating brain injury in rats." Journal of neurotrauma **36**(13): A144.

Traumatic brain injury (TBI) has been shown to induce extensive dendritic pathology. Increasing evidence suggests that damaged dendrite and spines directly affect synaptic plasticity, which plays a critical role in neuronal function and behavioral modulation. The current study was designed to define the temporal and regional alterations in neuronal morphology and dendritic loss in the penetrating ballistic-like brain injury (PBBI) model. Adult Sprague- Dawley rats were subjected to PBBI (10% injury, n = 8/group) or sham craniotomy (n = 4/group) and euthanized at 1, 2, 3, 7, 14 or 28 days post-injury. Assessment and quantitation of dendritic injury was done using Golgi and microtubule associated protein-2 (MAP- 2) staining. For dendritic Sholl analysis, Golgi stained neuronal images were analyzed using Fiji Sholl analysis plugin for ImageJ. MAP-2 immunostaining intensity was quantified separately from cortex and hippocampus using ImageJ. The injury core was devoid of Golgi stained neurons and neurons in the injury penumbra showed reduced dendritic branching complexity. Significant changes in various Sholl parameters including number of intersections, maximum radius and Schoenen Ramification Index (SRI), were observed following PBBI at the majority of post-injury time points studied. We also observed dendritic beading/blebbing in penumbral neurons indicating the presence of degenerating dendrites. Reduced MAP-2 staining was seen in the cortex at acute time points following severe brain injury, demonstrating loss of neurites. Employing Golgi staining coupled with Sholl analysis we have been able to identify several morphological changes in neurons following PBBI. Extensive trauma induced alterations in dendrites show that these changes may underlie neurological symptoms following TBI. Moreover, loss of MAP-2 staining even in areas distal to the injury core indicate that dendritic derangement is widespread following PBBI, and may contribute to post-

traumatic behavioral dysfunction. Further studies in PBBI model will utilize therapeutic approaches to protect spared neural dendrites and spines in an effort to mitigate functional abnormalities following severe TBI.

3342. Madathil, S. K., et al. (2018). "Temporal and regional changes in vascular density following penetrating type brain injury." Journal of neurotrauma **35**(16): A192.

Traumatic brain injury (TBI) has been shown to produce cerebral vasculature changes including damage to blood vessels, haemorrhage, reduced blood flow and sprouting of new blood vessels. While some of these post-injury vascular changes may be detrimental to reparative processes, angiogenesis (formation of new blood vessels from preexisting ones) may promote neurorepair. To design strategies that promote angiogenesis, we need to understand the changes in posttraumatic angiogenic responses. Here we examined the temporal and regional alterations in vasculature following penetrating ballistic-like brain injury (PBBI) in rats. Adult Sprague-Dawley rats were subjected to PBBI (10% injury, n = 8/time point) or sham craniotomy (n = 4/timepoint) and euthanized at different time points (1, 3 and 7days postinjury). To label perfused blood vessels, anesthetized rats were injected with Tomato Lectin-FITC (100ug/rat, tail vein injection) 15 min prior to euthanasia. Following transcardial formalin perfusion, brains were collected and processed for histological studies. FITC immunolabeling was used to identify perfused blood vessels. Immunostaining intensity was quantified separately from cortex and hippocampus using Image J software. Brain regions proximal to the injury core showed reduced vascular density at all the time points studied. Notably, the perilesional cortex showed increased vascular staining intensity compared to sham ($p < 0.05$) at 1 and 3 days post-injury, indicating angiogenesis. However, these newly formed blood vessels were not evident at 7 days post-injury and thus appear to be transient. Instead, we observed reduced vascular staining in the perilesional cortex 7 day post-injury ($p < 0.05$ vs. sham). The hippocampus showed reduced vascular staining at all time points studied. Overall, our results indicate significant alterations in vascular density following PBBI. Our findings indicate that the brain upregulates angiogenic responses at acute time points following PBBI, presumably to replace damaged blood vessels and to bring oxygen and nutrients to injured area. However, this reparative process appears to be transient as we observed significant reduction in vascular density by 1 week postinjury. Further studies will characterise chronic changes in vascular density following TBI.

3343. Madden, L. K., et al. (2013). "Admission temperature does not predict extended glasgow outcome scale score following traumatic brain injury." Journal of neurotrauma **30**(15): A39.

Introduction There is a lack of clear and robust evidence to aid understanding of the impact of body temperature on outcome and to guide clinical management. Using the UC Davis Neurotrauma database, our goal is to identify whether admission temperature (hypothermia, normothermia, or fever) predicts outcome. Methods Prospectively collected TBI registry and EMR data for patients who consecutively presented to a single Level-I Trauma Center, were identified. Eligibility criteria included: blunt injury mechanism, initial post-resuscitation GCS score ≤ 12, and treatment as an adult (≥ 16 years of age). Patients were excluded if they had a penetrating TBI or were treated at another facility for > 12 hours prior to transfer. IRB approval was obtained prior to performance of any study procedures. Over a 48-month period 426 patients were identified and of these, 340 had complete data available at the time of analysis. For this study, aberrance in temperature was defined as a measured value outside of the normal range (36.5-37.5°C). Relative hypothermia is defined as temperature < 36.5°C. Fever is defined as temperature of > 37.5°C. Results For this study sample, median age was 44.86 years and gender distribution was 73.5% male and 26.5% female. Ethnicity reporting identified 20% as Hispanic or Latino, 78% non-Hispanic or Latino and 2% unknown. Mechanisms of injury for this sample included MVC (28.2%), Fall (23.7%), Auto vs. Pedestrian (15%), Assault (12.7%), Found down (8.2%), MCA (6.6%), and others (5.6%). Ordinal regression was performed using SPSS (version 21) considering the explanatory variable, admission body temperature, grouped into the above-noted categories with the dependent variable, 6-month GOS-E. Before considering the effects of the explanatory variable, we need to determine whether the model improves our ability to predict outcome. Comparing the baseline intercept-only model against the final model with temperature, we sought to identify if adding the explanatory variable improved the fit to the data. Model fitting analysis of the - 2 log-likelihood (- 2LL) values for the baseline and the final model, and a chi-square to test the difference between the two models provides a non-significant statistic ($p = .120$). The final model with the explanatory variable does not gives better predictions than a guess based on the probabilities for the outcome categories. In assessing Goodness-of-Fit, Pearson's chi-square statistic was used. This statistic tests whether observed data are consistent with the fitted model. Considering the null hypothesis, the fit is good. We do not reject this hypothesis ($p = .941$), can conclude that the data and the model predictions are similar, and that we have a good model. However, pseudo R2

values (Nagelkerke = 1.3%, Cox and Snell = 1.2%, McFadden 0.3%) indicate that admission temperature group scores explain a relatively small proportion of the variation between patients in their outcome scores. The R2 indicates that a model containing only admission temperature is likely to be a poor predictor of outcome for any particular individual patient. Conclusions The IMPACT model validated that, multiple variables are needed to accurately predict outcome. Our current analysis suggests that admission temperature, as currently collected, do not add value to prediction models of GOS-E. However, this negative finding does not suggest that temperature is not critical. In fact it is important to consider whether the selected temperature ranges are appropriate for TBI. In addition, duration of temperature dysregulation should be added as a variable. Therefore we suggest that further research is needed and should (1) characterize the dose of severity and duration of temperature alteration after TBI; (2) determine if temperature alteration influences or predicts neurologic outcome; and (3) determine if the rate of temperature correction (warming from relative hypothermia or cooling from relative fever) influences or predicts neurologic outcome.

3344. Maddileti, G. B., et al. (2020). "An autopsy study of Cranio-cerebral Injuriesdue to road traffic accidents." Medico-Legal Update **20**(1): 1-6.

Cranio-cerebral injuries are a morbid state, resulting from gross structural changes to the scalp, skull and the contents of the cranium. In present scenario, accidents are now considered as one of major contributing factors of Non-Communicable Diseases which have become major health problems of developing countries like India. According to the national crime bureau statistics In India, over 1,46,133 people were killed in various road traffic accidents during 2015 and the count raised to 1,50,785 in 2016. Information on the contributing factors is mandatory to reduce this burden. A prospective study of all Road Traffic accidents coming for autopsy at Government Medical College, Anantapuram. Majority of victims were male in the age group between 31-40 years. Most of them had Linear fractures of the skull along with Sub dural haemorrhage. Two Wheeler riders were the most common victims. Most of the victims died due to Cranio- Cerebral Injury. Most of the times, it is the negligence, which results in an accident. The negligence may be on the part of the victim or may be there on the part of other person who occupied the second vehicle. Sometimes innocent pedestrians are also victimized to these deaths. An accident for all practical purposes is preventable, provided if it is anticipated and proper precaution and preventive measures are adopted.

3345. Madea, B., et al. (2008). "Fall downstairs: accident, homicide or natural death?" Forensic science, medicine, and pathology **4**(2): 122-128.

In homicide cases a clear anatomical or toxicological cause of death is normally evident. In the following a case is described where, without clear anatomical or toxicological cause of death, the husband of the deceased-a trained anaesthesiologist-was charged with murder. Suspicion was raised since the autopsy findings did not correspond to a fatal fall downstairs but instead could be definitely ruled out as cause of death, since intracranial bleedings and cerebral contusions, the leading causes of death in fatal falls downstairs, were missing. Further suspicion was raised since electrocardiograms (ECGs), previously stated by the accused to have been recorded personally from his wife during cardiopulmonary resuscitation (CPR), were obviously faked. Additionally, an ampule of succinylcholine was missing from his emergency case. In a trial lasting more than three quarters of a year with several witnesses and experts heard by the court, the cause of death remained unclear. However, a natural cause of death and a fatal fall downstairs were ruled out. Subsequently the husband admitted during the trial to have killed his wife without elaborating on the circumstances for legal reasons. He was sentenced to prolonged imprisonment. Of special importance was that, based on the knowledge of typical autopsy findings in fatal falls downstairs, a lethal fall downstairs could be ruled out. Therefore even negative autopsy findings are of great forensic importance.

3346. Madea, B., et al. (2016). "[Fatal explosion injuries from blasting a cigarette machine]." Todliche Explosionsverletzungen bei Sprengung eines Zigarettenautomaten. **237**(3-4): 130-142.

In the last few years, a growing number of cases have been reported in Germany in which vending machines have been blasted by criminals to get at the money. Thus, it was only a question of time for the first fatalities to occur as a consequence of such careless explosions. We report on the death of a 16-year-old boy who died after triggering an explosion by spraying a deodorant into the coin slot of a cigarette machine. Death was caused by severe craniocerebral trauma due to tertiary blast-related injuries when the front plate of the machine hit the victim's cerebral and facial skull.

3347. Madea, B., et al. (2010). "Molecular pathology in forensic medicine--Introduction." Forensic science international **203**(1-3): 3-14.

Techniques of molecular biology have improved diagnostic sensitivity, accuracy and validity in forensic medicine very much, especially in the field of identification (paternity testing, stain analysis). Since more than 10 years these techniques - meanwhile well established in clinical disciplines - are used also for other applications in forensic medicine: determination of cause and manner of death, tissue identification by mRNA and microRNA, examination of gene expression levels (survival time, time since death, cause of death), toxicogenetics.

3348. Madea, B. and M. Staak (1988). "Determination of the sequence of gunshot wounds of the skull." Journal - Forensic Science Society **28**(5-6): 321-328.

3349. Madei, W., et al. (1998). "[Endoscopic projectile extraction in treatment of a gunshot injury to the head]." Endoskopische Projektilextraktion zur Behandlung einer Kopfschussverletzung. **123**(39): 1139-1142.

HISTORY AND CLINICAL FINDINGS: A 14-year-old boy had in war-torn Bosnia sustained a transcranial gunshot wound from a 7.65 mm bullet. After primary medical care with craniotomy and the removal of bony fragments and cerebral debris followed by a duraplasty, he was transported to the French-German Field Hospital. On arrival he was breathing spontaneously and in stable cardiovascular state but with impaired responsiveness and somnolent. His pupils were moderately dilated with slight anisocoria (right > left). His gaze was deviated to the left and he had vertical gaze paralysis as well as right central facial nerve paresis. In addition he had a mild diencephalic syndrome, right hemiplegia and a right hemihypaesthesia with increased muscle tone, especially of the leg, paratonia and right positive Babinski reflex. There also was a marked ciliospinal reflex and he had a bulbar speech as well as cognitive and memory abnormalities., INVESTIGATIONS: Haemoglobin and haematocrit were below normal (12.1 g/dl and 35.0%, respectively), while biochemical tests were normal. Cranial computed tomography localized the bullet in the pineal recess of the 3rd ventricle and the lamina quadrigemina., DIAGNOSIS, TREATMENT AND COURSE: These findings indicated endoscopic transcranial removal of the bullet, achieved with a rigid endoscope and forceps along the entry track. Subsequent intensive care proceeded without complication. On discharge the boy was normal oriented and ready to make contact. The neurological defects were regressing., CONCLUSION: Endoscopic transcranial removal of a bullet wedged in the brain is a relatively sparing neurological procedure which, under unusual circumstances and conditions, can achieve a satisfactory result even with limited facilities.

3350. Madei, W. F. and H. P. Klieser (2000). "Intensive care medicine in the German Field Hospital during the implementation force mission in Trogir, Croatia." Military medicine **165**(6): 445-448.

To provide medical care for multinational personnel deployed during the Implementation Force mission, the German Army provided a mobile surgical hospital with sophisticated equipment to perform advanced resuscitation and lifesaving surgical procedures, as well as preoperative and postoperative intensive care, under conditions similar to those in rear hospitals. During an observation period of 4 months (December 1995 to April 1996), nearly 10,000 patients were treated at this facility. In addition to the presentation of statistical data from a unique critical care facility during the Implementation Force mission, this article discusses the usefulness of neurosurgical services as part of a forward field hospital.

3351. Mader, T. H., et al. (2006). "Ocular war injuries of the Iraqi Insurgency,January-September 2004." Ophthalmology **113**(1): 97-104.

PURPOSE: To document the types and causes of ocular and ocular adnexal injuries treated by United States Army ophthalmologists serving in Iraq during the Iraqi Insurgency., DESIGN: Prospective hospital-based observational analysis of injuries., PARTICIPANTS: All coalition troops, enemy prisoners of war, and civilians with severe ocular and ocular adnexal injuries., METHODS: We prospectively examined severe ocular and ocular adnexal injuries that were treated at the 31st Combat Support Hospital during the portion of the Iraqi Insurgency that took place from January 20 through September 12, 2004., MAIN OUTCOME MEASURES: Incidences and characteristics of ocular and ocular adnexal

injuries., RESULTS: During the time observed, 207 patients suffered severe ocular or ocular adnexal injuries, including 132 open globes. Blast fragmentation from munitions caused 82% of all injuries. The most common single cause of injury was the improvised explosive device (IED), which caused 51% of all injuries. Of 41 eye excisions, 24 were caused by IEDs., CONCLUSIONS: During the portion of the Iraqi Insurgency covered in our report, munitions fragments were the most common cause of ocular and ocular adnexal injuries. The single most common cause of injury was the IED, which produced devastating ocular and ocular adnexal injuries. The authors' findings indicate that polycarbonate ballistic eyewear could have prevented many, but not all, of the ocular injuries we report.

3352. Madias, J. E. (2015). ""Neurogenic stress cardiomyopathy in heart donors" is a form of Takotsubo syndrome." International journal of cardiology **184**(1): 612-613.

3353. Madson, A. Q., et al. (2013). "Non-battle craniomaxillofacial injuries from U.S. military operations." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **41**(8): 816-820.

INTRODUCTION: Non-battle injuries (NBIs) can be a source of significant resource utilization for the armed forces in a deployed setting. While the incidence and severity of craniomaxillofacial (CMF) battle injuries (BIs) have reportedly increased in the ongoing U.S. military conflicts in Iraq and Afghanistan, the prevalence and the nature of NBIs are not well described., MATERIAL AND METHODS: The Joint Theater Trauma Registry was queried from October 2001 to February 2011, covering Operations Enduring Freedom and Iraqi Freedom, for both NBIs and BIs to the CMF region. Patient demographics, injury severity score, mechanism and type of injury were included in the query. Using ICD-9 diagnosis codes, CMF injuries were classified according to type (wounds, fractures, burns, vascular injuries, and nerve injuries). Statistical analysis was performed for comparative analysis., RESULTS: NBIs constituted 24.3% of all patients with CMF injuries evacuated to a regional combat support hospital (CMF BIs 75.4%). These injuries were characterized by blunt trauma, most commonly motor vehicle collisions (37%), and falls (20%). As compared to CMF BIs, CMF NBIs resulted in less mortality (1.3% vs. 3.1%, $p < 0.0001$), fewer injuries per patient (1.87 vs. 2.26, $p = 0.055$), and a decreased severity score (ISS) (8.38 vs. 12.98, $p < 0.0001$). However, a significant percentage of CMF NBIs still required evacuation out of theater (27.8% of NBIs vs. 42.2% of BIs, $p < 0.0001$), depleting the combat strength of the deployed forces., CONCLUSIONS: CMF NBIs accounted for a substantial portion of total CMF injuries. Though characterized predominantly by blunt trauma with an overall better prognosis, its burden to the limited resources of a deployment can be significant. This descriptive study highlights the need to allocate appropriate resources for treatment of these injuries as well as strategies to reduce both its incidence and severity., LEVEL OF EVIDENCE: IV Prognostic.

3354. Madureira, A. J., et al. (2001). "Gunshot wound and bullet 'aspiration'." Pediatric radiology **31**(10): 758.

3355. Magagi, A., et al. (2022). "Management of trauma White weapons penetrating Head and Neck in the anesthesia department of the national hospital of Zinder in Niger: About five reported cases." Annals of medicine and surgery (2012) **78**: 103840.

We report five cases of craniocervical trauma with knives. The occurrence circumstances were common to all injuries. The trauma was caused by a knife during a fight or an intentional injury. All the victims were farmers or ranchers. Their average age was 17 years, with extremes of 13 and 22 years. The cause was most often community conflict. Pre-hospital transport was non-medical for all patients. The average admission time was 3 h and the average management time was 4 h. General anesthesia with orotracheal intubation was the anesthetic technique used. The average length of hospital stay was seven days. The prognosis was overall favorable and the patients returned home without any sequels.

3356. Magee, G. A., et al. (2021). "Risk Factors for Stroke in Blunt and Penetrating Extracranial Carotid Trauma." Journal of the American College of Surgeons **233**(5): e245.

INTRODUCTION: This study aims to report outcomes of blunt and penetrating extracranial carotid trauma from the American Association of Surgery for Trauma (AAST) PROspective Observational Vascular Injury Trial (PROOVIT) registry. METHODS: All patients with extracranial cerebrovascular injuries in the AAST PROOVIT registry from 2012-2020 were evaluated. Isolated external carotid and vertebral artery injuries were excluded. Patients with blunt mechanism of injury were compared to those with penetrating, and subset analysis was performed to evaluate risk factors for post-injury stroke in the penetrating cohort. RESULTS: A total of 573 patients from 22 institutions met criteria for inclusion. Mean age was 38 (±17) and 372 (65%) were male. Average GCS on presentation was 9 (±5) with an ISS of 25 (±15). There were 471 (82%) blunt carotid injuries and 102 (18%) penetrating. Penetrating injuries were more likely to require operative intervention (51% penetrating, 6% blunt). Overall stroke rate was 11%, (17% penetrating vs. 10% blunt). For penetrating injuries, lack of postoperative antiplatelet therapy (23% vs. 11%, p=.03), need for completion angiography (62% vs 38%, p=.02) were associated with a significantly higher rate of stroke on univariate analysis. Time to repair, type of injury, carotid ligation, concomitant jugular vein injury, and jugular vein ligation were not associated with stroke. CONCLUSION: Penetrating extracranial carotid trauma has a higher rate of operative repair and stroke than blunt injuries. For penetrating injuries, lack of antiplatelet therapy and need for completion angiography are independently associated with in-hospital stroke.

3357. Maghami, S., et al. (2020). "Comparison of the causes of death and wounding patterns in urban firearm-related violence and civilian public mass shooting events." The journal of trauma and acute care surgery **88**(2): 310-313.

BACKGROUND: There are no reports comparing wounding pattern in urban and public mass shooting events (CPMS). Because CPMS receive greater media coverage, there is a connation that the nature of wounding is more grave than daily urban gun violence. We hypothesize that the mechanism of death following urban gunshot wounds (GSWs) is the same as has been reported following CPMS., METHODS: Autopsy reports of all firearm-related deaths in Washington, DC were reviewed from January 1, 2016, to December 31, 2017. Demographic data, firearm type, number and anatomic location of GSWs, and organ(s) injured were abstracted. The organ injury resulting in death was noted. The results were compared with a previously published study of 19 CPMS events involving 213 victims., RESULTS: One hundred eighty-six urban autopsy reports were reviewed. There were 171 (92%) homicides and 13 (7%) suicides. Handguns were implicated in 180 (97%) events. One hundred eight (59%) gunshots were to the chest/upper back, 85 (46%) to the head, 77 (42%) to an extremity, and 71 (38%) to the abdomen/lower back. The leading mechanisms of death in both urban firearm violence and CPMS were injury to the brain, lung parenchyma, and heart. Fatal brain injury was more common in CPMS events as compared with urban events involving a handgun., CONCLUSION: There is little difference in wounding pattern between urban and CPMS firearm events. Based on the organs injured, rapid point of wounding care and transport to a trauma center remain the best options for mitigating death following all GSW events., LEVEL OF EVIDENCE: Epidemiological, level IV.

3358. Maghin, F., et al. (2019). "A case of suicide by double gunshot wounds to the head: the ability to act after the first shot." International journal of legal medicine **133**(5): 1469-1476.

A single gunshot (or multiple) does (do) not necessarily lead to immediate loss of consciousness or rapid neurological deficits, so the victim may be able to repeatedly pull the trigger before achieving the lethal effect. Despite multiple gunshot wounds can lead to the suspicious participation of other person to the death of the victim, in the medico-legal literature suicides with multiple gunshot wounds are reported, demonstrating the ability of the victim to act after two or more gunshots. In this case, a 47-years-old man was found dead in a pool of blood in the kitchen of his house. According to findings and analysis, the victim modified a single-shot, pneumatic toy gun branded "Condor" Cal. 7 mm (a gun that is made mainly with "ZAMAK" zinc-based alloy, designed to shoot one soft-polymer bullet at a time, with an initial kinetic energy lower than 1 Joule) into an improvised firearm weapon. With this gun, the victim achieved shooting of two bullets into his head, both entering from the right temporal region of his head, with one stopped in the left occipital lobe and the other one in the left temporal lobe. His death was caused by cranium-meningo-encephalic gunshot wounds. The conditions supporting the hypothesis that the victim was able to fire two shots to his head before the onset of incapacitation (the type of bullets used, the location of injuries and their consequences) and the characteristics that typically allow to distinguish the manner of death (suicide vs homicide) were evaluated. Based on all the collected elements, it was possible to confirm that suicide was the manner of death. This case underlines the importance of evaluating all available elements (post-mortem imaging, autopsy and toxicological findings, ballistics and neuropathological evaluations) to distinguish suicide from homicide and to prevent incorrect conclusions.

3359. Magnuson, J., et al. (2012). "Neuropathology of explosive blast traumatic brain injury." Current neurology and neuroscience reports **12**(5): 570-579.

During the conflicts of the Global War on Terror, which are Operation Enduring Freedom (OEF) in Afghanistan and Operation Iraqi Freedom (OIF), there have been over a quarter of a million diagnosed cases of traumatic brain injury (TBI). The vast majority are due to explosive blast. Although explosive blast TBI (bTBI) shares many clinical features with closed head TBI (cTBI) and penetrating TBI (pTBI), it has unique features, such as early cerebral edema and prolonged cerebral vasospasm. Evolving work suggests that diffuse axonal injury (DAI) seen following explosive blast exposure is different than DAI from focal impact injury. These unique features support the notion that bTBI is a separate and distinct form of TBI. This review summarizes the current state of knowledge pertaining to bTBI. Areas of discussion are: the physics of explosive blast generation, blast wave interaction with the bony calvarium and brain tissue, gross tissue pathophysiology, regional brain injury, and cellular and molecular mechanisms of explosive blast neurotrauma.

3360. Magyar, C. T. J., et al. (2021). "Severe penetrating trauma in Switzerland: first analysis of the Swiss Trauma Registry (STR)." European journal of trauma and emergency surgery : official publication of the European Trauma Society.

PURPOSE: The purpose of this study was to examine the epidemiology, demographics, injury characteristics and outcomes of patients who presented to Swiss trauma centers following severe penetrating trauma., METHODS: Swiss Trauma Registry (STR)-cohort analysis including patients with severe (ISS >= 16 or AIS head >= 3) penetrating trauma between 2017 and 2019. Primary outcome was mortality. Secondary outcomes were hospital and intensive care unit (ICU) length of stay (LOS), and prehospital times., RESULTS: During the 3-year study period, 134 (1.6% of entire STR) patients with severe penetrating trauma were identified [64 (48%) gunshot wounds (GSW), 70 (52%) stab wounds (SW)]. Median age was 40.5 (IQR 29.0-59.0) and 82.8% were male. Mortality rate was 50% for GSW; 9% for SW. Overall, prehospital time [incident to arrival emergency department (ED)] was 65 (IQR 45-94) minutes. The median number of patients admitted for a severe GSW/SW per center and year was 2 (range 0-14). Of 64 patients who sustained a GSW, 42 (65.6%) were self-inflicted. Mortality in self-inflicted GSW reached 66.7%, with the head being severely injured in 78.6%. The 67 patients with severe isolated torso GSW/SW had an ISS of 20 (IQR 16-26) and a mortality of 15%. Multivariable analysis identified severe chest trauma, ED Glasgow Coma Scale <= 8, age, self-infliction, massive blood transfusion and ISS as independent predictors for mortality., CONCLUSION: Severe penetrating trauma is very rare in Switzerland. Mortality ranges from 9% in SW to 67% in self-inflicted GSW. Particularly in the setting of GSW/SW to the torso, reduction in prehospital time may further improve patient outcomes.

3361. Mah, L. W. Y., et al. (2005). "Deficits in social knowledge following damage to ventromedial prefrontal cortex." The Journal of neuropsychiatry and clinical neurosciences **17**(1): 66-74.

Patients with damage to the frontal lobes frequently exhibit impaired social behavior, but it is not clear which specific processes are disrupted. The authors investigated the ability to interpret nonverbal emotional expression in patients with lesions involving ventromedial (N=20) or dorsolateral prefrontal cortex (N=9) and in healthy volunteers (N=23). As hypothesized, only patients with ventromedial prefrontal lesions showed impaired task performance relative to normal comparison subjects. These results suggest that deficits in social knowledge, namely difficulty interpreting nonverbal emotional expression, contribute to the aberrant social behavior observed following ventromedial prefrontal cortex lesions.

3362. Mahajan, M. and N. Shah (2004). "Accidental lodgment of an air gun pellet in the maxillary sinus of a 6-year old girl: a case report." Dental traumatology : official publication of International Association for Dental Traumatology **20**(3): 178-180.

Air gun, although considered a toy, can cause injuries ranging from trivial to very grievous. The type and severity of injuries depend on the type of air gun used, the distance at which it is fired, and the anatomic site at which the pellet hits. An interesting case involving a young girl, who was accidentally hit by an air gun pellet at a village fair, is described.

The pellet penetrated the maxillary bone to be lodged in the sinus. The treatment strategy along with literature review on short- and long-term complications of air gun injuries is presented. Copyright Blackwell Munksgaard, 2004

3363. Mahajna, A., et al. (2002). "Blunt and penetrating injuries caused by rubber bullets during the Israeli-Arab conflict in October, 2000: a retrospective study." Lancet (London, England) **359**(9320): 1795-1800.

BACKGROUND: Low-velocity rubber bullets were used by Israeli police to control riots by Israeli-Arabs in early October, 2000. We aimed to establish the factors that contribute to severity of blunt and penetrating injuries caused by these missiles., METHODS: We analysed medical records of 595 casualties admitted. We assessed relation of severity of injury to type of bullet, anatomical region of injury, and final outcome. Severity of injury was established by the abbreviated injury scale, and we calculated injury severity score., FINDINGS: 151 males and one female (age range 11-59 years) were included in the study, in whom 201 proven injuries by rubber bullets were detected. Injuries were distributed randomly over the body surface and were mostly located in the limbs (n=73), but those to the head, neck, and face (61), chest (39), back (16), and abdomen (12) were also frequently noted. 93 (61%) patients had blunt injuries and 59 (39%) penetrating ones. Severity of injury was dependent on ballistic features of the bullet, firing range, and anatomic site of impact. Two casualties died after a penetrating ocular injury into the brain and one died as a result of postoperative aspiration after a knee injury., INTERPRETATION: Resistance of the body surface at the site of impact (elastic limit) is the important factor that ascertains whether a blunt or penetrating injury is inflicted and its severity. Inaccuracy of rubber bullets and improper aiming and range of use resulted in severe injury and death in a substantial number of people. This ammunition should therefore not be considered a safe method of crowd control.

3364. Mahalangikar, R., et al. (2016). "Transorbital Penetrating Intracranial Injury with an Umbrella Wire Causing Cavernous Internal Carotid Artery Injury and Thrombosis." World neurosurgery **86**: 513.e515-518.

BACKGROUND: Transorbital penetrating intracranial injuries, though rare, can have serious consequences. Intracranial penetration can be present even if orbital trauma is trivial., CASE DESCRIPTION: We report an unusual case of transorbital penetrating intracranial injury with umbrella wire, sustained while opening an umbrella, leading to internal carotid artery injury and thrombosis. The patient sustained only ipsilateral third nerve palsy that completely recovered during followup., CONCLUSION: Trivial orbital injuries can be associated with significant intracranial injury in a neurologically intact patient. This case emphasizes the potentially injury-prone opening mechanism of conventional umbrellas. A high index of suspicion is important while evaluating such patients.

3365. Mahalick, D. M., et al. (1996). "Pediatric trauma and head injury." Trauma **38**(1): 39-58.

Pediatric trauma is a common injury that occurs as a result of accidents and deliberate abuse. The cost of head injuries in children is high, and the far-reaching consequences potentially grave. Because head injury often results in pronounced long-term neurobehavioral impairment, early recognition is important. Treatment regimens must be devised taking into account the differences between children and adults and their neurobehavioral and psychosocial needs.

3366. Mahmoud, N. A. (1979). "Traumatic aneurysm of the internal carotid artery and epistaxis. (Review of literature and report of a case)." The Journal of laryngology and otology **93**(6): 629-656.

A review of 108 years of world literature revealed 69 cases fulfilling the picture of a clinical syndrome of head injury, a latent period followed by epistaxis and cranial nerve lesions. A similar case has been added which is the fourth case to be reported to be due to a bullet injury. The applied anatomy of the intracranial internal carotid artery (ICA) and the aetiology, clinical syndrome, pathology, diagnosis, prognosis and management of ICA aneurysms have been briefly discussed.

3367. Mahmud, M. R., et al. (2014). "Patterns and outcomes of nonmissile penetrating head injuries a multi-centre study." Brain injury **28**(5-6): 824-825.

Objectives: Non-missile penetrating intracranial injuries resulting from impalement with objects are quite uncommon; they result from a wide range of objects ranging from nails to farm implements. This study is aimed at finding out how these patterns of presentation and extent of neurological damage directly affect outcome. Methods: This is a retrospective descriptive study of patients presenting with non-missile penetrating head injuries to three neurosurgical centres for a period of 21 months from January 2012 to September 2013. This study analysed the patterns of presentation, type of impaled object, resulting neurologic deficit, brain lobes affected and the outcome at discharge using the Glasgow outcome score. Results: Sixteen patients were analysed, 15 being males. The age ranged from 21 months to 50 years, presentation was delayed in most patients, only three patients presented within 1, 5 and 6 hours of injury, one presented after 24 hours, one presented after 18 years, while the rest presented within the range of 2 days to 30 days. Impaled objects include nails (in two cases), arrows, screw driver, hoe, axe, toy part, aluminium pot fragment, metallic objects and rock fragment. Four patients presented with hemiplegia, two with aphasia and one with long-term seizure disorder. Others had no neurologic deficits. Nine out of the 16 patients had their injuries in the frontal lobes, three had it in the parietal lobes, two had it in the temporal lobes, one had it in the occipital lobe, while one had it in the frontal, parietal and occipital lobes. Only six patients presented with mild deterioration in level of consciousness (GCS 13-14), all the rest were fully conscious at the time of presentation. One patient had extraction of the four impaled nails at a local drug store under unsterile conditions prior to presentation. One presented with a metallic fragment around the basal ganglia for 18 years, presenting only for persistent seizure disorder; he subsequently absconded from further treatment. Eleven of the patients had a Glasgow outcome score of 5 at the time of discharge; only three had a score of 4, while two had a score of 3. Conclusion: Despite the perceived doom associated with non-missile penetrating injuries by the populace, delay in presentation and wide array of impaled objects, non-missile penetrating head injuries are associated with a relatively good outcomes.

3368. Mahoney, P., et al. (2018). "Ballistic impacts on an anatomically correct synthetic skull with a surrogate skin/soft tissue layer." International journal of legal medicine **132**(2): 519-530.

The aim of this work was to further develop a synthetic model of ballistic head injury by the addition of skin and soft tissue layers to an anatomically correct polyurethane skull filled with gelatine 10% by mass. Six head models were impacted with 7.62 x 39 mm full metal jacket mild steel core (FMJ MSC) bullets with a mean velocity of 652 m/s. The impact events were filmed with high-speed cameras. The models were imaged pre- and post-impact using computed tomography. The models were assessed post impact by two experienced Home Office pathologists and the images assessed by an experienced military radiologist. The findings were scored against real injuries. The entry wounds, exit wounds and fracture patterns were scored positively, but the synthetic skin and soft tissue layer was felt to be too extendable. Further work is ongoing to address this.

3369. Mahoney, P., et al. (2019). "Forensic reconstruction of two military combat related shooting incidents using an anatomically correct synthetic skull with a surrogate skin/soft tissue layer." International journal of legal medicine **133**(1): 151-162.

Six synthetic head models wearing ballistic protective helmets were used to recreate two military combat-related shooting incidents (three per incident, designated 'Incident 1' and 'Incident 2'). Data on the events including engagement distances, weapon and ammunition types was collated by the Defence Science and Technology Laboratory. The models were shot with 7.62 x 39 mm ammunition downloaded to mean impact velocities of 581 m/s (SD 3.5 m/s) and 418 m/s (SD 8 m/s), respectively, to simulate the engagement distances. The damage to the models was assessed using CT imaging and dissection by a forensic pathologist experienced in reviewing military gunshot wounds. The helmets were examined by an MoD engineer experienced in ballistic incident analysis. Damage to the helmets was consistent with that seen in real incidents. Fracture patterns and CT imaging on two of the models for Incident 1 (a frontal impact) were congruent with the actual incident being modelled. The results for Incident 2 (a temporoparietal impact) produced realistic simulations of tangential gunshot injury but were less representative of the scenario being modelled. Other aspects of the wounds produced also exhibited differences. Further work is ongoing to develop the models for greater ballistic injury fidelity.

3370. Mahoney, P. F., et al. (2020). "Shooting through windscreens: ballistic injury assessment using a surrogate head model-two case reports." International journal of legal medicine **134**(4): 1409-1417.

A synthetic head model developed to reproduce military injuries was assessed in two different scenarios involving shooting through intermediate targets (a laminated vehicle windscreen in scenario 1 and a military helicopter windscreen in scenario 2) with 7.62 x 39-mm mild steel core (MSC) ammunition. The injury patterns resulting from the two scenarios were assessed by a military radiologist and a forensic pathologist with combat injury experience and found to be clinically realistic.

3371. Mahoney, P. F., et al. (2017). "Does preliminary optimisation of an anatomically correct skull-brain model using simple simulants produce clinically realistic ballistic injury fracture patterns?" International journal of legal medicine **131**(4): 1043-1053.

Ballistic head injury remains a significant threat to military personnel. Studying such injuries requires a model that can be used with a military helmet. This paper describes further work on a skull-brain model using skulls made from three different polyurethane plastics and a series of skull 'fills' to simulate brain (3, 5, 7 and 10% gelatine by mass and PermaGel TM). The models were subjected to ballistic impact from 7.62 x 39 mm mild steel core bullets. The first part of the work compares the different polyurethanes (mean bullet muzzle velocity of 708 m/s), and the second part compares the different fills (mean bullet muzzle velocity of 680 m/s). The impact events were filmed using high speed cameras. The resulting fracture patterns in the skulls were reviewed and scored by five clinicians experienced in assessing penetrating head injury. In over half of the models, one or more assessors felt aspects of the fracture pattern were close to real injury. Limitations of the model include the skull being manufactured in two parts and the lack of a realistic skin layer. Further work is ongoing to address these.

3372. Mahoney, P. F., et al. (2017). "The effect of helmet materials and simulated bone and tissue layers on bullet behaviour in a gelatine model of overmatch penetrating head injury." International journal of legal medicine **131**(6): 1765-1776.

The aim of this work was to simulate an overmatch ballistic event against a head wearing a helmet. The experiments were designed to understand how layers of bone (or synthetic bone), synthetic skin and currently used helmet materials influence the behaviour of full metal jacket mild steel core (FMJ MSC) 7.62 x 39 mm bullets, impacting on targets with a mean velocity of 650 m/s. Bullet behaviour within 10% (by mass) gelatine blocks was assessed by measurements made of the temporary cavity within the blocks using high-speed video and of the permanent cavity by dissecting blocks post firing. While ANOVA did not find significant difference at the 0.05 level in the mean values of most of the measurements, there was a significant difference in neck length within the gelatine blocks. The addition of material layers did produce greater variability in the temporary cavity measurements under some of the conditions. One of the synthetic bone polymers with a synthetic skin layer produced similar results within the gelatine blocks to the horse scapulae (with residual tissue) and may be suitable for future ballistic experiments.

3373. Mai, X., et al. (2021). "Correlation Between Electroretinogram and Visual Prognosis in Metallic Intraocular Foreign Body Injury." Frontiers in medicine **8**: 688305.

Purpose: This study aims to investigate the correlation between electroretinogram (ERG) and visual outcome in eyes with metallic intraocular foreign body (IOFB) injury. Methods: Cases with metallic IOFB injuries with preoperative ERG from January 2008 to May 2020 were reviewed retrospectively. Five ERG responses were recorded, including rod response, maximal response, oscillatory potentials, cone response, and 30-Hz flicker. The results were compared between the affected and the contralateral eyes. All patients received surgery to remove IOFBs. The correlation between amplitudes, implicit times, and grades of ERG with final best-corrected visual acuity (BCVA) was analyzed. Results: A total of 33 eyes of 33 patients were included. The eyes with IOFB had generally delayed implicit time and reduced amplitude in all waves. The maximum change was found in oscillatory potentials S3 and N1 (0.42 +/- 0.42 and 1.95 +/- 1.97 of the fellow eyes, respectively, $p < 0.05$). All amplitudes were negatively correlated with the final BCVA (rs: -0.676 to -0.459, all $p < 0.05$). In contrast, all implicit times were positively correlated with final BCVA, although, some of them were not statistically significant (rs: 0.035 to 0.687). Among them, oscillatory potential P3 has the highest correlation coefficient ($rs = 0.687$, $p < 0.001$). All grades of ERG waves were statistically correlated with the final BCVA (rs: -0.596 to -0.664, all $p < 0.001$). Conclusions: ERG can be used to assess visual outcome in metallic IOFB injury after surgery. Oscillatory potentials provided the most significant responses.

3374. Maier, H., et al. (2011). "[Penetrating injuries in the face and neck region. Diagnosis and treatment]." Penetrierende Gesichts- und Halsverletzungen. Diagnostik und Therapie. **59**(8): 765-782.

Penetrating head and neck injuries often present with vascular lesions and airway compromise and may be life-threatening. Thus controlling bleeding and airway stabilisation take priority in emergency treatment. High-velocity projectiles, fragmentations from improvised explosive devices (IEDs) and shrapnel can cause severe tissue injury, representing a challenge for the head and neck surgeon. Since several organ structures, such as the eyes, midface, pharynx, larynx, trachea, esophagus, nerves, vessels and vertebral spine can be injured at the same time, patients should be referred to a specialized trauma center for interdisciplinary treatment following emergency treatment. High-speed ballistic injuries were once confined to the battle field and have been uncommon in Europe since World War II. For this reason, experience among civilian head and neck surgeons is at present limited. With the increased incidence of terrorism and the use of IEDs as the preferred weapon in terrorism it has become important for civilian head and neck surgeons to understand the role of ballistic injuries in mass casualty events. The present paper discusses current viewpoints in the diagnosis and treatment of penetrating head and neck injuries.

3375. Mainali, S., et al. (2022). "Prolonged Automated Robotic TCD Monitoring in Acute Severe TBI: Study Design and Rationale." Neurocritical care **37**(Suppl 2): 267-275.

BACKGROUND: Transcranial Doppler ultrasonography (TCD) is a portable, bedside, noninvasive diagnostic tool used for the real-time assessment of cerebral hemodynamics. Despite the evident utility of TCD and the ability of this technique to function as a stethoscope to the brain, its use has been limited to specialized centers because of the dearth of technical and clinical expertise required to acquire and interpret the cerebrovascular parameters. Additionally, the conventional pragmatic episodic TCD monitoring protocols lack dynamic real-time feedback to guide time-critical clinical interventions. Fortunately, with the recent advent of automated robotic TCD technology in conjunction with the automated software for TCD data processing, we now have the technology to automatically acquire TCD data and obtain clinically relevant information in real-time. By obviating the need for highly trained clinical personnel, this technology shows great promise toward a future of widespread noninvasive monitoring to guide clinical care in patients with acute brain injury., METHODS: Here, we describe a proposal for a prospective observational multicenter clinical trial to evaluate the safety and feasibility of prolonged automated robotic TCD monitoring in patients with severe acute traumatic brain injury (TBI). We will enroll patients with severe non-penetrating TBI with concomitant invasive multimodal monitoring including, intracranial pressure, brain tissue oxygenation, and brain temperature monitoring as part of standard of care in centers with varying degrees of TCD availability and experience. Additionally, we propose to evaluate the correlation of pertinent TCD-based cerebral autoregulation indices such as the critical closing pressure, and the pressure reactivity index with the brain tissue oxygenation values obtained invasively., CONCLUSIONS: The overarching goal of this study is to establish safety and feasibility of prolonged automated TCD monitoring for patients with TBI in the intensive care unit and identify clinically meaningful and pragmatic noninvasive targets for future interventions.

3376. Majumdar, M., et al. (2009). "Cerebritis: An unusual complication of Klebsiella pneumoniae." Indian Journal of Critical Care Medicine **13**(1): 37-40.

Cerebritis is part of a continuum of brain infection and is difficult to diagnose. Cerebritis caused by Klebsiella in immunocompetent adults without predisposing factors such as neurosurgery or penetrating brain injury has not been reported before. We report a case of Klebsiella cerebritis in an adult patient with a proven extracranial focus of infection. We suggest considering cerebritis as a differential diagnosis for altered level of consciousness in patients of severe sepsis, even if an extracranial source of infection is proven.

3377. Makarov, P. V. (2002). "[Surgical strategy of treatment of severe and extremely severe eye burns. I]." K khirurgicheskoi taktike lecheniia tiazheloi i osobo tiazheloi ozhogovoi travmy glaz (soobshchenie I). **118**(3): 10-12.

A total of 112 patients with severe and extremely severe burns of the eyes were treated. The author proves that one of the main causes of unsatisfactory results is the absence of clearly defined criteria for the choice of surgical

strategy during the early period. Based on the classification of interventions, the author suggests an algorithm of early surgical treatment of eye burns.

3378. Makarov, P. V., et al. (2007). "[Study of the efficacy of cyclosporine used in patients at high risk of keratograft rejection. Communication 1. Results of clinical monitoring]." Vestnik oftalmologii **123**(4): 14-19.

The paper presents the results of a long-term (up to 2-year) clinical monitoring of 30 patients operated on for leukomas of various etiology, who were a high risk group and received the oral cyclosporine HEXAL postoperatively. Three types of the course of a postoperative period were identified. These included: an absolutely favorable course in 33.3% of cases (Group 1), a relatively favorable one in 30% (Group 2), and an absolutely unfavorable course in 36.7% (Group 3). The studies demonstrated that cyclosporine diminished the degree of an inflammatory reaction and promotes its rapid relief and better functional results in the late postoperative period. Transparent and semi-transparent engraftment could be achieved in 63.3% of cases. The causes of poor outcomes (in 36.7%) may be the inadequate doses of the cyclosporine and the time of its administration (unsteady-state blood cyclosporine concentrations (TO), the inadequate efficiency or initial inefficiency of immunosuppressive therapy.

3379. Makarov, P. V., et al. (2004). "[Keratoplasty in the surgical treatment of eye burns and their complications]." O keratoplastike v khirurgicheskom lechenii ozhogovoi travmy glaz i ee oslozhnenii. **120**(3): 14-16.

The report contains the analysis results of 53 keratoplasty procedures in the treatment of patients with severe and extra severe burns of eyes (185 cases within 6 years). On the basis of the obtained results, the authors conclude that the active surgical approach, when used soon after trauma (necrectomy, autotenoplasty, bloody blepharorrhaphy), cut significantly the rate of indications for emergency keratoplasty (to 9% only in cases involving the presence of a deep defect caused by the thermal affection or the presence of burn-agent particles in the corneal stroma); an extra severe burn is the absolute indication for lamellar keratoplasty; indications for transplantation of the cornea, 1 week after trauma and more, arise, when there is ulceration (especially, perforation), due to a prolonged and ineffective therapy and due to an inadequate surgical tactics. The authors suggest the criteria for a substantiated and more effective use of transplantation of the cornea in the treatment of eye burns.

3380. Makarov, P. V., et al. (2004). "[An efficiency study of transplantation of allogenic fibroblasts cultivated in collagen gel for the treatment of corneal burn defects in experiment]." Izuchenie effektivnosti transplantatsii kul'tivirovannykh allogennykh fibroblastov v kollagenovom gele pri lechenii ozhogovykh defektov rogovitsy v eksperimente. **120**(4): 27-29.

The paper contains the results of using a mew method applicable to regulation of corneal regeneration, i.e. transplantation of allogenic fibroblasts cultivated in collagen gel within an experimental model of acute alkali corneal burns in rabbits. Two experimental stages, involving 120 animals, were undertaken. The above method was used, at stage 1, on day 2 after trauma and, at stage 2, it was applied in two weeks after ocular burns with profound corneal defects were inflicted. The clinical, morphological and immune-histochemical examinations were used to show a high efficiency of the method in healing the corneal burn wounds; the mechanism of the therapeutic action of the transplant components exerted on regeneration of the affected cornea was investigated; finally, good outlooks for using the discussed method in clinical practice were proven.

3381. Makdissi, J. (2004). "Ultrasound guided removal of an air gun pellet from the temporal fossa: a technical note." International journal of oral and maxillofacial surgery **33**(3): 304-306.

3382. Makhdoomi, S. M., et al. (2018). "Radiographic prediction of metallic foreign body penetration in the reticulum of cows and buffaloes." Veterinary world **11**(4): 488-496.

AIM: This study aimed to evaluate the role of radiography in the standing (right and left) and recumbent (right) lateral positions for the detection and prediction of metallic foreign body penetration in the reticular wall., MATERIALS AND METHODS: A total of 41 bovines (23 cows and 18 buffaloes) having at least one sharp metallic foreign body (>1 cm) detected on reticular radiographs were investigated, and their extent of penetration in the reticular wall was confirmed on the left flank laparorumenotomy., RESULTS: Of total sharp metallic foreign bodies retrieved on rumenotomy, the

maximum percent were detected on the right recumbent radiographic view (75.00% in cows and 57.14% in buffaloes) compared to the right standing (54.38% in cows and 40.42% in buffaloes) and left standing (51.06% in cows and 27.08% in buffaloes) radiographic views. The presence of gas pocket or nodule adjoining a foreign body, faintly visible foreign body, foreign body that appeared partially or completely out of the reticulum, and foreign body that appeared parallel, into, or directed toward the diaphragm indicated a high probability in the prediction of penetrating foreign body in the left standing (100%) followed by the right recumbent (85.71% in cattle and 90% in buffaloes) and right standing (94.74% in cattle and 55.56% in buffaloes) radiographic views., CONCLUSION: The right recumbent radiographic view is most reliable to detect sharp metallic foreign bodies in bovine. Buffaloes engulf more number of foreign bodies; however, comparatively, the number of completely or partially penetrating foreign bodies is high in cattle. The hypothesized radiographic parameters for the prediction of penetrability of the metallic foreign body were 100% reliable in the left standing radiographic view in both the species.

3383. Makhlouf, F., et al. (2013). "Gunshot fatalities: correlation between post-mortem multi-slice computed tomography and autopsy findings: a 30-months retrospective study." Legal medicine (Tokyo, Japan) **15**(3): 145-148.

In this study we compared retrospectively the autopsy and the CT-scan findings in 47 gunshot victims (96 wounds) in order to assess the accuracy of the two methods in injury and ballistic diagnoses. Firing distance was determined in 46 wounds (47.9%). Firing range was determined by autopsy alone in 37 cases (80.5%) and by CT-scan alone in three cases (6.5%). In the six remaining cases (13%), autopsy and CT-scan reports concluded both to the same firing range. Entrance wounds were detected concordantly by both CT-scan and autopsy in 63 of the 91 penetrating wounds (69.2%). Exit wounds were present in 69 shots. They were concordantly detected by autopsy and CT-scan in 36 cases (52.2%). It was possible at CT imaging to determine the track of the bullet in up to 62 wounds (72.1%). CT-scan was superior to autopsy in determining two items: face fractures and pneumencephalon. CT scan was of limited value in demonstrating skull base fractures and contusions of the brain. There was good correspondence in demonstrating subarachnoid hemorrhage. CT-scan was accurate to demonstrate presence of gas, either in the pleural cavity (pneumothorax) or in the vessels' lumen (air embolism). Both autopsy and CT-scan were concordant in demonstrating thoracic well injuries, heart lacerations and intra thoracic hemorrhage. CT-scan was far below autopsy in detecting solid organs injuries except for kidneys. The present survey shows that CT-scan is second to none in demonstrating features as pneumencephalon, facial fractures, midline shifts, air embolism, pneumothorax, and pelvic bones fractures. It may contribute to determine the firing range in cases of contact-range and of intermediate range though the firing range assessment remains beyond post-mortem imaging possibilities, at least at the current state of knowledge.

3384. Maki, M. H. (2009). "Management outline of oral and maxillofacial missile injuries in Iraq: the value of the intermediate phase." The Journal of craniofacial surgery **20**(3): 873-877.

Oral and maxillofacial surgeons in Iraq are practicing in a paradoxical situation where a high number of extensive injuries are accompanied by limited resources. Steps of management should be followed cautiously in attempts to reduce residual deformities that characterize the end results of severe missile injuries. This study elucidate lessons extirpated from surgical experience in the management of diversity of causalities with special emphasis on the intermediate phase of management as well as different modalities of treatment, trying to get best benefit from available resources.

3385. Makkar, R. M. (2013). "The faciocervicopectoral flap for non-oncological cases of cheek reconstruction." Annals of the Royal College of Surgeons of England **95**(6): 397-400.

INTRODUCTION: Major facial defect has been a challenging case for plastic surgeons in terms of wound healing and covering technique for a long time., METHODS: Eight faciocervicopectoral (FCP) flaps were performed for reconstruction of major cheek defects due to handmade explosive and gun injuries. They were evaluated perioperatively and postoperatively with regard to operative time and operative blood loss as well as the function and cosmetic appearance., RESULTS: The technique showed marvellous cosmetic results but encountered minor postoperative flap complications., CONCLUSIONS: The FCP flap is one of the best solutions for coverage of a simple or complex cheek defect. Application of the FCP flap is easy and rapid.

3386. Makkat, S., et al. (2001). "Multiple growing fractures and cerebral venous anomaly after penetrating injuries: delayed diagnosis in a battered child." Pediatric radiology **31**(5): 381-383.

A growing fracture usually results from a skull fracture with dural tear after blunt head trauma during infancy. We present a case of child abuse with multiple growing fractures resulting from penetrating head trauma by scissors. MR imaging confirmed the presence of growing fractures and revealed a presumably post-traumatic venous anomaly (occluded left cavernous sinus and aberrant posterior venous drainage via the internal cerebral veins). Diagnosis of the growing fractures and venous anomaly was delayed until the age of 15 years. Medical expertise should be more readily available to battered children, and MR imaging is advocated in growing skull fracture to exclude associated post-traumatic brain lesions.

3387. Makoshi, Z., et al. (2016). "Nail gun injuries to the head with minimal neurological consequences: a case series." Journal of medical case reports **10**: 58.

BACKGROUND: An estimated 3700 individuals are seen annually in US emergency departments for nail gun-related injuries. Approximately 45 cases have been reported in the literature concerning nail gun injuries penetrating the cranium. These cases pose a challenge for the neurosurgeon because of the uniqueness of each case, the dynamics of high pressure nail gun injuries, and the surgical planning to remove the foreign body without further vascular injury or uncontrolled intracranial hemorrhage., CASE PRESENTATION: Here we present four cases of penetrating nail gun injuries with variable presentations. Case 1 is of a 33-year-old white man who sustained 10 nail gunshot injuries to his head. Case 2 is of a 51-year-old white man who sustained bi-temporal nail gun injuries to his head. Cases 3 and 4 are of two white men aged 22 years and 49 years with a single nail gun injury to the head. In the context of these individual cases and a review of similar cases in the literature we present surgical approaches and considerations in the management of nail gun injuries to the cranium. Case 1 presented with cranial nerve deficits, Case 2 required intubation for low Glasgow Coma Scale, while Cases 3 and 4 were neurologically intact on presentation. Three patients underwent angiography for assessment of vascular injury and all patients underwent surgical removal of foreign objects using a vice-grip. No neurological deficits were found in these patients on follow-up., CONCLUSIONS: Nail gun injuries can present with variable clinical status; mortality and morbidity is low for surgically managed isolated nail gun-related injuries to the head. The current case series describes the surgical use of a vice-grip for a good grip of the nail head and controlled extraction, and these patients appear to have a good postoperative prognosis with minimal neurological deficits postoperatively and on follow-up.

3388. Maksoud, S., et al. (2020). "Penetrating traumatic brain injury resulting from a cockerel attack: case report and literature review." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **36**(5): 1067-1070.

Traumatic brain injury is common in children and can lead to death or considerable, long-lasting morbidity. We present the case of a 10-month-old female child who presented after being attacked by a cockerel in a chicken coop. Following a seizure, an MRI scan revealed an intracerebral haemorrhage underlying a stab-type wound inflicted by the bird. Animal bite injuries are common worldwide but they rarely cause intracranial injuries. Domestic hens are rarely dangerous but can become defensive or aggressive during breeding periods or when protecting their territory. To date, only a handful of articles have reported on wounds inflicted by chicken beaks. Those reported were largely facial or ocular injuries. Infectious complications have also been encountered post-injury. This is to our knowledge the first report of a bird attack resulting in significant penetrating traumatic brain injury. Children should be cautioned by guardians to avoid unsupervised contact with chickens, particularly during breeding. Attacks to the neurocranium when they occur must be taken seriously and not treated as humorous or insignificant. Imaging appropriate to the child's clinical condition should be pursued and appropriate intervention and antibiotic treatment should be implemented.

3389. Malandrini, A., et al. (2001). "Neuropathological findings associated with retained lead shot pellets in a man surviving two months after a suicide attempt." Journal of forensic sciences **46**(3): 717-721.

We describe the neuropathological findings in a 30-year-old man who died two months after attempting suicide with a shotgun. We focused our study on lesions associated with retained lead shot pellets and distant therefrom, as well as lesions distant from the principal site of injury. At the sites of the retained lead shot pellets, we found

macrophage proliferation and astrocyte activation, together with axonal spheroids and signs of neuronal damage. In the remaining white matter we observed axonal swellings, astrocyte activation and rarefaction of the neuropil; regressive phenomena of the neurons were also present. All axonal spheroids immunoreacted with antibodies against APP, alphaB-crystallin, NF subunits and ubiquitin. Most reactive astrocytes were positive for GFAP and alphaB-crystallin immunostaining. Some neurons immunoreacting with alphaB-crystallin were also found. These data indicated that an important local reaction developed at the sites of lead shot retention, and mild signs of diffuse axonal damage were found throughout the brain.

3390. Malav, R. A., et al. (2015). "Outcome of penetrating brain injury in civilian practice." Indian Journal of Neurotrauma **12**(2): 122-127.

Introduction There is a dramatic increase in the incidence and little is known about outcome and recovery of penetrating brain injuries. Our study is based on analysis of clinical-radiological profile and outcome of patients of penetrating brain injuries. Method This is a retrospective analysis of patients with penetrating head injury during the period from June 2004 to May 2013. Patients with penetrating head injury were selected from our hospital record. Their operative findings were evaluated and only those patients with documented penetration of the dura by a foreign material were selected for data collection and analysis. Results A total of 60 patients were recruited in the study. Their mean age was 27 years, and most patients were male. Most common clinical presentation was brain matter and cerebrospinal fluid (CSF) leak in 48 (60%) patients followed by decreased level of consciousness in 40 (66.67%) patients. Frontal lobe was most commonly involved part in 24 (40%) patients followed by multiple lobe injury noted in 16 (26.66%) patients. Twelve patients expired during the hospital stay. Thirteen patients were discharged in GOS-2, 15 in GOS-3, and 20 in GOS-4. Wound infection occurred in 11 (18.33%) patients, and seizure developed in 8 (13.33%) patients. Conclusion Penetrating brain injuries are most common in 11-to 30-year-old age group and occur more commonly in male. Most common presentations were brain matter or CSF leak and most common mode of injury was firearm. Frontal lobe was the most commonly injured part of the brain and mortality was 20%. Higher mortality was observed among patients with seizure than in other patients with penetrating brain injury.

3391. Malbranque, S., et al. (2014). "Bone-patch type secondary projectiles: A report on two shots fired at point-blank range using hollow point bullets." Forensic science international **245**: e6-e10.

The number of head wounds due to firearms remains low in France because these cases are primarily linked to suicide (or attempted suicide) and, to a lesser extent, to attacks or hunting accidents [1]. Characterized by the impact of a projectile, which in most cases is made of metal, at high levels of kinetic energy, such acts generally result in severe trans-cerebral lesions with significant levels of morbidity/mortality [2]. Seldom are cases reported in the literature that give a detailed study of intracranial foreign bodies made of bone in such situations [3]. Here we report on the case of two suicides resulting from a transcranial gunshot wounds caused by weapons and ammunition issued by the French police force. Each case helped distinguish a characteristic bone fragment, in the form of a "patch", equivalent in size to the caliber of the bullet.

3392. Male, K. R., et al. (2008). "Intracranial halo pin penetration causing brain injury secondary to poor halo care technique: a case report and literature review." Cases journal **1**(1): 380.

: This is a case report of intra cranial penetration by halo pins resulting in cerebritis and fits secondary to incorrect halo care by the patient and his family. Halo pin penetration into the skull with brain injury is itself a rare incident. Previously documented case reports were in patients with a previous cranioplasties and they were highlight the fact that halo not to be used in cranioplasty patients. Cranial penetration of the halo pins has generally been secondary to a fall/medical condition as epilepsy. This incident how ever highlights the fact the halo care itself along with proper techniques used for tightening the halo pins by the carer plays a crucial role in preventing complications such as this.

3393. Malec, K., et al. (2013). "[Unsuccessful suicidal attempt with use of self-prepared bullet -- case report]." Nieudana proba samobojcza z zastosowaniem naboju samodzialowego -- opis przypadku. **70**(9): 754-756.

Gunshot injuries of the viscerocranium are rarely reported during times of peace in Europe. Penetrating wounds to the maxillofacial region pose a significant challenge for surgeons as they often comprise serious soft and bone tissue defects. We present a case report of 38-year-old male with gunshot wound to the viscerocranium after suicidal attempt. The patient's general condition was stable. The inlet wound was found in the submental region in the central line penetrating deep into the floor of the mouth, to the left, avoiding large vessels and hypoglossal nerve. No exit wound was identified. The ophthalmic examination revealed the limitation of motion in the left eyeball and diplopia in the whole field of vision. The revision was performed under general anesthesia. Control CT scan revealed the presence of one metallic fragment wedged in the hard palate. Second look of oral cavity with particular emphasis on the hard palate was performed. Shrapnel proved to be wedged in the bone of the hard palate very firmly and complete removal without damaging the function of the palate was impossible. The decision was made to withdraw from surgical removal of the remaining piece of the projectile. In most cases, it is recommended to remove all foreign material from human body. However, in the illustrated case we decided to leave small debris in the craniofacial skeleton. In our opinion, further surgical revision would result in greater tissue damage, disproportionate to the benefits of the removal of all fragments of the projectile.

3394. Malec, R., et al. (1983). "[Penetrating injuries of the brain through the orbit. Importance of graphic examinations]." Penetrujici poraneni mozku pres ocnici. Vyznam grafickych vysetreni. **122**(11): 323-326.

3395. Malhotra, A., et al. (2018). "TO the editor." Spine **43**(6): E379-E380.

3396. Malhotra, K., et al. (2019). "TRANSPLANTING A POLYCYSTIC KIDNEY- TROJAN HORSE OR SILVER LINING?" American Journal of Kidney Diseases **73**(5): 699.

There were 703,243 patients with End Stage Renal Disease (ESRD) in the U.S. in 2015 (80% increase since 2000) while only 17,878 kidneys were transplanted in 2015 (31% increase since 2000). The Organ Procurement and Transplantation Network's kidney allocation system changed in December 2014. It prioritizes candidates in the top 20th estimated post-transplant survival (EPTS) percentile to receive kidneys from donors with a kidney donor profile index (KDPI) ≤20%. On the flip side, it allows people with higher EPTS score to receive kidneys from donors with higher KDPI. A 76-year-old Caucasian male with Chronic Kidney Disease (CKD) secondary to prior analgesic use and increasing fatigue and loss of appetite had decided to start peritoneal dialysis. His labs showed a BUN of 61 mg/dl, creatinine 4.63 mg/dl. The next day transplant center called patient with an offer for kidney. The donor was a 27-year-old male, victim of gunshot wound and head trauma, who was pronounced brain dead the day after the incident. The patient was known to have Autosomal Dominant Polycystic Kidney Disease (ADPKD) since childhood with history of hypertension and was non-compliant with medications. Donor's creatinine was 1.5 mg/dl with no proteinuria. Cold ischemic time was 15.25 hours. The transplanted kidney was 19 cm long with mild interstetial fibrosis and inflammatory process on biopsy. Patient's post-transplant creatinine improved from 4.7 mg/dl to 1 mg/dl in 5 days. At 3 months post transplant, he is asymptomatic, with normal blood pressure and stable creatinine of 1.3mg/dl. With increasing incidence and prevalance of ESRD and high cost of dialysis, increased efforts are needed to promote transplantation. Due to shortage of kidney donors, ADPKD donor kidney in selected patients should be allowed. More research is needed to define what level of donor kidney function and biopsy findings are considered optimal for safe and successful outcomes.

3397. Malik, T. G., et al. (2015). "Broken bones and blind eyes: Ocular and orbital injuries in craniofacial trauma." Pakistan Journal of Medical and Health Sciences **9**(1): 381-385.

Aim: To describe ocular, neuro-ophthalmological and imaging patterns of head trauma, with special reference to road traffic accidents (RTA) in an urban area of Pakistan. Study Design: Descriptive, retrospective study. Study period: 2007 to 2013 Subjects and settings: 42 Patients of cranio facial trauma from three different centers of Lahore were included in the study. History charts and neuro-imaging reports were reviewed. The data considered for the study was age, sex, ocular manifestations, neuro-ophthalmological findings and imaging reports Results: Male to female ratio was 6: 1. Craniofacial injuries were common in patients of ≤ 40 years of age. The commonest cause of trauma was road traffic accidents (RTA). 9 patients had severe vision loss (NPL= no perception of light). 50% patients (n=21) had left sided trauma. 5(11.9%) were normal with no clinical and neuro-imaging findings. Congested eyes, decreased vision, muscle

entrapment in orbital fracture and restricted extra ocular movements due to severe edema were common ocular findings. Other clinical signs were Enophthalmos, Hyphema, intra ocular foreign body, ocular motor nerve palsies, papilledema, retinal detachment, ruptured globe, traumatic optic neuropathy, vitreous hemorrhage, Carotico-cavernous fistula and chiasmal damage. Conclusion: In urban areas, RTA account for maximum ocular injuries secondary to craniofacial trauma. Proper and prompt actions in emergency department by multidisciplinary experts can not only save lives but also vision.

3398. Malin, J. P. and T. Grumme (1975). "Craniocerebral gunshot wounds in civilian life." Aktuelle Traumatologie **5**(4): 251-259.

Report on 41 male and 4 female patients with craniocerebral gunshot wounds is reported. In 80% a suicidal accident occurred. The injuries are categorized into three major types: penetrating wounds with metallic fragments retained in the brain (22 cases), through and through wounds (21 cases) and tangential injuries with in driven bone fragments (2 cases). Death rate: 53%, operative deaths: 31%. In deciding on neurosurgery procedure the result of neurological examination, especially the presence or absence of a traumatic midbrain syndrome, the location of the missile and if possible, the result of angiography have to be considered.

3399. Malivukovic, A., et al. (2016). "Cranial reconstruction with prefabricated 3D implant after a gunshot injury: A case report." Vojnosanitetski pregled **73**(8): 783-787.

Introduction: Complex defects of skull bones with different etiology, still present the challenge in reconstructive surgery. The goldstandard for cranioplasty is the autologous calvarial bone graft removed during surgery which cannot be always applied, especially in gunshot wounds for sometimes complete bone destruction. Autologous reconstruction with split calvarial, rib bones or iliac bone graft is also possible. Materials routinely used for reconstructions like titanium mesh, polymethyl metacrylate (PMMA), and other have numerous disadvantages and limitations., Case report: We presented a patient with gunshot injury to the head with residual large bone defect in the frontal region, with involvement of the skull base, and open frontal sinus. After conservative treatment, six months after the injury, reconstruction of the residual bone defect was performed. The chosen material was computerdesigned PEEK-OPTIMA R implant, manufactured on the basis of MSCT scan. This material has not been used in this region so far. The postoperative and follow-up period of the next 12 months passed without surgical complications, neurological deficit, with satisfactory functional and aesthetic results., Conclusion: Implanted bone replacement was designed and manufactured precisely according to the skull defect, and we found it suitable for the treatment of complex defects of the cranium. Early results are in favor of this cranioplasty method over standardized materials. Therefore, this material is expected to become a method of choice for reconstructive surgery of bony defects of the face and skull especially in complex cases.

3400. Mallak, C. T., et al. (2001). "Saddam's revenge: a post-Gulf War casualty." The American journal of forensic medicine and pathology **22**(1): 43-45.

Artillery weapons are designed to inflict death and destruction by way of fragmentary and blast injuries. As pieces of modern machinery, they are also capable of causing serious injury by their very complex nature. The authors present a case analysis of an artillery piece that caused a projectile death without a shell.

3401. Mallory, G. W., et al. (2016). "The rise and fall of the craniocervical junction relative to the hard palate: a lifetime story." Journal of neurosurgery. Spine **24**(4): 521-526.

OBJECT: Endoscopic approaches to the anterior craniocervical junction are increasing in frequency. Choice of oral versus endoscopic endonasal approach to the odontoid often depends on the relationship of the C1-2 complex to the hard palate. However, it is not known how this relevant anatomy changes with age. We hypothesize that there is a dynamic relationship of C-2 and the hard palate, which changes with age, and potentially affects the choice of surgical approach. The aim of this study was to characterize the relationship of C-2 relative to the hard palate with respect to age and sex., METHODS: Emergency department billing and trauma records from 2008 to 2014 were reviewed for patients of all ages who underwent cervical or maxillofacial CT as part of a trauma evaluation for closed head injury. Patients who had a CT scan that allowed adequate visualization of the hard palate, opisthion, and upper cervical spine (C-1 and C-2)

were included. Patients who had cervical or displaced facial/skull base fractures, a history of rheumatoid arthritis, or craniofacial anomalies were excluded. The distance from McGregor's palatooccipital line to the midpoint of the inferior endplate of C-2 (McL-C2) was measured on midsagittal CT scans. Patients were grouped by decile of age and by sex. A 1-way ANOVA was performed with each respective grouping., RESULTS: Ultimately, 483 patients (29% female) were included. The mean age was 46 +/- 24 years. The majority of patients studied were in the 2nd through 8th decades of life (85%). Significant variation was found between McL-C2 and decile of age ($p < 0.001$) and sex ($p < 0.001$). The mean McL-C2 was 27 mm in the 1st decade of life compared with the population mean of 37 mm. The mean McL-C2 was also noted to be smaller in females (mean difference 4.8 mm, $p < 0.0001$). Both decile of age ($p = 0.0009$) and sex ($p < 0.0001$) were independently correlated with McL-C2 on multivariate analysis., CONCLUSIONS: The relationship of C-2 and the hard palate significantly varies with respect to age and sex, descending relative to the hard palate a full centimeter on average in adulthood. These findings may have relevance in determining optimal surgical approaches for addressing pathology involving the anterior craniocervical junction.

3402. Malone, D. R., et al. (1982). "Prosopagnosia: a double dissociation between the recognition of familiar and unfamiliar faces." Journal of neurology, neurosurgery, and psychiatry **45**(9): 820-822.

Two cases of a dissociation between prosopagnosia and impaired capacity to match familiar faces were studied. Recognition of familiar faces recovered in the first patient, whereas prosopagnosia persisted in the second patient despite recovery of matching unfamiliar faces and other visuoperceptive skills. This double dissociation is discussed in relation to current views of prosopagnosia.

3403. Malta Pio, G., et al. (2019). "Sclerokeratoplasty for the early management of acquired anterior staphyloma." Romanian journal of ophthalmology **63**(4): 379-382.

Objective: To report a case of acquired anterior staphyloma after trauma and its first surgical management. Methods: This is a case report of a 17-year-old man who had a history of trauma by insect on the right eye, without a previous history of eye conditions, and evolved with local pain and low visual acuity. The ophthalmological exam showed light perception visual acuity in right eye and 1,0 in left eye, anterior staphyloma and impossibility to blink. The first surgical procedure proposed was sclerokeratoplasty and the second one an optical transplantation but, after step one, the patient did not return to the service and missed the follow-up. Results: Sclerokeratoplasty was proposed once the posterior segment and the crystalline were preserved in topical position. The anterior tumor was excised in free-cut and corneal-scleral graft sutured in single points with 10-0 mononylon. Gatifloxacin 0.3% with Prednisolone Acetate 1%, Epitezan R and Atropine 1% were prescribed immediately postoperative. After 60 postoperative days, he maintained the use of Dexamethasone 0.1% and Atropine 1% and the patient had visual acuity of perception of hand movement in the affected eye. Conclusion: Few treatment options are alternatives to evisceration. In this case report, the sclerokeratoplasty was the chosen technique for the initial management. The second step was not possible due to loss of follow-up. Despite the uncomplicated procedure, we need greater compliance by the patient to conclude the treatment.

3404. Maltais, S., et al. (2005). "Closure of ventricular septal defects in the donor heart before transplantation: toward expanded acceptance criteria." The Journal of thoracic and cardiovascular surgery **129**(5): 1187-1188.

3405. Maltzman, B. A., et al. (1976). "A survey of ocular trauma." Survey of ophthalmology **21**(3): 285-290.

A four-year survey of all ocular trauma cases admitted to a large metropolitan eye hospital was conducted for the purpose of generally documenting ocular trauma and evaluating prophylactic, demographic and etiologic factors. Of 6254 eye admissions, 7.5% were for ocular trauma; hyphema was the most common diagnosis. Injuries were evaluated according to site, cause, and age, sex and race distribution.

3406. Ma'luf, R. N., et al. (2003). "Orbital osteoma arising adjacent to a foreign body." Ophthalmic plastic and reconstructive surgery **19**(4): 327-330.

A 27-year-old man sustained a blast injury to the face in April 1996, with a resultant foreign body at the right medial orbital wall. He refused to undergo surgical removal of the foreign body at that time and was discharged on oral antibiotics. Five years later, he presented because of recurrent attacks of swelling, redness, and pain at the right medial canthal area. A repeat computed tomography (CT) scan revealed fragmentation of the original orbital foreign body and an adjacent radiodense lesion that appeared to blend smoothly with the orbital bone from which it arose. This lesion was not present on the initial CT scan done 5 years earlier immediately following the blast. The patient was started on oral antibiotics and surgical exploration was carried out. Three fragments of the foreign body were removed in addition to the adjacent orbital lesion, which proved to be an ivory-type osteoma on histopathology. We briefly review previously suggested factors in the pathogenesis of osteoma and present further evidence in favor of both traumatic and infectious factors.

3407. Mamadaliev, A. M., et al. (1988). "[Information value of initial clinical signs for the prognosis of outcome in the first 24 hours after craniocerebral injury]." Informativnost' klinicheskikh priznakov dlia prognozirovaniia iskhodov v 1-e sutki posle cherepno-mozgovoi travmy. **88**(5): 3-7.

The informativeness of clinical indicators for predicting lethal and favourable outcomes during the first 24 hours after a head trauma has been investigated. A pool of clinical findings about the status of 302 patients examined according to a uniform technique has been analyzed using a packet of the MEDSTAT-85 software. The authors present an optimal set of clinical signs for predicting fatal and favourable outcome within the first 24 hours after the trauma with an 83% probability rate.

3408. Mancuso, P., et al. (1988). "Craniocerebral gunshot wounds in civilians. Report on 40 cases." Journal of neurosurgical sciences **32**(4): 189-194.

The Authors report an analysis on 40 cases of craniocerebral gunshot wounds treated in a civil hospital over a 8-year period. The important role of CT for a correct diagnosis and treatment planning is stressed even though patients with a G.C.S. lower than 4 die regardless of their CT findings; subdural and intracerebral hematomas are not a serious complication unless patient's neurological status is poor; timing of surgical treatment plays a major role in order to avoid infection of the wound.

3409. Mandat, T., et al. (2002). "[Posttraumatic visual agnosia and epilepsy as a consequence of gunshot injury to the head. Case report]." Pourazowa agnozja wzrokowa i padaczka jako powiklanie rany postrzalowej glowy. Opis przypadku. **36**(2): 403-411.

Half million people in the world, each year have a gunshot injury to the head and eighty thousand of them are hospitalized. Gunshot injuries to the head have became in Poland second most frequent cause of death from head trauma, and in some countries during peace became the most frequent cause of death among patient with head injury. Glasgow Coma Scale (GCS) is a useful prognostic factor for patients with gunshot injury to the head. Injury to the eloquent regions of the brain, commotion and contusion of the brain, intracranial hematomas, subarachnoid hemorrhage, cerebro-vascular spasm, injuries to the major vessels, liquorrhea, infections, coagulopathies and epilepsy are the most important and influential factors in the clinical status of the patient with gunshot injury to the head. The operation is the preferred treatment to all patient, no matter of their clinical status at the moment of the admission. The report presents the history of treatment of a patient with gunshot injury to the head. During the treatment extremely infrequently occurring posttraumatic visual agnosia and posttraumatic epilepsy were observed. Twenty-two months after operation the patient is independent and professionally active.

3410. Mandat, T. S., et al. (2005). "Artistic assault: an unusual penetrating head injury reported as a trivial facial trauma." Acta neurochirurgica **147**(3): 331-333.

The authors report a case of penetrating head injury that presented with a deceptively mild complaint. To our knowledge, it is the first report of a paint brush penetrating the brain. The patient reported being punched in the left eye and presented with a minor headache, swelling around the left orbit, a small cut on the cheek and slightly reduced left eye abduction. After radiological evaluation, a penetrating head injury was diagnosed. Under general anesthesia, through a lateral eyelid incision a 10.5 cm long paint brush, which had penetrated from the left orbit to the right

thalamus, was removed. No post-operative infection was seen at six months follow-up. This brief report serves to highlight that penetrating brain injury can occur without neurological deficit and that a minimally invasive surgical approach was successful in avoiding any complications.

3411. Manganello-Souza, L. C. (1994). "Reconstruction of frontonasal region with postauricular flap and calvarial bone split graft. A case report." International journal of oral and maxillofacial surgery **23**(5): 276-278.

An unusual case of delayed reconstruction of the frontonasal region is described. The versatility of the postauricular flap is emphasized along with the use of free parietal bone grafts.

3412. Mangla, S. and S. J. A. Sclafani (2008). "External carotid arterial injury." Injury **39**(11): 1249-1256.

Carotid vascular trauma has high mortality. The two primary causes of death are associated head injury and vascular injuries that cause exsanguination or stroke. In the past two decades interventional radiology, i.e. techniques of transcatheter embolisation, has become a vital component of the care of these cases. External carotid artery injuries are complex and are often inaccessible causes of exsanguinating haemorrhage. Transcatheter techniques have been shown to be highly effective in controlling this haemorrhage. An overview of injuries of the external carotid artery and its branches is presented.

3413. Manh, T. H., et al. (2020). "Penetrating spinal cord injury caused by a Needlefish: A case report and review of Needlefish trauma to the head and neck." Interdisciplinary Neurosurgery: Advanced Techniques and Case Management **21**.

Needlefish are predatory schooling fish with long slender jaws that have been known to leap out of the surface of the water at high speeds. There are multiple documented instances of Needlefish causing injury to humans, and these injuries can be more severe than their external appearance would indicate. There are few cases of penetrating head or neck trauma caused by these fish, however, and the following is the first known report of a partial spinal cord injury caused by a Needlefish and illustrates the benefits of prompt neurosurgical intervention and antibiotic prophylaxis.

3414. Maniara, B. P. and I. Wells (2021). "Ceftolozane/Tazobactam-Induced Leukocytosis and Clinical Failure in a Patient Being Treated for Ventilator-Associated Pneumonia Caused by Carbapenem-Resistant Pseudomonas aeruginosa: a Case Report." SN Comprehensive Clinical Medicine **3**(2): 701-704.

Ceftolozane/tazobactam is an intravenous beta-lactam/beta-lactamase inhibitor that utilizes a novel oxyimino-cephalosporin with a traditional beta-lactamase inhibitor. It is approved by the Food and Drug Administration to treat complicated intra-abdominal infections in combination with metronidazole, complicated urinary tract infections, and, most recently, hospital-acquired bacterial and ventilator-associated bacterial pneumonias. It is commonly utilized to treat infections caused by multidrug-resistant Pseudomonas aeruginosa. This case report delineates the first published case of ceftolozane/tazobactam-induced leukocytosis (up to 36.9 × 109 cells/L) and clinical failure when utilized in a high-dose regimen for a patient being treated for ventilator-associated pneumonia secondary to carbapenem-resistant P. aeruginosa. The reaction occurred during initial challenge, resolved after discontinuation, and recurred during re-challenge. In patients who are appropriately being treated with ceftolozane/tazobactam for susceptible infections, consider a drug-induced reaction as a potential cause of rising leukocytosis; this should be differentiated from clinical failure if the patient is clinically stable.

3415. Manjila, S., et al. (2015). "Understanding Edward Muybridge: historical review of behavioral alterations after a 19th-century head injury and their multifactorial influence on human life and culture." Neurosurgical focus **39**(1): E4.

Edward Muybridge was an Anglo-American photographer, well known for his pioneering contributions in photography and his invention of the "zoopraxiscope," a forerunner of motion pictures. However, this 19th-century genius, with two original patents in photographic technology, made outstanding contributions in art and neurology alike, the latter being seldom acknowledged. A head injury that he sustained changed his behavior and artistic expression. The shift of his interests from animal motion photography to human locomotion and gait remains a pivotal milestone in our understanding of patterns in biomechanics and clinical neurology, while his own behavioral patterns, owing to an injury

to the orbitofrontal cortex, remain a mystery even for cognitive neurologists. The behavioral changes he exhibited and the legal conundrum that followed, including a murder of which he was acquitted, all depict the complexities of his personality and impact of frontal lobe injuries. This article highlights the life journey of Muybridge, drawing parallels with Phineas Gage, whose penetrating head injury has been studied widely. The wide sojourn of Muybridge also illustrates the strong connections that he maintained with Stanford and Pennsylvania universities, which were later considered pinnacles of higher education on the two coasts of the United States.

3416. Mankowski, B., et al. (2016). "Intraspinal migration of a Kirschner wire as a late complication of acromioclavicular joint repair: a case report." Journal of medical case reports **10**: 66.

BACKGROUND: Penetrating neck trauma involving foreign bodies is a rare event in European countries. Due to its relatively high mortality rate, the correct management strategy must be initiated from the beginning to prevent fatal complications. In the medical literature, there are only a few cases describing foreign bodies penetrating the cervical spine. Because of its rareness, many trauma centers lack the proper routine to adequately manage such injuries., CASE PRESENTATION: This case report describes a 34-year-old white man of Central European descent with Kirschner wire migration and perforation of his vertebral foramen. He underwent acromioclavicular joint repair surgery 7 years ago, presented with a painful sensation around the area of his left clavicle and left side of his neck after a motorcycle accident. No neurological deficit was detected., CONCLUSIONS: In such cases, a thorough radiological evaluation of the spinal cord and the surrounding vasculature is mandatory for a complete understanding of the extent of the injury and determining the proper surgical management. In cases of vertebral artery trauma both an endovascular and an open approach can be contemplated.

3417. Manley, N. R., et al. (2019). "Survival after Prehospital Traumatic Cardiac Arrest: A Comparison of Isolated Head and Non-Head-Penetrating Injuries." The American surgeon **85**(3): e123-e125.

3418. Manning, M. (1979). "Neurosurgery: the casualties of conflict." Nursing mirror **148**(26): 30-32.

3419. Manning, T. C., et al. (2008). "Survival with good outcome after traversing brainstem injury: case report." Neurosurgery **62**(3): E749-E749.

OBJECTIVE: A penetrating injury to the brainstem is usually a fatal injury. The number of cases in which the brainstem is traversed during the injury and the patient survives is exceedingly small., CLINICAL PRESENTATION: We report a case of an automobile collision in which blunt injury to the face of a 22-year-old man resulted in a fragment of the clivus being impacted posteriorly traversing through the pons in a left-sided through-and-through manner. The striking radiographic images demonstrate a potentially devastating brainstem injury. Surprisingly, the patient was able to follow commands and move his left side on arrival at the hospital., INTERVENTION: The patient required a temporary tracheostomy and underwent surgical repair of his facial fractures. His hospital course was complicated by meningitis, and he required a long stay on the rehabilitation service. The patient made a remarkable recovery and became able to converse and walk with assistance. He has been able to live independently., CONCLUSION: The striking radiographic images of this rare case illustrate an unusual pathology with an even more unusual outcome.

3420. Mannis, M. J. and D. R. May (1983). "Use of the temporary keratoprosthesis in the subacute management of massive ocular trauma." Annals of ophthalmology **15**(8): 773-777.

The Landers-Foulks temporary operating keratoprosthesis was used in the treatment of a severe double perforating injury involving both the cornea and retina in a 12-year-old boy. The use of the keratoprosthesis permitted surgical intervention at the optimal time for successful treatment of the retina and vitreous, providing the patient with useful visual acuity. The temporary keratoprosthesis is an excellent device for the subacute management of massive ocular trauma involving both anterior and posterior segments.

3421. Mannocci, F., et al. (1997). "Sealing ability of several restorative materials used for repair of lateral root perforations." Journal of endodontics **23**(10): 639-641.

Amalgam, IRM, Vitremer, Bisfil, and Ana Norm Liner were evaluated for repair of experimentally induced lateral perforations. Eighty-five sound, mandibular, and maxillary molars, extracted for periodontal reasons, were selected for this study. The sample teeth were randomly divided in five groups with 15 specimens each. Ten teeth were used as control groups. After the perforations were filled with the above-mentioned materials, the teeth were immersed in a 2% methylene blue solution for 48 h, sectioned, and dye penetration was measured. The results indicated that Bisfil 2 B provided a significantly better seal than the other materials.

3422. Manolidis, S., et al. (2002). "Classification and surgical management of orbital fractures: experience with 111 orbital reconstructions." The Journal of craniofacial surgery **13**(6): 726-738.

Orbital skeletal injuries are frequently associated with other significant injuries and require a substantial surgical effort to correct. The use of a unified classification of orbital injury may better predict the surgical effort required to correct such injuries and help with future comparisons of results. In an attempt to summarize the principles of reconstruction of the orbital skeleton following trauma and introduce a unified classification system for orbital injuries, a retrospective review of all consecutive orbital reconstructions in a tertiary care teaching hospital was conducted. The nasoethmoidal region was involved in 32%, the zygomatic complex in 50%, and the frontal region in 28% of orbital fractures. Of the orbital walls, four walls were involved in 5%, three walls in 17%, two walls in 30%, and one wall in 53%. Associated ocular and neurologic injury was encountered in 33% and 57% of patients, respectively. Regions of fixation ranged from one to eight. Bone grafts were used in 20% and titanium mesh in 34% of the orbits. In general, the authors recommend an aggressive approach to orbital injuries, addressing all associated injuries simultaneously.

3423. Manso, R. (2012). "Pourfour du Petit syndrome due to nodular thyroid hyperplasia." Journal of neurology **259**(1): S221.

Objectives: The classical signs of Pourfour du Petit syndrome (PDPS) are exactly the opposite of those of Horner Syndrome (HS) and comprise mydriasis, lid retraction and exophthalmos. It is produced by stimulation of the ipsilateral sympathetic cervical chain and has the same causes as HS. Some cases have been reported following intracranial aneurysms, non-penetrating injuries of the cervical sympathetic chain and brachial plexus, post-traumatic syringomyelia, severe cranioencephalic trauma, aortic malformation, thoracic tumors (first rib condrosarcoma, esophagus carcinoma and lung carcinoma), and maxillofacial surgery (parotidectomy, mandible tumor resection). We report a patient with PDSP due to nodular thyroid hyperplasia. Methods: A 38 year-old men presented with episodes of right blurred vision, without headache or ocular pain. Looking in a mirror, he could see a protrusion of his right eye and that his right pupil was larger than the left. On neurologic examination, the patient exhibited a difference in pupillary widths, 4 mm in light and 2 mm in darkness. Cocaine (10 %) testing revealed no dilation lag. The position of the right upper lid was 2 mm higher than that of the left upper lid, the right eye with proptosis. Direct, consensual light reaction and the pupillary near reaction were normal for both eyes. The optic discs showed no oedema. Visual acuity, near and distant, was 20/25 in both eyes. The eye movements were adequate in all directions. There was no abnormal sweating response. The rest of the neurological examination was normal. Results: Laboratory data including thyroid function tests were within the normal limits. The chest x ray and computerized tomography (CT) also were normal. A magnetic resonance imaging (MRI) study was unremarkable. A cervical ecography demonstrated two thyroid nodules in the right lobe, which measure 2 cm each one. The patient was treated with total thyroidectomy one year later. The pathology exam was reported as a nodular thyroid hyperplasia. The ophthalmic signs persisted but had improved. Conclusion: PDPS often could remain unrecognised, especially when the signs are minor or transient. Awareness of PDPS could support earlier detection of sympathetic disorders and the underlying etiology.

3424. Mansour, A., et al. (2021). "Cerebrovascular Complications in Early Survivors of Civilian Penetrating Brain Injury." Neurocritical care **34**(3): 918-926.

BACKGROUND: This study investigates the presence of cerebrovascular injuries in a large sample of civilian penetrating brain injury (PBI) patients, determining the prevalence, radiographic characteristics, and impact on short-term outcome., METHODS: We retrospectively reviewed patients with PBI admitted to our institution over a 2-year period. Computed tomography head scans, computer tomography angiograms and venograms of the intracranial vessels

were evaluated to determine the wound trajectory, intracranial injury characteristics, and presence of arterial (AI) and venous sinus (VSI) injuries. Demographics, clinical presentation, and treatment were also reviewed. Discharge disposition was used as surrogate of short-term outcome., RESULTS: Seventy-two patients were included in the study. The mechanism of injury was gunshot wounds in 71 patients and stab wound in one. Forty-one of the 72 patients (60%) had at least one vascular injury. Twenty-six out of 72 patients suffered an AI (36%), mostly pseudoaneurysms and occlusions, involving the anterior and middle cerebral arteries. Of the 72 patients included, 45 had dedicated computed tomography venograms, and of those 22 had VSI (49%), mainly manifesting as superior sagittal sinus occlusion. In a multivariable regression model, intraventricular hemorrhage at presentation was associated with AI (OR 9.9, p = 0.004). The same was not true for VSI., CONCLUSION: Acute traumatic cerebrovascular injury is a prevalent complication in civilian PBI, frequently involving both the arterial and venous sinus systems. Although some radiographic features might be associated with presence of vascular injury, assessment of the intracranial vasculature in the acute phase of all PBI is essential for early diagnosis. Treatment of vascular injury remains variable depending on local practice.

3425. Mansour, A., et al. (2022). "USE OF TRANEXAMIC ACID IN GUNSHOT WOUNDS TO THE HEAD." Journal of neurotrauma **39**(11-12): A88-A89.

Introduction: Available literature on use of tranexamic acid (TXA) in gunshot wounds to the head (GSWH) is limited. We describe its safety and efficacy in civilian patients with GSWH. Methods: Retrospective observation on use of TXA in GSWH at a level I trauma center over 2 years. Demographics, GCS, coagulation profile, and neuroimaging were reviewed before and after TXA administration. Thrombotic complications, GOSE at discharge, and mortality were noted. TXA receivers were compared to a severitymatched group who did not receive TXA (n-TXA). Results: 207 GSWH screened, 26 received TXA. 92% had isolated GSWH. Mean age 28± 4 yrs. Median GCS-motor (IQR) 4(4). Median time (IQR) from injury to in-hospital TXA administration 117(39) mins. All patients received 1g bolus and 1g maintenance of TXA. After TXA, there was a significant increase in fibrinogen level (363 (99)vs.263 (135), p = 0.001) and maximal amplitude on thromboelastography (TEG) (62 (5.1)vs.55.2 (12.9), p = 0.009). Compared to n-TXA (n = 26), neuroimaging was stable in 10/16 (62%)vs.8/15 (53%) of patients. GCSmotor remained stable in 18/22 (82%)vs.16/22 (73%). New coagulopathy (22%vs.28%), progression of cerebrovascular injury (38%vs.30%) and thrombotic complications (11%vs.17%) weren't different between groups (p > 0.05 for all). There was no statistical difference in mortality (63%vs.62%, p = 0.944) or GOSE <4 (71%vs.81%, p = 0.411) at discharge. Multiple variable logistic regression didn't suggest an association between TXA and mortality (OR:1.08, CI:0.25-4.70, p = 0.914). Conclusion: In our cohort of GSWH, administration of TXA appeared safe but had no impact on neurologic outcome or mortality. A prospective randomized trial is needed to determine the efficacy of TXA in GSWH.

3426. Mansour, A., et al. (2021). "Coagulopathy as a Surrogate of Severity of Injury in Penetrating Brain Injury." Journal of neurotrauma **38**(13): 1821-1826.

Penetrating brain injury (PBI) is the most devastating type of traumatic brain injury. Development of coagulopathy in the acute setting of PBI, though common, remains of unclear significance as does its reversal. The aim of this study is to investigate the relationship between coagulopathy and clinical presentation, radiographical features, and outcome in civilian patients with PBI. Eighty-nine adult patients with PBI at a Level I trauma center in Chicago, Illinois who survived acute resuscitation and with available coagulation profile were analyzed. Coagulopathy was defined as international normalized ratio [INR] >1.3, platelet count <100,000 /muL, or partial thromboplastin time >37 sec. Median age (interquartile range; IQR) of our cohort was 27 (21-35) years, and 74 (83%) were male. The intent was assault in 74 cases (83%). The mechanism of PBI was gunshot wound in all patients. Forty patients (45%) were coagulopathic at presentation. In a multiple regression model, coagulopathy was associated with lower Glasgow Coma Scale (GCS)-Motor score (odds ratio [OR], 0.67; confidence interval [CI], 0.48-0.94; p = 0.02) and transfusion of blood products (OR, 3.91; CI, 1.2-12.5; p = 0.02). Effacement of basal cisterns was the only significant radiographical features associated with coagulopathy (OR, 3.34; CI, 1.08-10.37; p = 0.04). Mortality was found to be significantly more common in coagulopathic patients (73% vs. 25%; p < 0.001). However, in our limited sample, reversal of coagulopathy at 24 h was not associated with a statistically significant improvement in outcome. The triad of coagulopathy, low post-resuscitation GCS, and radiographical effacement of basal cisterns identify a particularly ominous phenotype of PBI. The role, and potential reversal of, coagulopathy in this group warrants further investigation.

3427. Mansour, G., et al. (2021). "Traumatic cerebral dural sinus vein thrombosis/stenosis in pediatric patients-is anticoagulation necessary?" Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **37**(9): 2847-2855.

INTRODUCTION: Cerebral dural vein thrombosis/stenosis (CDVT/S) is a condition that affects the venous drainage of the brain. Risk factors and causes associated with CDVT/S include systemic risk factors that cause hypercoagulability, or local factors such as head trauma. While consensus is that non-traumatic sinus vein thrombosis should be treated with anticoagulation therapy, treatment of patients with TBI-induced CDVT is not yet established., METHODS: Retrospective review of clinical data of pediatric patients presented to our medical center from July 2017 to August 2020. Inclusion criteria were age, birth to 18 years, admission due to head trauma, head CT scan with positive traumatic findings, and follow-up in our clinic. Exclusion criteria were a normal head CT on admission and failure to follow-up. Data regarding demographics, clinical presentation, imaging findings, treatment, and status on follow-up were recorded. Study protocol was approved by our institutional ethics committee., RESULTS: One hundred sixty-two patients were enrolled. Falling accident occurred in 90.1%, a minority suffered from direct head trauma or gunshot wound. Of the patients, 95.1% suffered from mild TBI. Forty-two percent suffered from an associated intracranial injury. Fourteen cases with CDVT were included in the cohort. Linear fractures were significantly correlated with CDVT. Additionally, occipital/suboccipital fractures, associated intracranial injury, and proximity of injury to the sinus were correlated with CDVT. From this group, 12 were treated conservatively; one patient was treated surgically due to EDH. All patients with CDVT were neurologically intact at discharge. Only one patient was treated with therapeutic dose of LMWH. A total of 86.7% of patients with CDVT who were treated conservatively had full recanalization on follow-up imaging. Four patients had CDVS; all were neurologically intact at admission and discharge, and all were treated conservatively and had full recanalization on follow-up., DISCUSSION: Treatment with ACT is established in pediatric CDVT but not in the sub-group of TBI. While ACT prevents progression of thrombosis, it might cause worsening of extra-axial hemorrhage. In our study, no clinical deterioration was noted with expectant management; thus, we present an algorithm for diagnosis and treatment of trauma-induced CDVT/S in children with frequent clinical and radiologic imaging while avoiding anticoagulation., CONCLUSION: In most cases, anticoagulation therapy is not necessary in traumatic CDVT/S. Initial expectant management in children is safe. However, each case should be evaluated individually and further studies should be performed.

3428. Maragkos, G., et al. (2017). "Meta-analysis of the effect of intracranial infections on morbidity and mortality of civilian craniocerebral gunshot injuries." Clinical neurosurgery **64**: 252-253.

INTRODUCTION: Civilian gunshot wounds to the head (GSWH) are a significant cause of traumatic brain injury-related mortality in the US. Intracranial infections are feared delayed complications in civilian GSWH and the benefit of prophylactic antibiotics has not been thoroughly studied. METHODS: We conducted a meta-analysis of retrospective studies. A database search was conducted in PubMed, EMBASE, Scopus, Web of Science and Cochrane Library for articles after 2000 for intracranial infections (meningitis, cerebritis, ventriculitis and cerebral abscess) after civilian GSWH. We compared the intracranial infection rate in patients who received antibiotic prophylaxis with those who did not. We also compared the mortality of postoperative patients developing intracranial infections with the rest, and their morbidity, as evidenced by their Glasgow Outcome Scale (GOS), and grouped as favorable (GOS 4-5) or unfavorable (GOS 2-3). RESULTS: We identified 64 relevant articles, 7 of which had extractable information. Two articles compared intracranial infection rates with and without antibiotic prophylaxis in 219 GSWH patients. Prophylactic antibiotics did not decrease the risk of developing intracranial infections (OR 1.84; 95% CI 0.93-3.62; P = 0.08). Five articles reported 509 patients admitted with GSWH, 91.9% male, mean age 26.6 years old. 224 patients survived resuscitation and surgery. Postoperative intracranial infections did not significantly increase mortality (OR 0.67; CI 0.19-2.43; P = 0.55), but led to more unfavorable outcomes (OR 4.86; CI 1.19-19.79; P = 0.03). Of note, 160 out of the 224 initial survivors (71.4%) were reported to have received prophylactic antibiotics. CONCLUSION: Prophylactic antibiotics are routinely given to GSWHpatients to prevent infections. This meta-analysis of retrospective studies suggests that 1. prophylactic antibiotics did not decrease the risk of intracranial infections; 2. the presence of intracranial infections in a GSWH setting did not affect mortality and 3. patients developing intracranial infections had worse neurological outcomes.

3429. Maragkos, G. A., et al. (2018). "Civilian Gunshot Wounds to the Head: Prognostic Factors Affecting Mortality: Meta-Analysis of 1774 Patients." Journal of neurotrauma **35**(22): 2605-2614.

Civilian gunshot wounds to the head (cGSWH) are devastating, but there is no consensus regarding prognosis and management. Therefore, we conducted a meta-analysis to identify prognostic factors associated with mortality. PubMed, EMBASE, Scopus, Web of Science, and Cochrane Library were queried for retrospective cohort studies of isolated cGSWH reporting mortality prognostic factors. Meta-Analysis Of Observational Studies in Epidemiology (MOOSE) guidelines were followed. Study quality was assessed using the Newcastle-Ottawa scale. Primary outcome was mortality. Pooled estimates of odds ratios (ORs) and 95% confidence intervals (CIs) were derived using random-effects models. Seventeen (17) observational studies (1774 patients) were identified and included. Factors associated with mortality were: age >40 years (OR, 3.44; 95% CI [1.71-6.91]), suicide attempt (5.78; [3.07-10.87]), Glasgow Coma Scale (GCS) 3-8 compared with 9-15 (38.02; [21.98-65.77]), GCS 3-5 versus 6-8 (15.38; [6.72-35.23], bilateral fixed and dilated pupils versus normal (67.12; [16.67-270.22]), and versus unilateral fixed and dilated pupil (25.35; [5.82-110.41]), dural penetration (29.07; [4.30-196.53]) and bihemispheric (4.23; [2.32-7.68]), and multi-lobar injuries (6.53; [1.99-21.42]). Selection for operative management, according to expert neurosurgical opinion, was protective (0.06; [0.01-0.22]). This is the first meta-analysis on cGSWH mortality prognostic factors. Increasing age, suicide attempt, lower GCS, bilateral mydriasis, dural penetration, and bihemispheric and multi-lobar injury are associated with increased mortality. This study can serve as a guide to clinicians and will provide directions for future research to develop evidence-based management algorithms.

3430. Marais, A. A. S. and H. J. Dicks (2019). "Utilization of X-ray Computed Tomography for the Exclusion of a Specific Caliber and Bullet Type in a Living Shooting Victim." Journal of forensic sciences **64**(1): 264-269.

A bystander claimed to have been shot by a police officer, and CT scans were used to match qualitative and quantitative aspects of the unremoved bullet with police issued 9 mm Luger ammunition. CT scan methodology proved a valid approach for the measurement of bullets based on calculated measurement capability and correlation with "gold standard" physical measurement by vernier caliper. Measurements regarding length and base diameter, as well as length/diameter ratio, were insufficient to unambiguously identify a specific caliber, or a bullet of specific mass within a caliber class. It was, however, possible to exclude a bullet of specific design and mass with well-characterized precision and accuracy values under selected CT scan conditions. A 9 mm Luger bullet (115 gr FMJ RN) was excluded from involvement in a shooting based on qualitative bullet shape combined with length, base, and ratio measurements of the bullet in-situ for the victim.

3431. Marano, A. A., et al. (2015). "Patterns of Intracranial Hemorrhage in Pediatric Patients with Facial Fractures." Craniomaxillofacial Trauma and Reconstruction **9**(1): 35-39.

Intracranial hemorrhage (ICH) is a potentially fatal injury accompanying fractures of the cranium and facial skeleton. When occurring at a young age, ICH can lead to developmental delay, cerebral palsy, epilepsy, and death. It is therefore important for clinicians to recognize the presence of ICH early, and understand the factors that affect its prognosis. In this study, we aim to identify diagnostic and prognostic signs for ICH in pediatric facial fracture patients by examining aspects of patient presentation, concomitant injuries, and fracture patterns. Data were collected for all radiologically diagnosed facial fractures between January 2000 and December 2012 at a level I trauma center in Newark, NJ. This was then further refined to include only patients 18 years of age or younger who had a documented ICH. Patient age, Glasgow coma scale (GCS) on presentation, fracture location, type of hemorrhage, and certain aspects of management were collected from these records. Data were then analyzed by either Pearson chi-square test or a t-test to determine significant relationships. A total of 285 pediatric patients were found to have sustained a facial fracture during this time period, 67 of which had concomitant ICH; 46 of these patients were male and 21 were female, with average ages of 14.26 and 9.52 ($p < 0.01$), respectively. Causes of injury included motor vehicle accidents, pedestrians struck, assault, falls, gunshot injuries, and sports-related injuries. All patients who suffered injuries as a result of violent crimes (assault and gunshot injuries) were male. Although nearly all fracture patterns were significantly associated with the presence of ICH, mandibular fractures showed a significant negative association with the presence of ICH. In addition, patients who received surgical intervention were significantly younger than those who did not (7.7 vs. 13.7, $p < 0.05$). The GCS was significantly lower in patients who underwent ICP (intracranial pressure) monitoring or EVD (external ventricular drain) placement, suffered intraventricular hemorrhage, experienced worsening of hemorrhage on repeat imaging, and suffered fatal injuries. Our data also showed a significant association between the need for intubation in the emergency department and fatality. Because the consequence of ICH can be life threatening, proper diagnosis and

management are imperative. The purpose of this study is to describe patterns associated with ICH in pediatric facial fracture patients to promote early recognition of the injury and understanding of poor prognostic signs.

3432. Maras, D., et al. (2006). "Covered stent-graft treatment of traumatic internal carotid artery pseudoaneurysms: a review." Cardiovascular and interventional radiology **29**(6): 958-968.

OBJECTIVE: To review the literature concerning the management with placement of covered stent-grafts of traumatic pseudoaneurysms of the extracranial internal carotid artery (ICA) resulting from penetrating craniocervical injuries or skull base fractures., METHOD: We have reviewed, from the Medline database, all the published cases in the English literature since 1990 and we have added a new case., RESULTS: We identified 20 patients with traumatic extracranial ICA pseudoaneurysms due to penetrating craniocervical injuries or skull base fractures who had been treated with covered stent-graft implantation. Many discrepancies have been ascertained regarding the anticoagulation therapy. In 3 patients the ICA was totally occluded in the follow-up period, giving an overall occlusion rate 15%. No serious complication was reported as a result of the endovascular procedure., CONCLUSION: Preliminary results suggest that placement of stent-grafts is a safe and effective method of treating ICA traumatic pseudoaneurysms resulting from penetrating craniocervical injuries or skull base fractures. The immediate results are satisfactory when the procedure takes place with appropriate anticoagulation therapy. The periprocedural morbidity and mortality and the early patency are also acceptable. A surveillance program with appropriate interventions to manage restenosis may improve the long-term patency.

3433. Marcellino, C. R., et al. (2017). "Cavernous sinus syndrome and traumatic carotid-cavernous fistula attributable to a self-inflicted bb gunshot injury." Journal of Neurological Surgery Part B: Skull Base **78**.

Introduction: Ball bearing or “BB” guns are a class of gas- or spring-powered projectile weapons whose power and muzzle velocity are often underestimated by casual users and children. Present technology has advanced such that modern BB guns produce high velocity but small caliber ballistic injuries which can penetrate the intracranial space and cause focal central neurologic deficits. The small size of the projectile simultaneously complicates diagnosis and treatment, particularly if the entry wound is not appreciated by the layperson, resulting in delayed care. We report a unique case of cavernous sinus syndrome precipitated by a self-inflicted facial BB gunshot injury in a child. Methods: Case report. Results: A 9-year-old boy was playing with a BB gun when he accidentally suffered a self-inflicted BB gunshot injury to the face. Family believed that a superficial injury only had been sustained, and medical evaluation was correspondingly delayed more than 5 days. During that time, the patient was unable to completely open his eye and complained of diplopia, eventually prompting ED presentation. At that time, he had progressed to malaise, nausea and vomiting, and a right complete CN III and IV nerve palsy, with intact vision, and functioning CN V and VI. Diagnostic angiography revealed a BB retained in the medial cavernous sinus, as well as a small carotid cavernous fistula. The BB was in contact with the cavernous segment of the ICA, inducing minimal arterial stenosis. The projectile was confirmed to be ferromagnetic, and so MRI was deferred. The patient was managed expectantly, and one-month follow-up angiography was arranged to rule out migration of the retained BB and reevaluate the status of the carotid-cavernous fistula. His serum lead level was followed periodically in consideration of medical management, although as this was a spherical BB and not a pellet, the lead content is believed to be low. Conclusion: Modern BB guns can penetrate the cranium and injure skull base structures such as the cavernous sinus, potentially producing severe and highly focal neurological injuries, depending on the trajectory of the pellet. Traumatic vascular injuries causes by BB guns are managed similarly to other missile or penetrating trauma, although little is known about their specific natural history. Other specific management considerations are MRI safety and lead content, which vary significantly from other types of retained projectile injuries, due to differences in composition.

3434. Marcellino, C. R., et al. (2018). "Cortical surface intracranial electrodes identify clinically relevant seizures missed on scalp EEG after traumatic intracranial hemorrhage." Epileptic disorders : international epilepsy journal with videotape **20**(6): 551-556.

Seizures and other electrophysiological disturbances are an under-recognized cause of coma, focal deficits, and prolonged encephalopathy following subdural hematoma evacuation. In these patients, it is possible that seizures remain unrecognized on scalp EEG. It has been shown that a high burden of seizures and other electrophysiological disturbances exist following surgical evacuation and underlie the encephalopathy commonly seen in this patient

population, predisposing them to medical complications and confounding estimates of prognosis. As part of a research protocol, we are performing intraoperative placement of cortical surface (non-parenchyma penetrating) intracranial EEG on patients who present after trauma and require emergent decompressive hemicraniectomy. In this case report of a patient with high-velocity traumatic epidural, subdural, and subarachnoid hemorrhages, we identified frequent non-convulsive seizures or seizure-like SIRPIDs with intracranial cortical surface monitoring that were not identified on simultaneous scalp EEG. Stimulation consistently triggered these electrographic seizures in addition to rhythmic lateralized periodic discharges. His mental status improved rapidly after resolution of these electrographic seizures shortly after increasing antiseizure medications, suggesting that they may have been contributing to his encephalopathy. More research is needed to determine the frequency of this phenomenon and determine whether treatment of such seizures improves patient outcomes.

3435. Marchetti, D., et al. (2003). "Reconstruction of the angle of shot by using computed radiography of the head." The American journal of forensic medicine and pathology **24**(2): 155-159.

In a case of murder by a single .22 caliber bullet fragmented in the head, determination of the trajectory was a key issue in identifying which of 2 windows, 1 of which was associated with 2 suspects, was the site of fire. For this purpose, we processed the computed tomography of the victim's head by using a radiation therapy planning system called Plato, which is routinely used in radiation oncology. This tool provided a 3-dimensional reconstruction of the cranio-cerebral lesions and a spatial location of bullet and bone fragments. In this article is described the more intuitive relationship with forensic and ballistic data obtained from the 3-dimensional visualization and the physical and mathematical analysis used to calculate the angle of shot.

3436. Marchioni, D., et al. (2016). "Traumatic intraconal foreign body: Report of an injury corrected with combined surgical and endoscopic treatment." Operative Neurosurgery **12**(4): 14-18.

BACKGROUND: Management of penetrating ocular splinter injuries is very controversial. Penetrating wounds of the orbit represent a complex therapeutic problem that requires a multidisciplinary approach. Endoscopic approaches to the orbit are currently performed through the lamina papyracea to access the medial part, or through large orbitotomies to access the lateral part. OBJECTIVE: To describe a novel combined approach to the lateral part of the orbit. METHODS: Clinical and surgical findings of intraorbital foreign body removal are presented. A minimal supraorbital osteotomy was performed, combined with endoscopic intraorbital dissection. RESULTS: The foreign body was removed, no postoperative complications were reported, and visual acuity increased from 2/10 preoperatively, to 8/10 one month after surgery. CONCLUSION: The present technique can be considered a safe and novel surgical approach to access the retrobulbar space and to treat the pathology of this anatomic region.

3437. Marciani, R. D. and S. Israel (1997). "Diagnosis of blunt carotid injury in patients with facial trauma." Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics **83**(1): 5-9.

OBJECTIVES: The purpose of this study was to review the clinical and diagnostic findings associated with blunt carotid artery injury, provide information related to clinical outcome, and report the findings of a retrospective study comparing patients with nonpenetrating and penetrating carotid artery injuries and the attendant facial injuries., STUDY DESIGN: Twenty-one patients admitted to the hospital nonelectively with a subsequent diagnosis of penetrating (11 patients) or nonpenetrating (10 patients) carotid artery injuries were included in the study. Records were analyzed for demographic data, mechanism of injury and time to diagnosis, neurologic status, presence of facial injuries, and outcome., RESULTS: Five patients had facial injuries associated with a blunt carotid artery abnormality; six patients had penetrating carotid wounds. Time from carotid injury by all mechanisms to diagnosis was 20 minutes to 12 hours (mean 4 hours). Seventeen patients survived their injury., CONCLUSION: Patients with completely asymptomatic head injuries and severe closed-head injuries must be given careful initial evaluation and subsequent secondary evaluation. The relatively high frequency of facial injuries associated with blunt carotid injury should alert the maxillofacial surgeon to consider the diagnosis.

3438. Marcikic, M., et al. (1998). "Management of war penetrating craniocerebral injuries during the war in Croatia." Injury **29**(8): 613-618.

From September 1991 to December 1992, during the war in Croatia, the General Hospital in Slavonski Brod served as an evacuation centre. During that period 197 patients with war-related penetrating craniocerebral injuries were admitted. They were analyzed according to wound characteristics, operability, mortality, operative and post-operative complications, and their condition after hospital discharge and follow-up. A less aggressive surgical approach was accepted in our surgical strategy, recommended in recent studies, followed by an aggressive intensive management. All patients received antibiotics ("war scheme") and anticonvulsants. Early results of treatment do not differ significantly from other recent studies (Vietnam, Israel) in respect to both mortality and complications. Follow-up was difficult. Most of the patients were Bosnia and Herzegovina citizens who were refugees and banished to foreign countries; thus their addresses were unknown. They are consequently lost to follow-up. A less aggressive surgical approach proved to be justified. Routine use of antibiotics and anticonvulsants lowered the infection rate and early seizure incidence to an acceptable level. Late seizure incidence is similar to those previously reported.

3439. Marcinkowski, T. (1974). "[Erroneous evaluation of missile's direction in cases of gunshot wounds of the head]." Mylna ocena kierunku lotu pocisku w przypadku ran postralowych glowy **25**(3): 457-459.

3440. Marcinkowski, T. (1974). "Erroneous evaluation of the direction of the missile in cases of gunshot wounds of the head (Polish)." Patologia Polska **25**(3): 457-459.

Histologic examination of fragments from the edges of shot wounds is insufficiently appreciated. It helps the investigation of the direction of shot wounds of the head, as is described in a case in which the surgeon assessed the direction of the missile erroneously.

3441. Margo, J. A., et al. (2016). "Open Globe Injuries Presenting With Normal or High Intraocular Pressure." Eye & contact lens **42**(4): 256-261.

OBJECTIVES: To determine the frequency, clinical characteristics, and visual outcomes of patients who present with high or normal intraocular pressure (IOP) and open globe injuries., DESIGN: Retrospective chart review., SETTING: University of Maryland Medical Center, a level 1 trauma center., PATIENT OR STUDY POPULATION: All cases of open globe injury presenting to The University of Maryland Medical Center from July 2005 to January 2014., OBSERVATION: Demographics, initial physical examination, computed tomography findings, IOP of the affected and unaffected eyes, and follow-up evaluations., MAIN OUTCOME MEASURES: (1) IOP 10 mm Hg or greater and (2) visual acuity., RESULTS: Of 132 eyes presenting with open globe injury, IOP was recorded in 38 (28%). Mean IOP for the affected and unaffected eyes was 14+/-10.3 mm Hg and 16.6+/-4.1 mm Hg, respectively. Twenty-three (59.4%) eyes had IOP greater than 10 mm Hg. Six eyes (16.2%) had IOP greater than 21 mm Hg. Using bivariate analysis, IOP greater than 10 mm Hg was associated with posterior open globe injury (P=0.01), posterior hemorrhage (P=0.04), and intraconal retrobulbar hemorrhage (P=0.05). Adjusting for age, sex, and race, IOP greater than 10 mm Hg was associated with the presence of posterior open globe injury on clinical examination (P=0.04). Higher presenting IOP was found to predict light perception or worse vision (P=0.01). Multivariate analysis showed that poor presenting vision was the best predictor of poor final vision (P<0.01)., CONCLUSIONS: High IOP does not exclude open globe injury. It is a frequent finding in patients with open globe injuries and may be associated with posterior injury and poor visual prognosis.

3442. Marhold, F., et al. (2022). "Surviving the Scene in Civilian Penetrating Brain Injury: Injury Type, Cause and Outcome in a Consecutive Patient Series in Austria." Frontiers in surgery **9**: 923949.

Background: Penetrating brain injury (PBI) is a heterogeneous condition with many variables. Few data exist on civilian PBI. In some publications, PBI differentiation between low-velocity injury (LVI) and high-velocity injury (HVI) is made, but exact definitions are not given yet. The incidence of PBI depends heavily on the country of origin. Furthermore, captive bolt pistol (CBP) injuries represent a rare type of LVI and almost no reports exist in the human medical literature. Treatment of PBI has been controversially discussed due to high morbidity and mortality with results varying considerably between series. Prognostic factors are of utmost importance to identify patients who presumably benefit from treatment., Methods: A retrospective, single-center analysis of a consecutive patient series was performed from September 2005 to May 2018. We included all patients with PBI who reached our hospital alive and received any neurosurgical operative procedure., Results: Of 24 patients, 38% died, 17% had an unfavourable outcome, and 46% had

a favourable outcome. In total, 58% of patients with PBI were self-inflicted. Leading causes of injury were firearms, while captive bolt pistols were responsible for 21% of injuries. LVI represented 54%, and HVI represented 46%. The outcome in HVI was significantly worse than that in LVI. A favourable outcome was achieved in 69% of LVI and 18% of HVI. Low GCS and pathological pupillary status at admission correlated significantly with an unfavourable outcome and death., Conclusions: PBI is a heterogeneous injury with many variables and major geographical and etiological differences. Differentiation between LVI and HVI is crucial for decision-making and predicting outcomes. In patients presenting with object trajectories crossing the midline, no favourable outcome could be achieved. Nevertheless, in total, a favourable outcome was possible in almost half of the patients who succeeded in surgery.

3443. Maricevic, A. and Z. Dogas (2004). "Land mine injury: functional testing outcome." Military medicine **169**(2): 147-150.

We present a case of a war patient treated with external fixation for a complex land mine injury involving the fracture of the tibial and fibular bones, which occurred at the front line during the war in Croatia and Bosnia and Herzegovina. Excessive destruction and foreign body penetration into the distal two-thirds of the right leg and foot endangered not only the patient's lower extremity but his life as well. Nevertheless, the patient's life, as well as extremity, was saved due to an intensive treatment. A 100-month follow-up showed a bridge callus between the tibia and fibula, tibial bone defects, tibial anterior angulation of 5 degrees, and arthrosis of the right upper ankle joint. Despite a relatively unsatisfactory X-ray finding, the functional testing on the dynamometry system Cybex 300 showed surprisingly good results. There was a satisfactory functional recovery of the treated extremity: the patient could walk without any help even on rocky grounds and was actively involved in his sheep farm duties.

3444. Marion, D. W. (2006). "Evidenced-based guidelines for traumatic brain injuries." Progress in neurological surgery **19**: 171-196.

An enormous amount of clinical and basic science brain injury research has been undertaken during the last several decades in an effort to improve outcomes following severe traumatic brain injury, but to date there still are no new therapies that have been clearly shown to be beneficial. There is, however, increasing evidence to suggest that evidence-based, protocol-driven, acute care can lead to improved outcomes. Evidence based guidelines for the medical and surgical management of severe brain injury, and for penetrating and pediatric brain injury, as well as for the pre-hospital management of brain injury, have all been published. In this chapter the conclusions of those guidelines is reviewed. In addition, the studies that demonstrate improved outcomes as a result of implementation of the guidelines are summarized.

3445. Marion, D. W. (2008). "Ballistics for the neurosurgeon: Commentary." Neurosurgery **62**(2): 480.

3446. Marjan, D., et al. (2004). "CT findings in patient with head injury from captive bolt gun." AJR. American journal of roentgenology **182**(3): 827-828.

3447. Markham, J. W., et al. (1964). "PENETRATING CRANIOCEREBRAL INJURIES. REPORT OF TWO UNUSUAL CASES." Journal of neurosurgery **21**: 1095-1097.

3448. Markham, J. W., et al. (1971). "Use of centrifuge in the treatment of an intraventricular metallic foreign body. Technical note." Journal of neurosurgery **34**(6): 800-804.

3449. Marklund, N., et al. (2002). "Effect of traumatic brain injury and nitrone radical scavengers on relative changes in regional cerebral blood flow and glucose uptake in rats." Journal of neurotrauma **19**(10): 1139-1153.

Changes in regional cerebral blood flow (rCBF) and glucose metabolism are commonly associated with traumatic brain injury (TBI). Reactive oxygen species (ROS) have been implicated as key contributors to the secondary injury process after TBI. Here, pretreatment with the nitrone radical scavengers (alpha-phenyl-N-tert-butyl nitrone (PBN) or its sulfonated analogue sodium 2-sulfophenyl-N-tert-butyl nitrone (S-PBN) were used as tools to study the effects of ROS on rCBF and glucose metabolism after moderate (2.4-2.6 atm) lateral fluid percussion injury (FPI) in rats. S-PBN has a half-life in plasma of 9 min and does not penetrate the blood-brain barrier (BBB). In contrast, PBN has a half-life of 3 h and readily penetrates the BBB. Regional cerebral blood flow (rCBF) and glucose metabolism was estimated by using (99m)Tc-HMPAO and [(18)F]Fluoro-2-deoxyglucose (FDG) autoradiography, respectively, at 42 min (n = 37) and 12 h (n = 34) after the injury. Regions of interest were the parietal cortex and hippocampus bilaterally. As expected, FPI produced an early (42-min) hypoperfusion in ipsilateral cortex and an increase in glucose metabolism in both cortex and hippocampus, giving way to a state of hypoperfusion and decreased glucose metabolism at 12 h postinjury. On the contralateral side, a hypoperfusion in the cortex and hippocampus was seen at 12 h only, but no significant changes in glucose metabolism. Both S-PBN and PBN attenuated the trauma-induced changes in rCBF and glucose metabolism. Thus, the early improvement in rCBF and glucose metabolism correlates with and may partly mediate the improved functional and morphological outcome after TBI in nitrone-treated rats.

3450. Markowski, J., et al. (2012). "Intraorbital foreign bodies--5 own cases and review of literature." Otolaryngologia polska = The Polish otolaryngology **66**(4): 295-300.

Five patients were surgically treated for intraorbital foreign body: a 14-year-old girl had a door glass splinter, a 23-year-old man a metallic foreign body--gunshot pellet, a 55-year-old man a splinter from a metallic bar, a 48-year-old patient the splinters of circular saw and 61-year-old man with shot. Two foreign bodies were removed using the Kronlein-Reese-Berk lateral orbitotomy, two others by Sewell medial orbitotomy and one with superior orbitotomy of Dandy-Naffziger. Radiographs and CT scans were used to identify and localize intraorbital foreign bodies. In one case we found coexistence foreign body (shot) and tumor--inflammation pseudotumor of the orbita. It is possible, that in this case long-time occupy foreign body in the orbita was a cause of that tumor. All foreign bodies were successfully removed, and postoperative course was uneventful. The Kronlein-Reese-Berk orbitotomy provides a satisfactory access to the lateral and posterior orbit, which is of particular importance in the case of a deeply penetrating foreign body (metallic or glass). Surgical removal of intraorbital foreign bodies is a classic example of an interdisciplinary therapeutic approach. Best outcome is usually a result of a team of an ophtalmologist, ENT surgeon, maxillary surgeon and possibly also neurosurgeon performing the operation.

3451. Marmor, M., et al. (2009). "Bilateral heel panniculitis presenting as calcaneal osteomyelitis." Orthopedics **32**(1): 59.

Panniculitis is an inflammatory process of the subcutaneous adipose layer (panniculos adiposus). It is frequently a sign of systemic disease with a wide range of clinical presentations. The histopathological findings are diverse, making diagnoses difficult. We present a case of heel panniculitis, initially misdiagnosed as calcaneal osteomyelitis. Our intention is to make physicians, treating these type of patients, aware of the possibility of this rare disease, especially in situations when conventional therapy is not successful. A 66-year-old woman was admitted to the hospital with the initial diagnosis of suspected calcaneal osteomyelitis of her right heel, presumably due to a foreign body penetration a few months prior. Initial treatment with intravenous antibiotics was unsuccessful. When significant fluctuation developed, she underwent incision and drainage of her right heel. Postoperatively, her right heel condition did not improve and similar phenomena appeared on her left side. She continued to deteriorate up to the point when panniculitis was diagnosed and corticosteroid treatment was initiated. Her condition rapidly improved after this treatment.

3452. Marnerides, A., et al. (2013). "An unusual case of multiple-gunshot suicide of an alcohol-intoxicated cancer sufferer with prolonged physical activity." Journal of forensic sciences **58**(2): 537-539.

Multishot firearm suicides are relatively rare and suggest the possibility of homicide. Physical activity following gunshots to the head, the neck, and the thorax does occur, and immediate incapacitation does not occur in every fatal gunshot wound that penetrates the head or perforates the heart. Cancer patients appear to be at increased suicide risk,

but alcohol intoxication is less common in such cases. We present-to the best of our knowledge for the first time-a case of a 54-year old, male, liver cancer sufferer, who under the influence of alcohol, discharged his revolver three times, suffered, among other wounds, a heart-perforating wound, and died after c. 1.5 h, being able to talk until just before he died. Our case underlines the importance of keeping an open critical mind when dealing with multiple-gunshot fatalities, especially when posttraumatic physical activity might be crucial in differentiating homicide from suicide. Copyright © 2013 American Academy of Forensic Sciences.

3453. Maroun, F. B., et al. (2002). "Penetrating head injury from wood slab." The Journal of trauma **52**(5): 1008.

3454. Marquardt, G., et al. (2000). "Brain abscess decades after a penetrating shrapnel injury." British journal of neurosurgery **14**(3): 246-248.

We describe a patient who developed a brain abscess 52 years after sustaining a penetrating craniocerebral shrapnel injury. For 10 years he had suffered from diabetes mellitus, a disorder known to predispose to infections from a diminished body defence. The treatment and aetiology of this rare occurrence is discussed.

3455. Marshall, L. F., et al. (1983). "The National Traumatic Coma Data Bank. Part 1: Design, purpose, goals, and results." Journal of neurosurgery **59**(2): 276-284.

This paper describes the pilot phase of the National Traumatic Coma Data Bank, a cooperative effort of six clinical head-injury centers in the United States. Data were collected on 581 hospitalized patients with severe non-penetrating traumatic head injury. Severe head injury was defined on the basis of a Glasgow Coma Scale (GCS) score of 8 or less following nonsurgical resuscitation or deterioration to a GCS score of 8 or less within 48 hours after head injury. A common data collection protocol, definitions, and data collection instruments were developed and put into use by all centers commencing in June, 1979. Extensive information was collected on pre-hospital, emergency room, intensive care, and recovery phases of patient care. Data were obtained on all patients from the time of injury until the end of the pilot study. The pilot phase of the Data Bank provides data germane to questions of interest to neurosurgeons and to the lay public. Questions are as diverse as: what is the prognosis of severe brain injury; what is the impact of emergency care; and what is the role of rehabilitation in the recovery of the severely head-injured patient?

3456. Martens, D. (2012). "Essay: Beauty in the complexity of the brain." CMAJ. Canadian Medical Association Journal **184**(8): 925-926.

3457. Martin, D., et al. (1988). "[The osteocutaneous outer arm flap. A new concept in microsurgical mandibular reconstructions]." Le lambeau osteo-cutane brachial externe. Un nouveau concept dans les reconstructions mandibulaires microchirurgicales. **89**(5): 281-287.

The authors present five cases where the OCLAF technique was adapted to reconstruct large mandibular defects. Some significant advantages made us think about the possibility of the OCLAF as an acceptable alternative in that specific case. These are the ease and safety of the dissection, the respect of a bony vascularisation, a very valuable pedicle size, and a remarkable mobility of the skin paddle to the underlying bone. Of course we had to face some minor disadvantages: the microsurgical procedure, the donor site scar, the absence of cancellous bone in the transfer and the weakening of the bone shaft at the donor site. Nevertheless we think the OCLAF is to be considered whenever large mandibular defects have to be reconstructed with vascularized bone.

3458. Martin, E. M. and A. B. Hummelgard (1986). "Traumatic aneurysms." The Journal of neuroscience nursing : journal of the American Association of Neuroscience Nurses **18**(2): 89-94.

A traumatic aneurysm is a potentially lethal complication of head trauma. The problem is unusual but not rare. The majority of traumatic aneurysms are caused by blunt injuries to the head (62%), although penetrating wounds (27%) and iatrogenic trauma (11%) during intracranial surgery are also well recognized. The pathogenesis, diagnosis, and

management of traumatic aneurysm are discussed, with focus on the patient course and nursing implications of a case study.

3459. Martin, G. (2001). "The death of Henry II of France: a sporting death and post-mortem." ANZ journal of surgery **71**(5): 318-320.

In 1559 Henry II King of France was wounded in a tournament and died. A broken lance entered his right orbit, destroying his eye and leaving behind many splinters. The skull was not penetrated but infection spread intracranially. Both Ambroise Pare and Vesalius saw him and predicted death. Nine days after wounding, both attended the King's post-mortem. The story shows how difficult life was without antisepsis, anaesthesia, antibiotics or investigations. The King's stubbornness highlights the dangers of continuing to play after concussion.

3460. Martin, J. E., et al. (2010). "Care of pediatric neurosurgical patients in Iraq in 2007: clinical and ethical experience of a field hospital." Journal of neurosurgery. Pediatrics **6**(3): 250-256.

OBJECT: Care for host-nation pediatric casualties and disease or nonbattle injuries is an essential mission of deployed military medical assets. Clinical experience with pediatric patients at field hospitals has been increasingly reported since 2001, with neurotrauma identified as a major cause of morbidity and death in this population. A concentrated pediatric neurosurgical experience at a deployed medical facility has not been reported. The authors reviewed their experience with pediatric neurosurgical patients at a field hospital in Iraq in 2007 to provide insight into the management of this patient population., METHODS: A retrospective review was conducted using a prospective database constructed by the authors for quality improvement during a single combat rotation in 2007., RESULTS: Forty-two patients among 287 consultations were 17 years of age or younger. Twenty-six of these children were 8 years old or younger. Penetrating head injuries were the most common indication for consultation (22 of 42 patients). Twenty-eight of 130 surgical procedures were performed in the children. One patient died in the perioperative period, for a trauma-related operative mortality rate of 4%. Seven patients received palliative care based on the extent of presenting injuries. Twenty-five patients were discharged with minimal or no neurological deficits., CONCLUSIONS: Pediatric patients represent a significant proportion of the neurosurgical patient volume at field medical hospitals in the Iraqi theater. The mature medical theater environment present in 2007 allowed for remarkable diagnostic evaluation and treatment of these patients. Penetrating and closed craniospinal injuries were the most common indication for consultation. Disease and nonbattle injuries were also encountered, with care provided when deemed appropriate. The deployed environment presents unique medical and ethical challenges to neurosurgeons serving in forward medical facilities.

3461. Martin, R., et al. (2014). "Colombia: Social transition and peace process. Has the reduction in violence had any impact on organ procurement and transplantation? New society, new strategies." Transplantation **98**: 274-275.

Introduction: Colombia is known worldwide for its high rates of violence as the result of the narcotics war and the presence of political-rebel groups; guerrillas. The violence increased dramatically during the 1990s and early 2000s, which is when it achieved its greatest influence. Nowadays the situation has changed. The Colombian government has retaken control, acting to decrease the macro and micro narco-traffic and a peace process with the guerrillas is ongoing. Because of this, Colombia is undergoing a social transition and the rate of all types of violence has decreased substantially. Aim: To investigate and report the direct impact of the decreased rates of violence on organ procurement and transplantation in Colombia. Materials and Methods: A 10-year retrospective study of national and international data reports on interpersonal violence, intentional homicide and car accidents including the data of The National Institute of Coroners and Forensic Science of Colombia. Results: The homicide rate in Colombia has decreased from 67.5 per 100,000 inhabitants in 2002 to 33 per 100,000 inhabitants in 2012; 91% of murders occurred in males aged 20 to 35 years in the last decade. The primary homicide trigger was the guerrillas war in 2002 and now seems to be the interpersonal fights in 2012. Although shooting has declined substantially from >24,000 in 2002 to <12,000 in 2012, it remains the most common mechanism of death (75%). On the other hand, the rate of deaths due to car accident has also decreased. Regarding organ procurement, the number of effective brain-death donors has decreased substantially. Also, the main cause of brain death changed from trauma in 2002 to stroke in 2012. Conclusions: It is quite interesting to see how the social transition and the peace process that Colombia is undergoing directly impacts on the health system including the Colombian Network of Organ Procurement and Transplantation (CNOPT). There is a reduction in all types of violence; brain-death donors due to gunshot wounds and traffic accidents are less now than 10 years ago. Thus, the

transplants performed using living and extended-criteria donors are now fundamental. Designing new strategies has been necessary to adjust the CNOPT to a modern society, in order to increase the amount of effective donors. Those strategies may be an archetype to the countries that are living in a social transition like Colombia.

3462. Martin, R. R., et al. (1987). "Machete wounds to the head: report of three cases." Neurosurgery **20**(2): 270-272.

Three cases of machete wounds to the head are described. The resulting injuries from this unusual mode of trauma varied in severity and included transection of a previously placed ventriculoperitoneal shunt. Complications of these injuries resulted from delayed and inadequate treatment.

3463. Martin, S., et al. (2009). "Management of embedded foreign body: penetrating stab wound to the head." Journal of trauma nursing : the official journal of the Society of Trauma Nurses **16**(2): 82-86.

Penetrating craniocerebral trauma is an injury in which a projectile violates the skull but does not exit. The significance of penetrating injuries to the head depends largely on the circumstances of the injury, the velocity of impact, and attributes of the projectile. While most penetrating head injuries are caused by firearms, lower-velocity mechanisms of penetrating brain injury present unique challenges for the multidisciplinary team involved with the delivery of care. Appropriate management can lead to optimal outcomes and limit secondary brain injury.

3464. Martin, S. A., et al. (2016). "The negative impact of anemia on outcome from traumatic brain injury." Journal of neurosurgery **124**(4): A1177.

Introduction: Anemia's impact on outcome from traumatic brain injury (TBI) is controversial. We hypothesized TBI patient outcomes with concomitant anemia would be worse than without anemia, and investigated anemia effects on TBI considering hemoglobin sampling times, threshold values, gender and transfusion. Methods: Patients from 2009-2013 with non-penetrating TBI, head Abbreviated Injury Scale (AIS) <3, and abnormal head CT findings were reviewed. Relationships between initial hemoglobin and lowest hemoglobin during hospitalization threshold values of <7, <8, <9, and <10 g/dl were related to follow-up Glasgow Outcome Score within one-year. A duration effect of anemia was investigated using area-under-the-curve analysis. Results: Of 939 patients (mean age 46.75, 66.1% male gender) meeting inclusion criteria, initial and first hemoglobin were significant predictors of poor outcome ($p<0.0001$). Every 1g/dL higher hemoglobin value had a 33% good outcome increase. More severe anemia levels were associated with lower GCS, higher head AIS, and higher ISS ($p<0.0001$). Anemic patients had more surgery and blood transfusions ($p<0.0001$). Anemia duration did not appear to impact outcomes. Female patients had worse outcomes for initial hemoglobin between 7 and 8 g/dL ($p<0.05$). Blood transfusion was associated with poorer outcome at hemoglobin levels <9 and <10 g/ dl ($p<0.05$), but not at more severe anemia levels. Conclusion: TBI patient outcomes are worse with concomitant anemia. While anemic patients have more severe injuries, initial hemoglobin and lowest hemoglobin are independent factors affecting outcome. Female patients may be more susceptible to more severe anemia levels. These findings indicate packed red cell transfusion is appropriate with hemoglobin <8g/dl.

3465. Martin, T. (2018). "Neck trauma management." Surgery (United Kingdom) **36**(8): 429-434.

Neck trauma is common, and may result from blunt, penetrating or combined mechanisms. Although much of this trauma is minor, the complex and vulnerable anatomy of the neck predisposes to major life threatening complications from even relatively low energy transfer injury patterns. This article reviews mechanisms of injury along with investigation and management principles.

3466. Martin-Delgado, M. C., et al. (2019). "Summary of Spanish recommendations on intensive care to facilitate organ donation." American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons **19**(6): 1782-1791.

With the aim of consolidating recommendations about the practice of initiating or continuing intensive care to facilitate organ donation (ICOD), an ad hoc working group was established, comprising 10 intensivists designated by the Spanish Society of Intensive Care and Coronary Units (SEMICYUC) and the Spanish National Transplant Organization (ONT). Consensus was reached in all recommendations through a deliberative process. After a public consultation, the

final recommendations were institutionally adopted by SEMICYUC, ONT, and the Transplant Committee of the National Health-Care System. This article reports on the resulting recommendations on ICOD for patients with a devastating brain injury for whom the decision has been made not to apply any medical or surgical treatment with a curative purpose on the grounds of futility. Emphasis is made on the systematic referral of these patients to donor coordinators, the proper assessment of the likelihood of brain death and medical suitability, and on transparency in communication with the patient's family. The legal and ethical aspects of ICOD are addressed. ICOD is considered a legitimate practice that offers more patients the opportunity of donating their organs upon their death and helps to increase the availability of organs for transplantation.

3467. Martinez, A. Y. (2012). "Gunshot injuries to the head and face. analysis of 144 cases." Journal of oral and maxillofacial surgery **70**(9): e-104.

Statement of the Problem: Gunshot wound injuries (GSW) have devastating effects in the head and maxillofacial region with fatal outcome and creating complex soft and hard tissue defects in the survivors. The purpose of this study was to analyze GSW in the head and face area treated in a level 1 urban trauma center with special emphasis in deceased subjects. Materials and Methods: A retrospective study using the trauma registry database for GSW from 1/1/2005 until 12/31/2011 was performed. Methods of Data Analysis: Subjects were grouped according to different categories: outcome (alive vs. deceased), age, gender, race, anatomic location and year of injury. Results: A total of 144 subjects with GSW were identified. 34 subjects died from their injuries and 110 survived. The most prevalent age group was 21- 40 years with 77 subjects, in contrast the least prevalent group was 61 years and older with 4 (table 1). Males outnumber females in a 6:1 ratio. 89 (62%) individuals were African american, 43 (29.7%) were caucasian, 11 (7.6%) hispanic and 1 (0.7%) asian. The most common location of injury was the head with 53 subjects (37%), followed by multiple sites (combination of head, midface and mandible) 43 (30%), midface 25 (17%) and mandible 23 (16%). Location of fatal GSW was predominantly head 25, multiple sites 6, midface 2 and mandible 1. The distribution of injuries per year is shown below (table 2). (table presented) Conclusions: GSW to the head in our series of cases resulted in fatal outcome in approximately 50 % of the cases. It is imperative to establish survival prognosis of patients with concomitant GSW to the head and face with the neurosurgeon before attempting large and complex facial reconstruction.

3468. Martínez, F. (2008). "To the editor [1]." Journal of the Chinese Medical Association **71**(2): 110.

3469. Martinez Ibanez, V., et al. (1981). "[Thoracic and abdominal trauma in children: study of 122 cases (author's transl)]." Traumatismos toracicos y abdominales en la infancia. Estudio de 122 casos. **15**(6): 527-534.

Authors present a review of patients under 7 years of age affected with thoracic and/or abdominal trauma not due to birth injuries, observed in the period 1966-1979. In these 122 patients, they observed 154 injuries, including 63 abdominal, 58 renal, 28 thoracic and 5 vertebral. Automobile accidents, falls and penetrating injuries, in this order are the etiological factors. Six patients died due to brain injuries (66%) and the rest of septic and hemorrhagic shock. Authors observed a high incidence of multiple injuries involving thehead, skeleton, abdomen and chest and the importance of recognizing these coexisting injuries to improve the prognosis. Finally, they point out that the pediatric surgeon's function is not only to treat the patient but to prevent the injuries through interdisciplinary meetings.

3470. Martinez-Bustamante, D., et al. (2015). "[Craniocerebral gunshot wounds in civilian population: Analysis of experience in a single center in Monterrey, Mexico]." Heridas craneales por proyectil de arma de fuego en poblacion civil: analisis de la experiencia de un centro en Monterrey, Mexico. **83**(2): 94-99.

BACKGROUND: Gunshot wounds in civilian population of Mexico were quite rare. Currently, conflicts amongst organized crime groups are carried out with weapons, which are considered as exclusive use by the nations army., OBJECTIVES: Describe the experience of our institution and share results of clinical and radiological factors influencing the prognosis of the patients., MATERIAL AND METHODS: Observational and retrospective study of patients with cranial gunshot wounds (GSW), which penetrated the duramater, treated from January 2009 - January 2013. We considered several demographic variables, Glasgow Coma Scale (GCS), upon admission, state of pupils, type of surgery and size of

decompression, Glasgow Outcome Score (GOS) upon discharge, and after 6 months., RESULTS: Of 68 patients, we excluded those whose duramater was not penetrated, leaving 52 patients. The average age was 28.7 years, and 80.8% were males. All were surgically intervened, with 8% of general mortality. Mortality in the GCS 3 to 5 points group was 43%, from the 6 to 8 points it was 6%, and no deaths in the 9 to 15 points. In patients with both pupils fixed, anisocoric and isocoric, mortality was 67%, 7%, and 3%, respectively. Bihemispheric, multilobar and unihemispheric trajectory of the bullet plus ventricular compromise was related to a Glasgow Outcome Score <= 3 upon discharge in 90.9% of the cases., CONCLUSIONS: GCS upon admission and state of the pupils are the most influential factors in the prognosis. Patients with a GCS > 8 < 13 points upon admission, normal pupillary response, without ventricular compromise can benefit with early and aggressive surgical treatment.

3471. Martinez-Lage, J. F., et al. (2011). "Depressed skull fracture by a three-pin head holder: a case illustration." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **27**(1): 163-165.

UNLABELLED: BACKGROUND AND CASE REPORT: Many surgical procedures require a rigid immobilization of the patients' head, which is usually achieved by using a pin-type head holder. We briefly illustrate the case of a 4-year-old girl who sustained a depressed skull fracture by penetration of a pin of the head holder. The fracture was noted at the end of the surgery performed for treatment of a cerebellar astrocytoma and was managed conservatively., DISCUSSION: Several factors seem to be involved in the production of this complication as are faulty application of the pins, excessive pin pressure, skull thinning, young patient's age, and pathological conditions that evolve with long-standing raised intracranial pressure. Prevention and management measures are briefly discussed.

3472. Martinez-Lage, J. F., et al. (2001). "Air-gun pellet injuries to the head and neck in children." Pediatric surgery international **17**(8): 657-660.

Air-gun pellet injuries to the head and neck are seldom reported in pediatric practice, although they typically occur in children. The adult skeleton stops these projectiles, but they can easily transverse the thin bones of children. If unnoticed, these apparently trivial injuries may have catastrophic consequences. We report three children who sustained a central nervous system injury resulting from a shot by a compressed-air gun. The true nature and extent of the lesion in two infants was established only by neuroradiological investigations. We also briefly review the management and prevention of this type of injury.

3473. Martinez-Lopez de Arroyabe, B., et al. (2015). "Ventricular assist devices: from bridge to transplantation to bridge to organ donation." Journal of cardiothoracic and vascular anesthesia **29**(3): 738-740.

3474. Martinez-Soba, F., et al. (2019). "Intensive Care to Facilitate Organ Donation: A Report on the Experience of 2 Spanish Centers With a Common Protocol." Transplantation **103**(3): 558-564.

BACKGROUND: The aim of this study is to report the experience with a program of Intensive Care to facilitate Organ Donation (ICOD) in 2 Spanish centers based on a common protocol., METHODS: Retrospective review of clinical charts of patients with a devastating brain injury whose families were approached to discuss the possibility of ICOD once further treatment was deemed futile by the treating team. Study period is from January 1, 2011, to December 31, 2015., RESULTS: ICOD was discussed with families of 131 patients. Mean age of possible donors was 75 years (SD = 11 years). The main cause of brain injury was an intracranial hemorrhage (72%). Interviews with families were held after the decision had been made not to intubate/ventilate in 50% of cases, and after the decision not to continue with invasive ventilation in the remaining cases. Most interviews (66%) took place in the emergency department. The majority of families (95%) consented to ICOD. Of the 125 consented cases, 101 (81%) developed brain death (BD), most in 72 hours or less. Ninety-nine (98%) patients transitioned to actual donation after BD, with 1.2 organs transplanted per donor. Of patients who did not evolve to BD, 4 died after an unexpected cardiac arrest and 18 after the withdrawal of life-sustaining measures. ICOD contributed to 33% of actual donors registered at both centers., CONCLUSIONS: ICOD is well accepted by families. Most patients evolve to BD within a short period of time. The practice substantially contributes to increasing organ donation and offers more patients the chance of donating their organs after death.

3475. Martins, C. B. d. G. and S. M. d. Andrade (2008). "[Accidents with foreign bodies in children under 15 years of age: epidemiological analysis of first aid services, hospitalizations, and deaths]." Acidentes com corpo estranho em menores de 15 anos: analise epidemiologica dos atendimentos em pronto-socorro, internacoes e obitos. **24**(9): 1983-1990.

This study aims to analyze accidents involving foreign bodies among children less than 15 years of age residing in Londrina, Parana State, Brazil, in terms of first aid, hospitalization, and death (2001). Data were obtained from general hospital records and the Municipal Mortality Database. A total of 434 accidents were analyzed, with a 3.7% hospitalization rate and 0.7% mortality. Boys predominated (53.7%), and the incidence rate was highest among children one to three years of age (7.2 per 1,000 children). Foreign body penetration in natural orifices (eyes, nostrils, and ears) accounted for 94%, inhalation/ingestion of food 2.8%, inhalation/ingestion of objects 2.5%, and aspiration of gastric contents 0.7%, and these causes accounted for all the deaths. The results contribute to epidemiological knowledge on such accidents and indicate the need to restructure health services in order to decentralize care for less complex injuries, besides emphasizing the need for preventive measures.

3476. Martins, I. P., et al. (1995). "Atypical dominance for language in developmental dysphasia." Developmental medicine and child neurology **37**(1): 85-90.

The authors report an association between developmental language disorder and acquired aphasia in a 13-year-old right-handed boy. Acquired aphasia was caused by a right-frontal abscess (crossed aphasia). It was non-fluent, with a disorder of auditory comprehension, an unusual feature of prerolandic lesions. This case shows that developmental language impairment can be associated not only with an atypical cerebral dominance, but also with unusual patterns of intrahemispheric specialization. The rapid and complete recovery of this boy's aphasia suggests that the cerebral plasticity for acquired lesions can be normal in such cases.

3477. Martins, R. S., et al. (2003). "Prognostic factors and treatment of penetrating gunshot wounds to the head." Surgical neurology **60**(2): 98-104.

BACKGROUND: In an attempt to evaluate the predictive factors of morbidity and mortality in patients who suffered from civilian gunshot wounds to the head, we reviewed a series of 319 patients admitted to the Hospital Santa Marcelina, Sao Paulo, Brazil, between 1994 and 2000., METHODS: Clinical and cranial computed tomography (CT) results are described. The initial Glasgow Coma Scale (GCS), the presence of an unilateral dilated pupil or medium fixed pupils, and five different findings in the CT scan were considered as variables. The Qui-Square Fisher test was utilized to verify the correlation between the presence of the variables and the occurrence of an increased mortality rate and of an unfavorable outcome (Glasgow Outcome Scale = 2 and 3)., RESULTS: In 265 cases the missile penetrated the dura (83%). In our study there was a significant correlation between the low GCS scores on admission and a higher mortality ($p < 0.001$). This kind of correlation was also noted with patients admitted with unilateral dilated pupil and medium fixed pupil. There were 187 patients (70.5%) evaluated by CT scan. There was a significant correlation between the presence of transventricular or bihemispheric central type trajectory and high mortality. The patients admitted with unilobar supratentorial wounds resulted in better outcome when compared to those with bilobar or multilobar wounds ($p < 0.001$). A group of 156 patients was submitted to an aggressive surgical protocol. The best results were seen in patients admitted with initial GCS score higher than 8., CONCLUSIONS: We conclude that low GCS scores at admission, unilateral dilated pupil or medium fixed pupil, transventricular or bihemispheric central type trajectory, and bilobar or multilobar wounds noted through CT scan are predictive factors of high morbidity and mortality in patients with gunshot wounds to the head, in our clinical experience. We also conclude that surgical treatment is not recommended for patients with penetrating wounds and GCS score of 3 to 5 in the absence of hematoma causing a mass effect.

3478. Martins, W. D. (1988). "[Technical note. Localization of foreign bodies using angular variation in cranial radiography]." Nota tecnica. Localizacao de corpo estranho utilizando variacao de angulacao em radiografias de cranio. **4**(1-2): 25-26.

3479. Martin-Saborido, C., et al. "Indomethacin for intracranial hypertension secondary to severe traumatic brain injury in adults." (11).

Background, Among people who have suffered a traumatic brain injury, increased intracranial pressure continues to be a major cause of early death; it is estimated that about 11 people per 100 with traumatic brain injury die., Indomethacin (also known as indometacin) is a powerful cerebral vasoconstrictor that can reduce intracranial pressure and, ultimately, restore cerebral perfusion and oxygenation. Thus, indomethacin may improve the recovery of a person with traumatic brain injury., Objectives, To assess the effects of indomethacin for adults with severe traumatic brain injury., Search methods, We ran the searches from inception to 23 August 2019. We searched the Cochrane Central Register of Controlled Trials (CENTRAL; 2019, Issue 8) in the Cochrane Library, Ovid MEDLINE, Ovid Embase, CINAHL Plus (EBSCO), four other databases, and clinical trials registries. We also screened reference lists and conference abstracts, and contacted experts in the field., Selection criteria, Our search criteria included randomised controlled trials (RCTs) that compared indomethacin with any control in adults presenting with severe traumatic brain injury associated with elevated intracranial pressure, with no previous decompressive surgery., Data collection and analysis, Two review authors independently decided on the selection of the studies. We followed standard Cochrane methods., Main results, We identified no eligible studies for this review, either completed or ongoing., Authors' conclusions, We found no studies, either completed or ongoing, that assessed the effects of indomethacin in controlling intracranial hypertension secondary to severe traumatic brain injury. Thus, we cannot draw any conclusions about the effects of indomethacin on intracranial pressure, mortality rates, quality of life, disability or adverse effects., This absence of evidence should not be interpreted as evidence of no effect for indomethacin in controlling intracranial hypertension secondary to severe traumatic brain injury. It means that we have not identified eligible research for this review.

3480. Martucciello, G. and R. Tripodi (2012). "A stray bullet in the brain." Lancet (London, England) **379**(9812): e19.

3481. Maruca-Sullivan, P. E., et al. (2016). "Missing the point: self-inflicted traumatic brain injury in psychosis." BMJ case reports **2016**.

A 36-year-old man was brought to the emergency department by emergency medical services after being found acting unusually at a gas station with blood on his head and clothing. He presented acutely psychotic and reported that he had a pen in his head. Medical evaluation was notable for a superficial puncture wound to the right temple, and he was medically cleared for psychiatric evaluation. After he developed nausea and headache later that evening, the CT scan revealed a temporal bone fracture, pneumocephalus, intraparenchymal haemorrhage and the presence of a metal pen tip lodged in the brain parenchyma. The full nature of the injury went undiscovered in the emergency department for 16 hours due to the superficial appearance of the injury and his acute psychosis with prominent delusional thought content and disorganisation. He underwent craniotomy with removal of the pen and subsequent hospitalisation for intravenous antibiotics, followed by a prolonged psychiatric hospitalisation for psychosis. Copyright 2016 BMJ Publishing Group Ltd.

3482. Marut, D., et al. (2020). "Evaluation of prophylactic antibiotics in penetrating brain injuries at an academic level 1 trauma center." Clinical neurology and neurosurgery **193**: 105777.

OBJECTIVE: Infections from penetrating brain injuries (PBI) lead to higher morbidity and mortality rates. The results of this research will be evaluated to develop institutional guideline for antibiotic prophylaxis in this patient population. The objective was to characterize the prophylactic antibiotic usage for patients presenting with PBI., PATIENTS AND METHODS: This retrospective chart review included patients with a PBI identified through the institution's trauma center registry between December 2015 and July 2018. The primary outcome was the proportion of patients that received prophylactic antibiotics. Secondary outcomes included antibiotic administration timing, selection and duration of antibiotic regimens, infection rates and patient outcomes., RESULTS: The study population included 33 patients, with 82 % males and an average age of 32 years. The most common mechanism of injury was a gunshot wound (94 %). Of the 33 patients, 24 (73 %) received at least one dose of prophylactic antibiotics. The median time to antibiotic administration was 52.8min (IQR, 18-120), while the median duration of prophylaxis was 24h (IQR, 7-84). The most common antibiotic regimen was a single cefazolin dose, with the next most common regimen included scheduled ceftriaxone and metronidazole. Overall, there were no documented central nervous system or skin and soft tissue infections during the initial admission, while 4 patients (12 %) were treated for pneumonia. Survivors (67 %) had a median hospital length of stay of 5.8 days., CONCLUSION: The median duration of prophylaxis was shorter than the

current data suggesting antibiotics for 5 days; however, there were no documented central nervous system infections, which is less than previously reported in the literature.

3483. Maruya, J., et al. (2002). "Brain abscess following transorbital penetrating injury due to bamboo fragments--case report." Neurologia medico-chirurgica **42**(3): 143-146.

A 56-year-old female presented with transorbital penetrating injury caused by bamboo fragments, which resulted in brain abscess 2 weeks after the injury. Initial computed tomography (CT) of the head did not reveal the foreign bodies. However, follow-up CT demonstrated a well-defined hyperdense abnormality of 1.0 cm length in the left orbit and brain abscess in the left temporal lobe. The lesion corresponding to the hyperdense abnormality on CT appeared isointense on T1-weighted magnetic resonance (MR) imaging and hypointense on T2-weighted MR imaging. The bamboo fragments were surgically removed, and aspiration and continuous drainage were performed for the brain abscess. The postoperative course was uneventful and the patient was transferred to a local hospital with minor neurological deficits. Bamboo foreign bodies may show changes in properties on CT and MR imaging in the subacute stage. Careful radiological examination and follow-up monitoring are required for the correct diagnosis and treatment of such injuries.

3484. Marvin, E. A., et al. (2020). "Response of Pembrolizumab Alone for Non-small Cell Lung Cancer With Brain Metastasis: A Case Report and Literature Review." Frontiers in Oncology **10**.

Treatment of brain metastases often includes surgical resection, chemotherapeutics and radiotherapy. Given the difficulty in obtaining therapeutic levels of medications within the immune-privileged central nervous system, chemotherapy as a stand-alone treatment modality for brain metastases is an uncommon option. However, there is a growing body of evidence to suggest that immunomodulatory agents can induce a robust immune response in the central nervous system. Here, we describe a 68-year old male who presented with radiographic evidence of new and enlarging lung nodules with mediastinal adenopathy. Lung biopsy was consistent with adenocarcinoma. Immunohistochemical staining demonstrated high expression of programmed cell death protein 1 with a tumor proportion score of 100%. Surveillance magnetic resonance imaging of the brain demonstrated a single enhancing 11 × 7 × 12 mm lesion along the mesial surface of the right frontal lobe. The patient deferred surgical resection as well as stereotactic radiosurgery but agreed to treatment with pembrolizumab. Repeat magnetic resonance imaging at 3-months after initiation of treatment demonstrated complete radiographic resolution of the brain lesion. To our knowledge, this is one of only a few reports in the current literature to document complete resolution of non-small cell lung cancer brain metastasis with pembrolizumab alone. We discuss the emerging literature regarding the efficacy of pembrolizumab in the treatment of brain metastases, central nervous system penetration, and emerging new treatment paradigms involving novel immunotherapy agents.

3485. Marx, R. E. and J. R. Ames (1982). "The use of hyperbaric oxygen therapy in bony reconstruction of the irradiated and tissue-deficient patient." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **40**(7): 412-420.

Eighteen bony reconstructions of the mandible or maxilla using a newly defined and specific hyperbaric oxygen protocol are reported. Eleven of 12 grafts in irradiated tissue met six rigid criteria for a 91.6% rate of success. All six grafts into scarred and deficient tissue beds also met the same criteria, for an overall success rate of 94%. The rationale for emphasizing preoperative tissue preparation using hyperbaric oxygen is discussed, as are the mechanisms of action of hyperbaric oxygen on a biochemical, cellular, and tissue level. Neovascularity and neocellularity are demonstrated histologically by human biopsy specimens, and this is suggested as being the reason for the excellent results of reconstruction in irradiated and/or deficient tissue beds.

3486. Masella, P. C., et al. (2014). "Posttraumatic lingual artery pseudoaneurysm treated with ultrasound-guided percutaneous thrombin injection." Annals of vascular surgery **28**(5): 1317.e1311-1315.

Pseudoaneurysms of the lingual artery are extremely rare and are commonly iatrogenic in nature or less frequently a result of blunt or penetrating trauma. Traditionally, these vascular abnormalities have been repaired with open or endovascular techniques. Although ultrasound-guided percutaneous thrombin injection has become a standard

treatment for superficial pseudoaneurysms, there are no reports of this being used in the treatment of lingual artery pseudoaneurysms. We report the case of a 26-year-old man who suffered a penetrating head and neck injury after an improvised explosive device blast in Iraq who presented with persistent oropharyngeal swelling. Color-flow Doppler ultrasonography revealed the classic yin/yang sign of a pseudoaneurysm, and a computed tomography scan was obtained that revealed a right lingual artery pseudoaneurysm. With the lack of endovascular capabilities and the excessive risk of open surgery, thrombin was injected directly into the pseudoaneurysm under ultrasound guidance. A computed tomography scan and Doppler ultrasonography revealed complete resolution of the aneurysm. This article presents the first reported case in the English literature of a lingual artery aneurysm after penetrating trauma managed successfully with ultrasound-guided percutaneous thrombin injection. Copyright Published by Elsevier Inc.

3487. Mashiyama, S., et al. (2006). "[Stab injury of the brain by kitchen knife]." No shinkei geka. Neurological surgery **34**(5): 497-502.

A 32-year-old male attempted suicide by stabbing his forehead with a kitchen knife, and was sent to our hospital. On admission, he was confused (20-30/JCS), but was able to move his both extremities. Skull X-p, CT scan indicated that the kitchen knife penetrated the frontal bone, reached the cerebrum by way of the frontal sinus. Cerebral angiography was performed, and showed no vascular lesions. Emergent craniotomy was performed and the kitchen knife was removed with minimum movement. Traumatic intracerebral hematoma was removed, and injured frontal sinus, dura mater and frontal bone were repaired. Postoperative course was excellent and he was discharged with the wounds well healded, no neurological deficits on the 17th day after the operation. There are several reported cases of such stab injury. Stab injury of the brain was discussed in the literature.

3488. Masimov, M. O. (2005). "Realization of surgery saving principle in grave gunshot wounds of limbs (war experience in Karabakh region of Azerbaijan Republic)." Azerbaijan Medical Journal(1): 164-170.

Aim of investigation. The goal of the present study concludes in improvement of morphological and functional issues of grave gunshot wounds of the limbs through realization of surgery saving principle (SV) in regard to affected tissues and on the basis of orthopedic and surgical rehabilitation of wounded men. Material & methods. The authors own data of treatment and study of 523 patients with grave fighting pathology of lower (80.3%) and upper limbs: complicated with deep wounds of soft tissues (5.2%), contact explosive cuttings and bashings (23.1%), fractures (71.7%), make basis of the present study. Fractures of "A" type-constitute 13.3%, of "B" type - 40.8%, of "C" type - 45.9%. Different neuro-vascular damages in bone fractures are noticed in 32.6% of cases, being mostly observed in fractures of "B" and "C" type. On the stage of specialized medical care 21.4% of patients were delivered with serious wound inflammation, 32.3% - with "typical" suppuration, while 46.3% - with primary and secondary complications. Results. The elaborated system of surgical rehabilitation, anticipating maximal shortening of stages of medical evacuation, is based on application of improved differentiated surgical tactics, methods of surgical wound treatment, general and local pathogenesis therapy, technology of early reconstructive and recovery (R&R) operations. The system optimizes wound process and allows prevention and cessation of suppurative and necrotic complications and, for this account, to realize in practice the offered concept concerning possibility formation of vital vascular and non-vascular bone, soft tissue, bone-soft tissue autographs from adapted to ischemia present tissue resources that are necessary for S&V therapy of damaged limb. Total lethal issues constituted 4.4%, the reasons of death were mostly grave injuries of brain and internal organs. In contact explosive wounds with limb cutting, the complications were eliminated in all patients; besides, in 78% cases the affected segments and adjoining joints were succeeded to save. In bone fractures amputations were realized in 13.5% cases, being conducted to vitality indications in relation to extremely grave pathology. In the rest wounded men, in spite of presenting relative indications to amputations, in 96.8% cases positive morphological and functional issues are achieved. The results show to an opportunity of realization of surgery SV in grave gunshot trauma of limbs with application of improved orthopedic and surgical rehabilitation of affected men.

3489. Maslinska, D., et al. (2002). "Proinflammatory cytokines in injured rat brain following perinatal asphyxia." Folia neuropathologica **40**(4): 177-182.

In contrast to astrogliosis, which is common to injuries of the adult CNS, in the developing brain this process is minimal. Reasons postulated for this include the relative immaturity of the immune system and the consequent insufficient production of cytokines to evoke astrogliosis. To explore this hypothesis, the study was undertaken to detect

the presence of some proinflammatory cytokines in the injured rat brain following perinatal asphyxia (ischaemia/hypoxia). The localisation of TNF-alpha, IL-15, IL-17 and IL-17 receptors was visualised by means of immunohistochemistry. In numerous neurones of the rat brain, the IL-17 appeared to be constitutively expressed. In the early period of inflammation the IL-15 was produced mainly by the blood cells penetrating the injured brain but later it was synthesised also by reactive astrocytes surrounding brain cysts and forming dense astrogliosis around necrotic brain regions. The direct effect on astrogliosis of other estimated cytokines seems to be negligible. All the results lead to the conclusion that from all cytokines identified in the injured immature rat brain the IL-15 plays the most important role during inflammatory response and participates in the gliosis of reactive astrocytes.

3490. Mason, A. C., et al. (2000). "Occult craniocerebral injuries from dog bites in young children." Annals of plastic surgery **45**(5): 531-534.

Although dog bite injuries to the head and scalp of children occur frequently, penetrating dog bite wounds to the cranial vault occur only occasionally and may go unnoticed on initial examination. Substantial morbidity and mortality can ensue if these penetrating injuries are not detected and treated. The authors detail the evaluation of dog bites of the scalp in young children. They highlight the ease with which puncture wounds of the calvarium may be missed during physical examination as a result of scalp displacement at the time of puncture. The cranial puncture may not be large and may later be covered by scalp that returns to its native position. Well-scrutinized skull films and a careful, methodical physical examination are advocated. Recognized craniocerebral injuries should be explored. Depressed cranial fractures should be irrigated, debrided, and elevated. Dural tears should be repaired. Expedient management is necessary to prevent meningitis and its associated sequelae.

3491. Mason, M. F., et al. (1967). "Four non-lethal head wounds resulting from improper revolver ammunition: report of a case." Journal of forensic sciences **12**(2): 205-213.

3492. Massad, M. and M. S. Slim (1990). "Intravascular missile embolization in childhood: report of a case, literature review, and recommendations for management." Journal of pediatric surgery **25**(12): 1292-1294.

A collective review of 20 cases of missile embolization among children (1961 to 1988) is analyzed, one case added, and guidelines for diagnosis and management are outlined. Causative agents were bullets (14 patients), pellets (5), and fragments (2). Their trajectory was arterioarterial (11), venovenous (5), paradoxical (4), and mixed (1). Diagnosis was suspected when an exit wound was absent and the foreign body was traced on regional x-ray. Embolization was predominantly to the legs, with a tendency for the left (5 of 8 cases). Upper extremity emboli were exclusively to the right. Only one of five cardiac entries required closure to control bleeding compared with four of six aortic. Embolectomy was performed in 16 patients. The overall mortality rate was 9.5%. Factors predicting a favorable outcome are early presentation, diagnosis, and intervention; location of cardiovascular entry and embolus site; and presence of soft tissue tamponade at entry wound. Although embolectomy for cerebral, asymptomatic pulmonary arterial, and silent venous emboli is controversial, universal agreement prevails regarding removal of systemic arterial as well as venous emboli that are potentially problematic.

3493. Massarelli, O., et al. (2014). "Chimeric lateral supramalleolar artery perforator fibula free flap in the reconstruction of composite head and neck defects." Plastic and reconstructive surgery **133**(1): 130-136.

The authors evaluate the use of an osteomyocutaneous fibula free flap, combined in a chimeric fashion, with a lateral supramalleolar flap, in 10 patients with composite head and neck defects. All reconstructions were performed successfully. With the exception of one patient who died after disease recurrence, all patients were decannulated and resumed an oral diet. Speech intelligibility was good in seven of 10 patients. Dental implants were used in two of 10 patients, with a total of 10 fixtures placed successfully. The donor site healed without complications in all except one case, where necrosis of the skin graft occurred with fungal infection. The chimeric lateral supramalleolar artery perforator fibula free flap may be a valid option for maximizing the quality of life in patients with composite oromandibular defects.

3494. Mataro, M., et al. (2001). "Long-term effects of bilateral frontal brain lesion: 60 years after injury with an iron bar." Archives of neurology **58**(7): 1139-1142.

BACKGROUND: Harlow's report of the case of Phineas P. Gage in 1848 was one of the earliest description of the personality and behavioral changes following frontal lobe damage. Since Harlow's articles, a few more case reports of frontal lobe damage have been published. As standard neuropsychological and neurologic evaluations may reveal subtle defects, case reports have been particularly useful in characterizing the behavioral changes that follow frontal lobe damage., OBJECTIVE: To describe the long-term outcome of an 81-year-old patient who sustained a severe frontal brain lesion 60 years ago caused by the passage of an iron spike through his head., RESULTS: The patient has bilateral damage affecting the orbital and dorsolateral frontal regions. He displays many of the typical frontal behavioral disturbances described in the literature. His conduct is characterized by dependence on others, cheerfulness, planning difficulties, problems establishing realistic goals, lack of drive, and difficulties in initiating, continuing, and finishing activities. Although gross cognitive functioning is intact, neuropsychological deficits are present in the executive functioning, memory, and visuoconstructive domains., CONCLUSIONS: In contrast with the antisocial conduct pattern usually associated with frontal damage in the literature, this case suggests that large frontal lesions can produce behavioral and personality changes that are compatible with stable functioning in family, professional, and social settings. In addition to the localization of the lesion, many other factors should be considered in the long-term prognosis of frontal brain injured patients.

3495. Mathe, D., et al. (2015). "A novel SPECT-based approach reveals early effects of systemic inflammation on brain injury and peripheral organs after cerebral ischemia." European Journal of Nuclear Medicine and Molecular Imaging **42**(1): S289.

Introduction. Inflammation that develops in the brain and peripheral organs after stroke contributes profoundly to the outcome of patients. Clinical decision making would highly benefit from rapid assessment of central and peripheral inflammatory changes after acute brain injury, but appropriate medical imaging tools are not available yet. Here we show that singlephoton emission computed tomography combined with MRI (NanoSPECT/CT Plus, nanoScan MRI/SPECT) allows early visualization of blood brain barrier injury and inflammation in the brain after experimental stroke, well before signs of brain injury can be detected with magnetic resonance imaging (MRI).Materials and Methods. Whole-body 99mTc-DTPA SPECT/CT; 99mTc-HMPAO SPECT and MRI imaging was performed in groups of 5 mice with middle cerebral artery occlusion (MCAO) for 30 or 60 minutes. In one group LPS induced systemic inflammation was present before the MCAO to model pre-existing inflammatory diseases. Imaging was done 1, 3, 6 and 24, 72 hours post MCAO and was validated by IgG, CD45 and Iba1 immunofluorescent microscopy and H&E staining in respective brains and peripheral organs. Results. Penetration of 99mTc-DTPA into the brain parenchyma overlaps with areas of brain injury and perfusion deficits after cerebral ischemia. Systemic inflammation preceding experimental stroke leads to very early perfusion deficits and increased blood brain barrier injury (within 2 h) after the onset of ischemia. Acute brain injury also leads to infectious complications in peripheral organs such as the lung. We detected that SPECT imaging reveals early (within 1-3 h) changes in perfusion, barrier function and inflammation in the lungs and the gut of all mice after experimental stroke, with good predictive value for outcome. Discussion. Our results suggest that early inflammatory changes as detected by SPECT/MRI, SPECT/CT whole-body imaging precede injury in the brain and peripheral organs. Thus these hybrid nuclear medicine imaging methods are proposed to support decision making in the clinic.

3496. Mathew, M., et al. (2017). "Midline depressed skull fracture presenting with quadriplegia: A rare phenomenon." Surgical neurology international **8**(1).

Background: Midline depressed skull fractures (MDSFs) deserve a special mention among skull fractures and should always be treated with caution. Here, an extremely unusual clinical presentation of a case of MDSF is highlighted along with its successful surgical management. Case Description: A 26-year-old male presented with quadriplegia following assault on the head with sharp weapons. The patient had multiple lacerated wounds on the scalp with underlying cranial fractures. On evaluation, computerized tomography (CT) of the brain showed a midline depressed skull fracture compressing the superior sagittal sinus (SSS) causing bilateral frontoparietal venous infarction. CT venogram showed a filling defect of the SSS due to the penetrating bone fragment. He underwent elevation of the depressed fracture and repair of the sinus with pericranial graft. Patient improved neurologically, and follow-up magnetic resonance venogram showed a patent SS. Conclusion: MDSF can present with quadriparesis/quadriplegia due

to middle one-third SSS obstruction/thrombosis leading to bilateral motor cortical venous infarction. Such MDSFs may require emergent surgical elevation of the depressed bone fragment for restoration of the patency of the sinus.

3497. Mathew, P., et al. (2013). "Operative treatment of paediatric penetrating head injuries in southern Afghanistan." British journal of neurosurgery **27**(4): 489-496.

The operative management and early post-operative outcome of 16 consecutive cases of paediatric penetrating head injury treated by a single surgeon at a military trauma centre in Southern Afghanistan are retrospectively analysed. The majority of cases of injury were caused by fragments from exploding munitions. The aim of neurosurgical intervention in penetrating head injury is the prevention of wound infection and treatment or prevention of a critical rise in intracranial pressure. In 14 cases in this study, these aims were fulfilled without resort to brain resection, although a delayed cranioplasty procedure was required in 6 patients. Despite the ongoing conflict, families, local communities and coalition forces transport teams combine to make the latter a viable option in Southern Afghanistan, with an excellent short-term outcome.

3498. Mathew, P., et al. (2016). "Safe management of paediatric penetrating head injury without a CT scanner: A strategy for humanitarian surgeons based on experience in southern Afghanistan." Annals of the Royal College of Surgeons of England **98**(3): 198-205.

INTRODUCTION: In many parts of the world, access to a CT scanner remains almost non-existent, and patients with a head injury are managed expectantly, often with poor results. Recent military medical experience in southern Afghanistan using a well-equipped surgical facility with a CT scanner has provided new insights into safe surgical practice in resource-poor environments., METHODS: All cases of children aged under 16 years with penetrating head injury who were treated in a trauma unit in southern Afghanistan by a single neurosurgeon between 2008 and 2010 were reviewed. Based on a previously published retrospective review, a clinical strategy aimed specifically at generalist surgeons is proposed for selecting children who can benefit from surgical intervention in environments with no access to CT scanners., RESULTS: Fourteen patients were reviewed, of whom three had a tangential wound, 10 had a penetrating wound with retained fragments and one had a perforating injury. Two operations for generalist surgeons are described in detail: limited wound excision; and simple decompression of the intra-cranial compartment without brain resection or dural repair., CONCLUSIONS: In resource-poor environments, clinically-based criteria may be used as a safe and appropriate strategy for selecting children who may benefit from relatively straightforward surgery after penetrating brain injury.

3499. Mathews, W. E. (1972). "The early treatment of craniocerebral missile injuries: experience with 92 cases." The Journal of trauma **12**(11): 939-954.

3500. Mathewson, A. J. and M. Berry (1985). "Observations on the astrocyte response to a cerebral stab wound in adult rats." Brain research **327**(1-2): 61-69.

The temporal and spatial distribution of immunocytochemically identified reactive astrocytes is described following a cerebral stab wound in adult rats. Different patterns of reactivity were observed in the cerebral cortex, the corpus callosum and the deep structures of the hemisphere. In the cerebral cortex, the zone of astrocytic reactivity was initially limited to the vicinity of the wound but spread with time to encompass the entire ipsilateral cortex, then regressed; in the deep structures only a spreading phase was observed and this was slower than in the cortex; reactivity in the corpus callosum was slight and always restricted to the immediate vicinity of the lesion. Reactive astrocytes were never observed in the hemisphere contralateral to the lesion. The reorganization of reactive astrocytes in the immediate vicinity of the lesion into a membrana gliae limitans accessoria was also observed. On the basis of these observations, the hypothesis is proposed that astrocytes respond primarily to the mechanical disruption consequent to injury and that the response promotes the restoration of the structural integrity of the lesioned tissue.

3501. Mathisen, G. E. (2006). "Brain abscess: Avoiding diagnostic and management pitfalls." Infections in Medicine **23**(2): 72-81.

Brain abscess does not always present with the classic triad of headache, fever, and neurologic findings. The location of an abscess may provide clues to the underlying source and microbiology. Dental disease may be the source of a "cryptic" brain abscess. For a patient with a brain abscess, obtain a brain MRI scan and review it with a neuroradiologist whenever possible; obtain a neurosurgical consultation as soon as possible when a pyogenic abscess is suspected. For any abscess, start antibiotic therapy immediately if the patient appears septic or shows signs of progressive neurologic deterioration. Use a third-generation cephalosporin plus metronidazole for initial antibiotic coverage of a suspected pyogenic abscess. Patients should be warned about the long-term risk of seizures following a brain abscess.

3502. Mathog, R. H., et al. (1989). "Surgical correction of enophthalmos and diplopia. A report of 38 cases." Archives of otolaryngology--head & neck surgery **115**(2): 169-178.

Enophthalmos, hypophthalmos, and diplopia are complications of orbital injury. This article reviews the causes of these sequelae, describes a method of strategic implantation of bone grafts to the orbit (and malar bone), and reports the long-term (six months to eight years) results in 38 cases. As a result of bone grafting, all but two patients had a correction of the enophthalmos to within 1 to 2 mm of the opposite eye. Of the 20 patients with diplopia, 15 had correction, and an additional four had an improvement of diplopia so it occurred in only one field of gaze. Of the 22 patients with grafts to the malar bone, 16 were thought to have good to excellent results; however, six developed some degree of reabsorption at the graft site. No patients had any decrease in vision. The advantages and disadvantages of the surgical procedure are described and compared with other methods.

3503. Matschke, J., et al. (2002). "[Continued physical capacity after head gunshot injury]." Erhaltene Handlungsfahigkeit nach Kopfschuss. **209**(3-4): 88-94.

The human brain shows a very high density of functionally important structures. Even small lesions may therefore cause clinical symptoms. Penetrating gunshots to the head are presumed to cause immediate incapacitation by subsequent disturbance of cerebral functions. The authors discuss anatomical and functional principles of the terms action, capacity to act and incapacitation and report two illustrative cases with lack of incapacitation following gunshots to the head.

3504. Matsubara, M., et al. (2022). "Day 14 intervention for penetrating brain injury with a good Glasgow Coma Scale score: A case report." Clinical Case Reports **10**(1).

Penetrating brain injury is a rare pathology generally requiring emergency surgical intervention. We discuss a case of penetrating brain injury by the umbrella in which surgical intervention was performed 14 days after the injury, and obtained good clinical results.

3505. Matsuda, S., et al. (2017). "Post-Traumatic Trigeminal Neuropathy Caused by an Orbital Stab Wound." The Journal of craniofacial surgery **28**(1): e28-e30.

Sensory and motor neuropathy of the trigeminal nerve due to trauma is quite rare. Furthermore, there have been no detailed reports on occlusal abnormalities and trismus associated with post-traumatic trigeminal motor neuropathy. Here, the authors report a case of trigeminal motor neuropathy and trigeminal sensory neuropathy in all 3 divisions caused by an orbital stab wound. During kendo practice, a 61-year-old man was injured in his right medial canthus with the splinter of a broken bamboo sword. Imaging examinations did not show a brain injury or orbital bone fracture. Intraoral and extraoral examination and needle electromyography revealed trismus, posterior open bite, and denervation of the right masseter. After the injury, the patient strived to use the right molars during mastication and began chewing exercises in the right molar region. A follow-up examination 7 months after the injury revealed an improvement of the functional problems in the masticatory system. Although slight facial numbness in the right ophthalmic division remained, the patient was satisfied with the present status. Further knowledge concerning the natural history of trigeminal neuropathy as well as the treatment of choice should be explored in the future.

3506. Matsumoto, S., et al. (1998). "Intracranial penetrating injuries via the optic canal." AJNR. American journal of neuroradiology **19**(6): 1163-1165.

Two cases of intracranial penetration of a plastic or wooden chopstick via the optic canal are described. CT scans showed the chopsticks as linear hypodense structures in the suprasellar cistern contiguous with the optic canal. In one case, MR imaging was performed, which clearly depicted the foreign body and adjacent brain structures. Although they are extremely rare, transorbital intracranial penetrating injuries via the optic canal require physicians' awareness.

3507. Matsushima, K., et al. (2017). "Surgical outcomes after trauma pneumonectomy: Revisited." The journal of trauma and acute care surgery **82**(5): 927-932.

BACKGROUND: Trauma pneumonectomy has been historically associated with an exceedingly high morbidity and mortality. The recent advent of standardized reporting and data-collecting measures has facilitated large volume data analysis on predictors and outcomes of trauma pneumonectomy. The purpose of this study is to describe patient characteristics and outcomes of the patients who underwent trauma pneumonectomy in the modern era and identify clinical factors associated with postoperative mortality., METHODS: Data between 2007 and 2014 from the National Trauma Data Bank were used for analysis, which included patients with both blunt and penetrating trauma who underwent pneumonectomy within 24 hours after admission. Patient characteristics, injury data, and outcomes were analyzed. Postoperative survival was estimated using the Kaplan-Meier method. Multivariate logistic regression analysis was performed to identify variables associated with postoperative mortality., RESULTS: A total of 261 patients were included for analysis. Of those, 163 (62.5%) patients sustained penetrating trauma. Less invasive lung resections were performed before pneumonectomy in 12.6% of patients. First 24-hour and in-hospital mortality were significantly higher in blunt trauma patients compared with penetrating trauma patients (54.1% vs. 34.1% and 77.6% vs. 49.1%, respectively; $p < 0.01$). In our multivariate logistic regression analysis, an admission Glasgow Coma Scale of less than 9 (odds ratio [OR], 2.16, 95% CI: 1.24-3.77, $p < 0.01$) and associated brain injury (OR, 2.11, 95% CI: 1.01-4.42, $p = 0.048$) were significantly associated with in-hospital death, whereas penetrating mechanism (OR, 0.36, 95% CI 0.19-0.70, $p < 0.01$) and less invasive lung resections before pneumonectomy (OR, 0.39, 95% CI: 0.17-0.87, $p = 0.02$) were significantly associated with survival to hospital discharge., CONCLUSION: Trauma pneumonectomy remains a highly morbid procedure even in the modern era and should be reserved for carefully selected patients., LEVEL OF EVIDENCE: Prognostic study, level IV.

3508. Matsuyama, T., et al. (2001). "Transorbital penetrating injury by a chopstick--case report." Neurologia medico-chirurgica **41**(7): 345-348.

A one-year-old boy presented with orbitocranial penetrating injury by a chopstick. Neurological examination did not reveal abnormal findings. Skull radiography did not reveal any sign of fracture and there were no abnormal findings. Initially, computed tomography (CT) of the head did not reveal any intracranial lesions. However, bone window CT showed a well-defined low-density abnormality measuring 2.5 cm in length in the right orbit and parasellar region. Magnetic resonance imaging clearly revealed a low-intensity structure extending from the orbit to the prepontine area. Surgical exploration was emergently performed and the wooden fragment was removed. The postoperative course was uneventful. Transorbital penetrating injury by a wooden foreign body is relatively rare. The wound may be superficial and trivial. Major neurological deficit does not usually manifest immediately, so the penetrating injury may be overlooked. If the foreign body is retained in the orbit and cranium, severe infectious complications may occur later.

3509. Matteini, C., et al. (2004). "Surgical timing in orbital fracture treatment: experience with 108 consecutive cases." The Journal of craniofacial surgery **15**(1): 145-150.

Orbital fractures can lead to esthetic deformities and functional impairments, and adequate surgical timing is considered important in obtaining good results from surgery. By means of chart review, a retrospective analysis was carried out in 108 consecutive cases of pure orbital fractures to investigate the differences in surgical timing and the correlations with patient age and clinical and radiographic findings. In this analysis, surgical timing of pure orbital fractures was strongly related to the combination of parameters such as anatomical location of the fracture, eventual exposure of the fracture, cerebrospinal fluid (CSF) leakage or penetrating wounds, age of patients, eventual functional impairments or muscle entrapment, and serious conditions of compression or ischemia. As the data confirmed, an urgent approach was considered indispensable in severe orbital apex fractures and in orbital fractures with CSF leakage,

penetrating objects, or exposure. Early surgery was necessary within 3 days in children with diplopia (type IIIb) and mainly within 7 days in adults with double vision (type IIIa). Delayed surgery, within 12 days in all cases, was performed orbital wall fractures with no impairments (type II) or in orbital rim fractures (type I). Data from this retrospective analysis confirm the need for an aggressive approach to all orbital fractures. In our experience, surgery was performed within 12 days and most orbital fractures were treated during the first week after trauma, which is earlier than previously reported.

3510. Maull, K. I. (1989). "Cranial impalement injury." Journal of the Tennessee Medical Association **82**(9): 481-482.

3511. Mavrogiannis, L. A. and A. O. M. Wilkie (1993). "Enlarged Parietal Foramina
GeneReviews R."

CLINICAL CHARACTERISTICS: Enlarged parietal foramina are characteristic symmetric, paired radiolucencies of the parietal bones, located close to the intersection of the sagittal and lambdoid sutures, caused by deficient ossification around the parietal notch, which is normally obliterated by the fifth month of fetal development. Enlarged parietal foramina are usually asymptomatic. Meningeal, cortical, and vascular malformations of the posterior fossa occasionally accompany the bone defects and may predispose to epilepsy. In a minority of individuals, headaches, vomiting, or intense local pain are sometimes associated with the defects, especially on application of mild pressure to the unprotected cerebral cortex., DIAGNOSIS/TESTING: Typically oval or round, enlarged parietal foramina resemble a "pair of spectacles" on postero-anterior skull radiographs. They may be less apparent on lateral skull radiographs because the lucencies are projected obliquely through normal bone. In young children, the disorder may present as a persistently enlarged posterior fontanelle caused by a single large central parietal bone defect (cranium bifidum). 3D CT scanning using bone windows clearly reveals the defect. MRI is useful in defining associated intracranial anatomic changes. Heterozygous pathogenic variants in either ALX4 or MSX2 are established causes., MANAGEMENT: Treatment of manifestations: Treatment is generally conservative. Persistent cranium bifidum may warrant operative closure. Associated headaches or seizures should be treated appropriately. The risk for penetrating injury to the brain is small but may cause anxiety; education of parents, teachers, and the affected child to avoid risky behaviors that could result in injury suffices in most circumstances. Agents/circumstances to avoid: Contact sports in those with a persistent midline bony defect., GENETIC COUNSELING: Enlarged parietal foramina are inherited in an autosomal dominant manner with high, but not complete, penetrance. Most individuals diagnosed with enlarged parietal foramina have an affected parent. The proportion of cases caused by de novo pathogenic variants appears to be small. Each child of an individual with enlarged parietal foramina has a 50% chance of inheriting the pathogenic variant. Detailed fetal ultrasound examination at 18 to 20 weeks' gestation can usually detect the defects in a fetus at risk; fetal MRI is also an option. When the pathogenic variant has been identified in an affected family member, prenatal diagnosis of a pregnancy at increased risk and preimplantation genetic testing are possible.

3512. Maximova, N., et al. (2020). "Standard treatment–refractory cytomegalovirus encephalitis unmasked by immune reconstitution inflammatory syndrome and successfully treated with virus-specific hyperimmune globulin." Clinical and Translational Immunology **9**(11).

Objectives: Cytomegalovirus (CMV)-related encephalitis is a rare but potentially life-threatening complication of CMV infection in immunocompromised patients. The high mortality rate is associated with deficient immune system reconstitution after hematopoietic stem cell transplant (HSCT) and poor bioavailability of antiviral drugs in cerebrospinal fluid (CSF). CMV-related central nervous system (CNS) infection may occur with aspecific symptoms, without evidence of either blood viral load or magnetic resonance imaging (MRI) signs of encephalitis. Methods: Here, we describe a 10-year-old girl who underwent an allogeneic HSCT and subsequently developed CMV encephalitis. Because of the absence of CMV antigen in the blood, the diagnosis of encephalitis was proposed only after a delay, following the onset of immune reconstitution inflammatory syndrome (IRIS). Two months of combined dual antiviral therapy with ganciclovir and foscarnet proved ineffective against CMV and caused significant bone marrow and renal toxicity. To avoid further toxicity, the girl was given daily treatment with CMV-hyperimmune globulins alone. Results: After three weeks, the CSF viral load dropped significantly and was undetectable within three more weeks. In the meantime, the renal impairment resolved, and there was a complete bone marrow recovery. Conclusion: We suggest that this patient succeeded in

achieving CMV CSF clearance with high dose of CMV-hyperimmune globulin, given alone, because of the ability of immunoglobulins to penetrate the blood–brain barrier (BBB).

3513. Maxwell, A. K., et al. (2022). "Management of the facial nerve following temporal bone ballistic injury." Laryngoscope Investigative Otolaryngology.

Objective: To understand the patterns of temporal bone fracture and facial nerve injury from ballistic trauma. Study Design: Retrospective case series. Methods: Retrospective review of 42 patients evaluated following temporal bone ballistic injury at a single institution, university-based level-one trauma center between 2012 and 2021. Demographics, facial nerve status, CT images, interventions, complications, and outcomes were reviewed. Results: Mean age 30.3 years (range 5–58 years); 79% male. Racial demographics reflected the surrounding community. Seven mortalities occurred. Nineteen patients (54%) demonstrated facial nerve injury. Of those, 13/19 displayed immediate paralysis, 1 delayed, 5 unknown (due to altered mental status). On consultation, House-Brackmann grade 6 paralysis was common (13/19). Fracture was otic capsule-sparing in 17/19 (90%), universally comminuted, with significant disruption along the mastoid tip (16/19), external auditory canal (EAC) (15/19), and periauricular soft tissues (13/19). Nine patients underwent surgical intervention: Transmastoid facial nerve decompression to remove compressive bony spicules (n = 5); eye protection surgery (n = 3); and peripheral facial nerve exploration (n = 1), noting transection at the pes. One required middle cranial fossa and transmastoid repair of cerebrospinal fistulae in setting of severe meningitis. House-Brackmann scores improved in 80% following transmastoid nerve decompression despite CT evidence of likely additional injury in its extratemporal course. Conclusions: Common patterns of temporal bone fracture seen in blunt trauma (longitudinal/transverse, otic capsule-sparing/disrupting) were not found in patients with ballistic facial nerve injury. Rather, injury was commonly apparent in the EAC, mastoid tip, and periauricular soft tissues. Clinicians should have high suspicion for extratemporal facial nerve injury following ballistic trauma.

3514. Maxwell, W. L. and J. McGadey (1988). "Response of intraventricular macrophages after a penetrant cerebral lesion." Journal of anatomy **160**: 145-155.

The response of epiplexus and supraependymal cells to extravasated blood after a penetrant cerebral lesion was investigated. Epiplexus cells respond more actively than supraependymal cells. The epiplexus cells tend to aggregate near areas of extravasation of erythrocytes, this being most marked 6 hours after injury. Epiplexus cells lose their smooth surface appearance, retract their filopodia and adopt a more spherical form, with short microvilli or blebs. Numerous inclusion vesicles develop; some contain disrupted erythrocytes 6-12 hours after injury and these are still present 24-30 hours after injury. By 8-16 days after injury epiplexus cells resume a smooth surface appearance and the number of inclusion vesicles is much reduced. This suggests reversion to a quiescent state, from an earlier active state.

3515. May, D. R. (2011). "Editorial comment." Journal of Trauma - Injury, Infection and Critical Care **71**(3): 778.

3516. May, M. (1985). "Facial reanimation after skull base trauma." The American journal of otology **Suppl**: 62-67.

Three basic types of procedures are used by the author to reanimate the face paralyzed by interruption of the facial nerve at the skull base. In order of choice they are direct nerve repair or grafting; hypoglossal-facial nerve anastomosis; and regional facial reanimation (brow lift, implantation of a gold weight or spring in the eyelid, tightening of the lower eyelid, and temporalis muscle transposition to reanimate the mouth). The indications for and expected results of each approach are presented with special emphasis on the usefulness of regional reanimation.

3517. May, M., et al. (1973). "Mandibular fractures from civilian gunshot wounds: a study of 20 cases." The Laryngoscope **83**(6): 969-973.

3518. Mayfrank, L., et al. (1993). "Bilateral chronic subdural haematomas following traumatic cerebrospinal fluid leakage into the thoracic epidural space." Acta neurochirurgica **120**(1-2): 92-94.

This report describes a patient who developed bilateral chronic subdural haematomas after a stab injury to the thoracic meninges causing prolonged cerebrospinal fluid leakage into the epidural space. Diagnostic findings and therapeutic management are presented and possible pathogenic mechanisms are discussed. This case suggests that patients who have symptoms or signs of increased intracranial pressure after a penetrating spinal injury should be studied for subdural haematoma.

3519. Mayo, G. L., et al. (2002). "Delayed orbital foreign body reaction to dicotyledon (hardwood) libriform fibers." Archives of ophthalmology (Chicago, Ill. : 1960) **120**(12): 1770-1771.

3520. Mayo, W., et al. (2022). "Facial defects reconstruction by titanium mesh bending using 3D printing technology: A report of two cases." Annals of Medicine and Surgery **78**.

Introduction: Facial injuries and deformities have received special attention during the previous decades for their functional, esthetic impairment, surgical challenges related to the location of the intervention, and their relationship to a lower survival rate. Moreover, there have been many surgical reconstructive methods due to the different materials and tools available and thus the final results following the surgical intervention. Case presentation: This study was conducted on two patients with severe war injuries; they both suffered from a significant loss in one or more of the following bones: the zygomatic bone, maxilla, nasal bone, infraorbital rim, and mandible. They were treated using preshaped 3D titanium mesh implants that were made using polylactic acid (PLA) material. The final shape was identified depending on pregenerated multislice 3D modeling using computed tomography (CT) scan. Clinical discussion and conclusion: The patient-specific titanium implants produced using polylactic acid (PLA) have been an important option for reconstructive surgical interventions in facial injuries. It has achieved a better outcome in comparison with manual bent titanium mesh in terms of anatomical symmetry, overall operating time, functional and esthetic impairment. These points helped achieve better care for both civilian and war injuries associated with bone loss.

3521. Mayr, L., et al. (2021). "Response to avapritinib in a pediatric spinal cord H3K27M-mutant glioma patient." Neuro-Oncology **23**(SUPPL 6): vi108.

H3K27M-mutated diffuse midline glioma (H3K27M-DMG) may arise in the pons, thalamus and spinal cord generally having a dismal prognosis. Notably, H3K27M-DMG are driven by oligodendrocyte precursor-like cells which are partly sustained by PDGFRA signaling. Co-mutations including TP53, ACVR1, PDGFRA, KIT and PI3K pathway alterations are present in a subset of cases, and molecular profiling may allow detection of additional targetable alterations. However, small-molecule inhibitors often have limited efficacy associated with low blood-brain-barrier (BBB) penetration. Here, we report on a patient with spinal, leptomeningeal disseminated H3K27M-DMG treated with avapritinib, an orally administered, BBB-penetrant and highly selective KIT and PDGFR inhibitor, provided through a compassionate-use program. Initial therapy consisted of subtotal resection, focal radiotherapy and temozolomide (TMZ) resulting in disease stabilization. Ten months after diagnosis, leptomeningeal metastases were detected, biopsied and treated with local irradiation and TMZ. The patient subsequently received systemic and intrathecal chemotherapy augmented with dasatinib. Molecular analyses of the biopsy revealed the H3F3A and TP53 mutations present in the primary tumor, as well as de novo PDGFRA and KIT amplifications with gene copy numbers of 25 and 21, respectively. Upon further disease progression, therapy with avapritinib was initiated. Assessment of treatment response according to RANO criteria after four months revealed stable disease of the target lesion in the cerebellum and partial response of all non-target lesions. Avapritinib was generally well tolerated with lower limb edema (Grade 2), small intratumoral bleeding (Grade 1) and unrelated hydrocephalus (Grade 3) as reported adverse events. As precaution, treatment was interrupted and re-initiated after one week as the bleeding was stable. A ventriculoperitoneal shunt was implanted resolving the hydrocephalus. Pharmacokinetic analyses revealed up to 65% avapritinib plasma exposure and clinically relevant levels in cerebrospinal fluid. In summary, we report on first effective therapy of treatment-resistant H3K27M-DMG with avapritinib as clinical proof of concept.

3522. Mazieres, J., et al. (2021). "P85.01 Activity of Tepotinib in Brain Metastases (BM): Preclinical and Clinical Data in MET Exon 14 (METex14) Skipping NSCLC." Journal of Thoracic Oncology **16**(3): S668-S669.

Introduction: Approximately 20% of METex14 skipping NSCLC cases involve brain lesions at diagnosis. Tepotinib is an oral, once-daily, highly selective MET inhibitor that has shown clinical activity in MET-driven tumors. We investigated the activity of tepotinib in preclinical models and patients with baseline BM in the Phase II VISION study. Methods: Brain penetration was assessed in Wistar rats (n=3) at tepotinib dose 3.66 mg/kg/h intravenously by determining unbound brain (fu br) and plasma (fu pl) concentrations using liquid chromatography with tandem mass spectrometry. Preclinical efficacy was assessed in two patient-derived xenografts (PDX) obtained from BM harboring high MET amplification (MET copy number gain: 11 for LU5349 and 24 for LU5406). NOD-SCID mice with PDX orthotopically implanted into the brain (n=10/group) were treated with tepotinib 125 mg/kg or vehicle control orally once daily. Intracranial tumor growth was monitored by gadolinium-based MRI. Patients enrolled in VISION Cohort A with METex14 skipping NSCLC and asymptomatic BM (prior brain-specific therapy allowed) received tepotinib 500 mg once daily. Endpoints included systemic response per RECIST v1.1, duration of response (DOR), and progression-free survival (PFS) by independent review committee (IRC). Results: The fraction of unbound tepotinib in rat brain tissue (fu br = 0.4%) was low compared with plasma (fu pl = 4%), indicating high binding in the brain. Upon treatment with tepotinib, both PDX tumors from MET-driven NSCLC BM regressed significantly in orthotopic brain models (mean tumor volume reduction of 63% for LU5406 and 84% for LU5349). VISION Cohort A enrolled 22 patients with baseline BM (identified by IRC or investigator assessment), whose demographic characteristics were similar to the overall population (N=152). As of July 1, 2020, 21 patients with baseline BM had ≥9 months' follow-up and were included in efficacy analyses. Confirmed systemic best overall response was partial response in 11 patients for an ORR (95% confidence interval [CI]) of 52.4% (29.8, 74.3), which was comparable to that in overall population (table). Median DOR (95% CI) was 9.5 months (5.5, not estimable), and median PFS (95% CI) was 9.5 months (5.7, 11.2). Case studies illustrating response of brain lesions in VISION patients will also be presented. [Formula presented] Conclusion: Tepotinib administration resulted in regression of orthotopic BM in preclinical models. Patients in the VISION study with baseline BM had a comparable systemic response to that in the overall population. Tepotinib activity against BM will be further assessed by follow-up brain scans in the confirmatory VISION Cohort C. Keywords: MET exon 14 skipping, Brain metastases, tepotinib

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3523. McCabe, C. J. and R. L. Warren (2005). "Trauma: an annotated bibliography of the recent literature--2004." The American journal of emergency medicine **23**(5): 667-685.

3524. McCabe, C. T., et al. (2021). "Mental and physical health, and long-term quality of life among service members injured on deployment." Health and quality of life outcomes **19**(1): 220.

BACKGROUND: More than 52,000 casualties have been documented in post-9/11 conflicts. Service members with extremity injuries (EIs) or traumatic brain injury (TBI) may be at particular risk for long-term deficits in mental and physical health functioning compared with service members with other injuries., METHODS: The present study combined medical records with patient reports of mental health and health-related quality of life (HRQOL) for 2,537 service members injured in overseas contingency operations who participated in the Wounded Warrior Recovery Project. Combined parallel-serial mediation models were tested to examine the pathways through which injury is related to mental and physical health conditions, and long-term HRQOL., RESULTS: Results revealed that injury was indirectly related to long-term HRQOL via its associations with physical health complications and mental health symptoms. Relative to TBI, EI was associated with a higher likelihood for a postinjury diagnosis for a musculoskeletal condition, which were related to lower levels of later posttraumatic stress disorder (PTSD) symptoms, and higher levels of physical and mental HRQOL. Similarly, EI was related to a lower likelihood for a postinjury PTSD diagnosis, and lower levels of subsequent PTSD symptoms, and therefore higher physical and mental HRQOL relative to those with TBI. Despite this, the prevalence of probable PTSD among those with EI was high (35%). Implications for intervention, rehabilitation, and future research are discussed.

3525. McCandlish, I. A. and E. J. Ormerod (1978). "Brain abscess associated with a penetrating foreign body." The Veterinary record **102**(17): 380-381.

Oropharyngeal foreign bodies are not infrequently encountered in dogs and are usually associated with dysphagia. In this case an oropharyngeal foreign body resulted in nervous signs as a result of penetration of the cranial cavity and the development of a brain abscess.

3526. McCauley, M. B., et al. (2008). "Posterior chamber visian implantable collamer lens: stability and evaluation following traumatic grenade explosion." Journal of refractive surgery (Thorofare, N.J. : 1995) **24**(6): 648-651.

3527. McCollum, N. and S. Guse (2021). "Neck Trauma: Cervical Spine, Seatbelt Sign, and Penetrating Palate Injuries." Emergency medicine clinics of North America **39**(3): 573-588.

Pediatric cervical spine, blunt cerebrovascular, and penetrating palate injuries are rare but potentially life-threatening injuries that demand immediate stabilization and treatment. Balancing the risk of a missed injury with radiation exposure and the need for sedation is critical in evaluating children for these injuries. Unfortunately, effective clinical decision tools used in adult trauma cannot be uniformly applied to children. Careful risk stratification based on history, mechanism and examination is imperative to evaluate these injuries judiciously in the pediatric population. This article presents a review of the most up-to-date literature on pediatric neck trauma.

3528. McCoy, E. and H. Sontheimer (2010). "MAPK induces AQP1 expression in astrocytes following injury." Glia **58**(2): 209-217.

Aquaporin-4 (AQP4) is the principle water channel and the primary route for water transport across astrocytic membranes. AQP4 co-localizes with Kir4.1 channels at astrocytic endfeet, and it has been suggested that these channels cooperate in K(+) and water homeostasis. In response to injury, two additional aquaporins, AQP1 and AQP9, can be detected in astrocytes, yet neither is found in cultured astrocytes, and therefore their contribution to astrocyte water uptake and biology is poorly investigated. In this study, we used a cortical stab wound assay to demonstrate an upregulation of AQP1 following injury in reactive glia. We were able to mimic such injury in astrocytic cultures and show that AQP1 expression is induced within 16 h following injury in vitro. This induction could be blocked by inhibition of MEK1/2 using U0126, and suggests that AQP1 is specifically induced in reactive astrocytes via the mitogen-activated protein kinases signaling pathway.

3529. McCutcheon, V., et al. (2014). "Development and validation of two zebrafish models of TBI." Journal of neurotrauma **31**(5): A49.

Traumatic brain injury (TBI) is a leading cause of death and morbidity in industrialized countries with considerable associated direct and indirect health care costs. Zebrafish (ZF) are an emerging model organism for studies of disease and development owing to their unique advantages in genome manipulation, whole animal in vivo imaging, rapid rate of procreation and amenability to large scale preclinical drug validation. We developed a ZF model of chemically-induced brain injury in 4 dpf larvae using a 10mM dose of glutamate. The NMDA receptor antagonist, MK-801, applied at of 62.5 nM, 125 nM, and 250nM concentrations resulted in a dose-dependent delayed larval survival.We are currently evaluating other known neuroprotective compounds as validation of the larvae ZF model. Candidate compounds will be further evaluated in an adult ZF model.We use a targeted 1-MHz pulsed high intensity focused ultrasound (pHIFU) system applied to adult ZF to produce a non-penetrating head injury to the brain. Preliminary results indicate that pHIFU pressure amplitude at 10MPa results in a 70.5 ± 1%and 102 ± 1%change in NF160 expression at 5,000 and 10,000 cycles respectively. Beta-III tubulin shows a 14 ± 1%and 16 ± 1%increase at the same parameters.We also found a 30 ± 1%increase in cleaved caspase-3 in injured brains compared to controls. Post-injury recovery times show a linear increase with increasing injury severity. Our preliminary results indicate that the ZF response to brain trauma exhibits similar mechanisms of secondary injury to mammalian pathophysiology after TBI. Further refinement of the model is in progresswith the aim to use themodel to identify pharmacotherapeutic compounds via high throughput compound library drug screening.

3530. McCutcheon, V., et al. (2014). "Development and validation of two zebrafish models of TBI." Journal of neurotrauma **31**(12): A120.

Traumatic brain injury (TBI) is a leading cause of death and morbidity in industrialized countries with considerable associated direct and indirect healthcare costs. The cost and time associated with preclinical development of TBI therapeutics is lengthy and expensive. The Zebrafish (ZF) is an emerging model organism for studies of disease and

development owing to its similarity in genome and cell signalling pathways in mammalian species, ease of genome manipulation, capacity for whole animal in vivo imaging, rapid rate of procreation, and amenability to large scale automated preclinical drug validation. We have developed a two-stage model of TBI in ZF using larvae and adult fish. In larval ZF, we developed a highthroughput method of screening therapeutic compounds in a chemically-induced brain injury model. As proof-of-concept, we demonstrate dose-dependent larval survival with known neuroprotective compounds (eg. MK-801). We are currently validating other known neuroprotective compounds in the larvae ZF model. Compound libraries of FDA-approved drugs are currently being screened for repurposing in our larval model. Candidate compounds will be further evaluated in an adult ZF model. We use a targeted 1-MHz pulsed high intensity focused ultrasound (pHIFU) system applied to adult ZF to produce a non-penetrating injury to the brain. Preliminary results indicate that pHIFU pressure amplitude at 10MPa results in a 70.5 ± 1% and 102 ± 1% change in NF160 expression at 5,000 and 10,000 cycles respectively. b-III tubulin shows a 14 ± 1% and 16 ± 1% increase at the same parameters. We also found a 30 ± 1% increase in cleaved caspase-3 expression in injured brains compared to controls. The adult ZF injury model allows whole animal behaviour outcome measures such as post-injury recovery times which demonstrate a dose dependent effect with increasing injury severity. Adult ZF subject to pHIFU also show locomotor swim deficits at 24 h post injury. Our preliminary results indicate that the ZF exhibits similar responses to injury and pharmacotherapeutic manipulation as found in mammalian pathophysiology after TBI. This suggests the possibility of using a two-step ZF injury model system to screen compound libraries to quickly identify potential therapeutic candidates at a fraction of the time and cost of studies in mammalian species.

3531. McDonald, L. (1978). "Determination of brain death via pulsatile echoencephalography." Journal of neurosurgical nursing **10**(4): 150-155.

For cerebral death to occur there must be many levels of cerebral function destroyed. Cortical and subcortical irreversible damage is evident by unresponsiveness to any stimuli. Brain stem and basal ganglia damage is indicated by absence of spontaneous respirations, cephalic reflexes, and thus cerebral circulation. All elements of the criteria for cerebral death must be met. The decision should be made by the attending physician in consultation with his peers. The life support mechanisms should be discontinued after the diagnosis of cerebral death has been made. Absence of pulsatile echoes means absence of cerebral circulation and cerebral function, or a definitive diagnosis of cerebral death. It is a final parameter in the criteria and allows definite measures to be taken. But it behooves one to remember that this phenomenon of cerebral death makes organ donation and transplantation possible. It has not been created in order to supply the needs for organ transplant!

3532. McDonald, V., et al. (2017). "Networks underlying trait impulsivity: Evidence from voxel-based lesion-symptom mapping." Human brain mapping **38**(2): 656-665.

Impulsivity is considered a multidimensional construct that encompasses a range of behaviors, including poor impulse control, premature decision-making, and the inability to delay gratification. In order to determine the extent to which impulsivity and its components share a common network, a voxel-based lesion-symptom mapping (VLSM) analysis was performed in a large sample of patients (N = 131) with focal, penetrating traumatic brain injuries (pTBI). Impulsivity was assessed using the Barratt Impulsiveness Scale (BIS-11), a standard self-report measure that allows for unique estimates of global impulsivity and its factor analysis-derived components (e.g., "motor impulsivity"). Heightened global impulsivity was associated with damage to multiple areas in bilateral prefrontal cortex (PFC), left superior, middle and inferior temporal gyrus, and left hippocampus. Moreover, a cluster was identified within the left PFC associated specifically with motor impulsivity (defined as "acting without thinking"). The results were consistent with the existing literature on bilateral prefrontal cortical involvement in behavioral impulsivity, but also provided new evidence for a more complex neuroanatomical representation of this construct, characterized by left-lateralized temporal and hippocampal involvement, as well as a left-lateralized prefrontal network specifically associated with motor impulsivity. Hum Brain Mapp 38:656-665, 2017.

3533. McFadden, J. T. (1970). "Stereotactic localization of cerebral foreign bodies." Virginia medical monthly **97**(6): 336-339.

3534. McFadden, J. T. and C. E. Horton (1971). "Stereotaxic localization of extracranial foreign bodies in the head." The American surgeon **37**(6): 353-356.

3535. McGaha, P., 2nd, et al. (2020). "Factors that predict the need for early surgeon presence in the setting of pediatric trauma." Journal of pediatric surgery **55**(4): 698-701.

INTRODUCTION: Evidence based variables predicting the need for surgeon presence (NSP) on arrival of an injured child are limited. We sought to identify prehospital factors that best correlate with NSP and highest level of activation in pediatric trauma. A secondary analysis was also performed to determine whether injury severity score (ISS) was predictive of NSP in pediatric trauma., METHODS: This was a retrospective, single institution study of injured patients age<=16years delivered from scene to our Pediatric Level I trauma center between January 2016 and June 2017. 526 patients had complete data available for analysis. NSP was previously described as the presence of any of these factors: intubation, transfusion, emergent operation with the trauma team/craniotomy with the neurosurgery team, vasopressors, interventional radiology, spinal cord Injury, chest tube, emergency department thoracotomy, intracranial pressure monitor, pericardiocentesis, or death in the trauma bay. Multivariable analysis was performed with covariates of interest including scene and ED arrival vitals and interventions., RESULTS: Independent predictors of NSP and highest level of activation were GCS of <=12 (OR 22.3), penetrating trauma (OR 5.4), and hypotension (age adjusted) (OR 10.2). We also found that ISS>=16 was a poor indicator of NSP with a sensitivity of only 61%., CONCLUSION: A validated model based on these variables may be useful in predicting NSP and highest level of activation prior to arrival of pediatric trauma patients. NSP may augment assessment of over and undertriage in pediatric trauma patients as compared to the ISS/Cribari system alone. Level of evidence Level III, retrospective cohort study.

3536. McGee, W. T. and P. Mailloux (2011). "Ventilator autocycling and delayed recognition of brain death." Neurocritical care **14**(2): 267-271.

BACKGROUND: Improvements in technology play an important role in caring for critically ill patients. One example is the advance in ventilator design to facilitate triggering of mechanical breaths. Minimal changes in circuit flow unrelated to respiratory effort can trigger a ventilator breath and may mislead caregivers in recognizing brain death., METHODS: We observed patients with devastating brain injuries in a mixed medical/surgical intensive care unit (ICU) with a high clinical suspicion for brain death including the absence of cranial nerve function with apparent spontaneous breathing during patient-triggered modes of mechanical ventilation. Further clinical observation for spontaneous respirations was assessed upon removal of ventilatory support., RESULTS: Nine patients with brain injury due to multiple etiologies were identified and demonstrated no spontaneous respirations when formally assessed for apnea. Length of time between brain death and its recognition could not be determined., CONCLUSION: When brain-dead patients who are suitable organ donors are mistakenly identified as having cerebral activity, the diagnosis of brain death is delayed. This delay impacts resource utilization, impedes recovery and function of organs for donation, and adversely affects donor families, potential recipients of organs, and patient donors who may have testing and treatment that cannot be beneficial. Patients with catastrophic brain injury and absent cranial nerve function should undergo immediate formal apnea testing.

3537. McGonigal, L. J., et al. (1995). "Posttraumatic meningioma: explanation of an epidemiologic dichotomy." Military medicine **160**(2): 92-94.

A 23-year-old soldier sustained a penetrating gunshot wound to the right frontoparietal region of the head in 1971 while serving in Vietnam. In 1984, he developed headaches and seizures, and a meningioma was found at the cranioplasty site. Recurrent meningiomas, requiring resection, developed at this site in 1988 and 1990. In 1994, he developed right proptosis. An extensive mass involving the right intraorbital region and the anterior and middle cranial fossa was found. Pathological examination of this tumor demonstrated malignant meningioma. Although antecedent head trauma has been implicated as a risk factor for meningioma, epidemiological studies of this association have yielded divergent conclusions. An explanation for this epidemiologic dichotomy is suggested.

3538. McGuinness, M. J., et al. (2021). "Nail gun injuries: not just an occupational hazard." The New Zealand medical journal **134**(1540): 56-63.

INTRODUCTION: Nail guns are commonly used in the construction industry. They represent an occupational hazard, and in the context of mental illness can pose a threat to life., AIM: To determine the number of patients admitted to Auckland City Hospital (ACH) with a nail gun injury, and to review the current New Zealand legislation surrounding nail guns., METHODS: A 25-year retrospective review of patients admitted to ACH with a nail gun injury was performed by searching the ACH Trauma Registry. New Zealand legislation was reviewed., RESULTS: Between 1994 and 2019, 45 patients were admitted to ACH with a nail gun injury. Two subgroups were identified: 31% with an intentional injury; 69% with an unintentional injury. All patients were male. The mean age was 36.3. Patients with an intentional injury had a higher mortality rate (21.4% vs 9.5%), Injury Severity Scores (24.2 vs 3.4) and ICU admission rate (50% vs 3%) and required more intensive post-injury care when compared to unintentional injuries. There is currently no legislation in New Zealand specifically governing the use of nail guns. Only powder-actuated nail guns require certification., CONCLUSION: The continued occurrence of unintentional nail gun injuries and the high lethality of intentional injuries represent two distinct areas of concern. The Government should publish guidance aimed at improving safety and reducing the rate of intentional injury.

3539. McGuire, A. (1986). "Issues in the prevention of neurotrauma." The Nursing clinics of North America **21**(4): 549-554.

Over one half of all neurotrauma occurs in or by motor vehicles. The other causes of neurotrauma are falls, violent assaults, sports and recreation, and firearms. The victims who survive are left with paralysis, disfigurement, loss of sight and hearing, seizures, epilepsy, psychiatric disorders, amnesia--in short, significant and often permanent impairment. To permanently prevent this annual human destruction, the prevention agenda should include advocating for air bags in all cars, helmet use for all motorcyclists, the elimination of handguns, and the regionalization of all trauma care. After this is accomplished, we can continue working on preventing other neurotrauma problems.

3540. McGuone, D., et al. (2017). "Penetrating gunshot head injuries with prolonged survival: A potential risk factor for chronic traumatic encephalopathy." Journal of neurotrauma **34**(13): A21.

Post-traumatic neurodegeneration in the form of chronic traumatic encephalopathy (CTE) is associated with a history of traumatic brain injury in susceptible individuals, although the types and number of insults required to initiate neurodegeneration remain incompletely defined. Penetrating gunshot head trauma has not previously been considered a risk factor for neurodegeneration despite being a major cause of traumatic brain injury in many urban centers in the United States. Penetrating gunshot head wounds do not perforate the head and kinetic energy possessed by the projectile is entirely absorbed by the head (including brain). We hypothesized that in penetrating gunshot head wounds with a survival interval, the crushing and stretch injury of brain tissue by the bullet and the contusion of cortical surfaces from rapid, brief expansion of skull contents, might act as substrates for aggregation of hyperphosphorylated tau. In New York City, gunshot lethalities are investigated by the Office of the Chief Medical Examiner (OCME). Over a 6-month period we prospectively examined brains of all gunshot head wounds referred to the forensic neuropathology consultation service at the NYC OCME. Of these, 4 had retained bullet(s) or fragments, and a survival period after injury; these underwent full neurodegenerative disease workup including Bielschowsky silver preparation and immunohistochemistry for tau, beta-amyloid, alpha-synuclein and ubiquitin. All 4 cases were male. Age range at injury was 14 to 29 years and at death was 19 to 50 years. Survival periods ranged from 1 month to 30 years. All victims had neurologic deficits following injury and two had post-traumatic seizure disorder. Neuropathologic evaluation revealed tau deposition in 2: one with rare threads in the bank of the middle frontal gyrus (survival, 1 month), the other with rare threads around cortical vessels in the wound cavity and rare tangles in the locus ceruleus and thalamus (survival, 30 years). No other abnormal protein expression was detected. Detection of tau at autopsy suggests penetrating gunshot trauma represents an independent risk factor for CTE among injured survivors.

3541. McHugh, D., et al. (1987). "Clostridium perfringens brain infection following a penetration wound of the orbit." Journal of neurology, neurosurgery, and psychiatry **50**(2): 241.

3542. McIlwaine, G. G., et al. (1989). "Spontaneous recovery of vision following an orbital haemorrhage." The British journal of ophthalmology **73**(11): 926-927.

A 73-year-old man presented to casualty with a penetrating orbital injury and total loss of vision in the affected eye. He subsequently spontaneously recovered full vision. We stress the need for frequent assessment of vision before considering potentially hazardous surgical intervention.

3543. McKee, A. C. (2013). "Interneuronal spreading of tau pathology in chronic traumatic encephalopathy." Prion **7**: 9.

Chronic traumatic encephalopathy (CTE) is a progressive tauopathy that occurs as a consequence of repetitive mild traumatic brain injury.1 In the earliest stages of CTE, focal perivascular clusters of hyperphosphorylated tau (p-tau) neurofibrillary tangles are found at the depths of the sulci in the cerebral cortex. Even in the absence of additional trauma, CTE appears to progress over decades to become a severe tauopathy affecting widespread regions of the cerebral cortex, basal ganglia, diencephalon and brainstem and medial temporal lobes. How focal tau pathology spreads slowly to involve other brain regions in CTE might involve multiple mechanisms, including a prion-like templated misfolding of tau. Under normal conditions in the mature human central nervous system, tau is primarily associated with microtubules in axons, where it is neither toxic nor associated with neurofibrillary pathology. Brain trauma causes some tau to become dissociated from microtubules in axons via mechanisms that probably include intracellular calcium influx, glutamate receptor-mediated excitotoxicity, and kinase activation mediating hyperphosphorylation of intracellular tau. Tau dissociated from microtubules becomes abnormally phosphorylated, misfolded, aggregated and proteolytically cleaved by calpains and caspases, all of which are associated with neurotoxicity. Direct and indirect evidence for interneuronal tau transfer in animal models has recently suggested that interneuronal spreading of tau pathology may be due to transfer of toxic tau species between neurons.2-5 This might be mediated by either a prionlike templated misfolding of tau, or by calcium dysregulatory effects of oligomeric or toxic N-terminal tau in the receiving neuron.6 While spreading of tau pathology is generally thought to occur in association with neuronal synapses, glial to glial spread, periventricular and diffuse extracellular tau migration patterns involving the cerebrospinal fluid represent additional pathways by which lesion spreading could occur in CTE.7 Cerebrospinal fluid enters the brain parenchyma along the Virchow-Robin spaces surrounding penetrating arteries and brain interstitial fluid is cleared along paravenous drainage pathways. Recent studies have demonstrated that Aß peptide is cleared through this route.8 Clearance through paravenous flow and the cerebrospinal fluid might also regulate extracellular levels of p-tau and explain the frequent perivascular, subpial and periventricular localization of tau protein in CTE. Interneuronal spreading of tau pathology in CTE is complex and likely involves a variety of non-synaptic mechanisms as well as synaptically mediated mechanisms.

3544. McKee, D. M. (1978). "Microvascular bone transplatation." Clinics in plastic surgery **5**(2): 283-292.

A technique has been presented for the transplantation of bone with its own vascular system. Microvascular techniques have been developed to the point that this procedure is feasible in both the laboratory animal and in humans. Using this technique or the fibula transplantation technique of Taylor and colleagues, it should be possible to reconstruct many bone dificits that are refractory to free bone grafting.

3545. McKee, J. L., et al. (2019). "The iTClamp in the treatment of prehospital craniomaxillofacial injury: a case series study." Journal of injury & violence research **11**(1): 29-34.

BACKGROUND: Craniomaxillofacial (CMF) injuries are very common in both civilian and military settings. Nearly half of all civilian trauma incidents include a scalp laceration and historical rates of CMF battle injuries increased from 16%-21% to 42.2%. The scalp is highly vascular tissue and uncontrolled bleeding can lead to hypotension, shock and death. Therefore, enabling on-scene providers, both military and civilian, to immediately manage scalp and face lacerations, in a manner that allows them to still function in a tactical way, offers operational advantages. This case series examines how effectively a wound-clamp (iTClamp) controlled bleeding from CMF injuries pre-hospital environment., METHODS: The use of the iTClamp for CMF (scalp and face laceration) was extracted from iTrauma Care's post market surveillance database. Data was reviewed and a descriptive analysis was applied., RESULTS: 216 civilian cases of iTClamp use were reported to iTrauma Care. Of the 216 cases, 37% (n=80) were for control of CMF hemorrhage (94% scalp and 6% face). Falls (n=24) and MVC (n=25) accounted for 61% of the mechanism of injury. Blunt accounted for 66% (n=53), penetrating 16% (n=13) and unknown 18% (n=14). Adequate hemorrhage control was reported in 87.5%

(n=70) of cases, three respondents reported inadequate hemorrhage control and in seven cases hemorrhage control was not reported. Direct pressure and packing was abandoned in favor of the iTClamp in 27.5% (n=22) of cases., CONCLUSIONS: CMF injuries are common in both civilian and military settings. Current options like direct manual pressure (DMP) often do not work well, are formidable to maintain on long transports and Raney clips are a historical suggestion. The iTClamp offers a new option for control of external hemorrhage from open wounds within compressible zones.

3546. McKendy, K. M., et al. (2017). "Epidural analgesia for traumatic rib fractures is associated with worse outcomes: a matched analysis." The Journal of surgical research **214**: 117-123.

BACKGROUND: The optimal method of pain control for patients with traumatic rib fractures is unknown. The aim of this study was to determine the effect of epidural analgesia on respiratory complications and in-hospital mortality in patients with rib fractures., METHODS: Adult patients at a level I trauma center with >=1 rib fracture from blunt trauma were included (2004-2013). Those with a blunt-penetrating mechanism, traumatic brain injury, or underwent a laparotomy or thoracotomy were excluded. Patients who were treated with epidural analgesia (EPI) were compared with those were not treated with epidural analgesia (NEPI) using coarsened exact matching. Primary outcomes were respiratory complications (pneumonia, deep vein thrombosis/pulmonary embolus, and respiratory failure) and 30-d in-hospital mortality. Secondary outcomes were total hospital and intensive care unit length of stay, and duration of ventilator support., RESULTS: About 1360 patients (EPI: 329 and NEPI: 1031) met inclusion criteria (mean age: 54.2 y; standard deviation [SD]: 19.7; 68% male). The mean number of rib fractures was 4.8 (SD: 3.3; 21% bilateral) with a high total burden of injury (mean Injury Severity Score: 19.9 [SD: 8.9]). The overall incidence of respiratory complications was 13% and mortality was 4%. After matching, 204 EPI patients were compared with 204 NEPI patients, with no differences in baseline characteristics. EPI patients experienced more respiratory complications (19% versus 10%, P = 0.009), but no differences in 30-d mortality (5% versus 2%, P = 0.159), duration of mechanical ventilation (EPI: 148 h [SD: 167] versus NEPI: 117 h [SD: 187], P = 0.434), or duration of intensive care unit length of stay (6.5 d [SD: 7.6] versus 5.8 d [SD: 9.1], P = 0.626). Hospital stay was higher in the EPI group (16.6 d [SD: 19.6] vs 12.7 d [SD: 15.2], P = 0.026)., CONCLUSIONS: Epidural analgesia is associated with increased respiratory complications without providing mortality benefit after traumatic rib fractures. Alternate analgesic strategies should be investigated to treat these severely injured patients.

3547. McKennan, K. X. and R. A. Chole (1992). "Facial paralysis in temporal bone trauma." The American journal of otology **13**(2): 167-172.

A retrospective review of 36 patients with delayed-onset (19 patients) and immediate-onset (17 patients) traumatic facial paralysis was performed. We hypothesized that traumatic delayed-onset facial paralysis does not necessitate surgical decompression under any routine circumstances. Of 19 patients in this group, normal recovery (House grade 1) occurred in 94 percent of the patients without surgical intervention. The small percentage (6%) of these patients who failed to recover completely demonstrated mild degrees of weakness and synkinesis (House grade 2). Immediate-onset paralysis occurred in 17 patients. It has a much poorer prognosis. Seven patients with penetrating wounds had facial nerve transections, usually of the vertical portion of the facial nerve. Closed head injured patients with immediate-onset facial paralysis sustained injuries usually to the horizontal and perigeniculate portion of the facial nerve. For those cases in which surgical exploration of the traumatized facial nerve is indicated, the operating surgeon should have the capacity to enlarge the exposure with a translabyrinthine or middle-fossa dissection.

3548. McKenzie, J., et al. (2019). "Imaging characteristics and treatment of a penetrating brain injury caused by an oropharyngeal foreign body in a dog." Veterinary radiology & ultrasound : the official journal of the American College of Veterinary Radiology and the International Veterinary Radiology Association **60**(3): E24-E28.

A 4-year-old Border collie was presented with one episode of collapse, altered mentation, and a suspected pharyngeal stick injury. Magnetic resonance imaging (MRI) and computed tomography showed a linear foreign body penetrating the right oropharynx, through the foramen ovale and the brain parenchyma. The foreign body was surgically removed and medical treatment initiated. Complete resolution of clinical signs was noted at recheck 8 weeks later. Repeat MRI showed chronic secondary changes in the brain parenchyma. To the authors' knowledge, this is the first

report of the advanced imaging findings and successful treatment of a penetrating oropharyngeal intracranial foreign body in a dog. Copyright © 2017 American College of Veterinary Radiology.

3549. McKeon, A. B., et al. (2019). "Traumatic brain injury and sleep disturbances in combat-exposed service members and veterans: Where to go next?" NeuroRehabilitation **45**(2): 163-185.

OBJECTIVE: To synthesize the current evidence on sleep disturbances in military service members (SMs) and veterans with traumatic brain injury (TBI)., METHODS: An electronic literature search first identified abstracts published from 2008-2018 inclusively referencing sleep, TBI, and military personnel from Operation Enduring Freedom, Operation Iraqi Freedom, Operation New Dawn, and Persian Gulf veterans. Selection criteria eliminated studies on non-combat TBI, open or penetrating injuries, and articles where the relationship between sleep and TBI was not directly examined. Articles on all military branches and components, those currently serving and veterans-ranging from medical chart reviews to clinical trials, were included. Forty-one articles were selected for full text-review., RESULTS: Twenty-four papers estimated the prevalence of sleep disturbances in TBI. Eight studies demonstrated the contribution of common co-occurring conditions, most notably posttraumatic stress disorder, to the relationship between disrupted sleep and TBI. Ten studies differentiated sleep profiles between military SMs and veterans with and without acute TBI and detected significant differences in sleep disturbances across the course of injury. Longitudinal studies were scarce but helped to establish the temporal relationship between sleep disturbances and TBI and isolate sleep-related mechanisms influencing TBI prognosis. Only three studies reported on interventions for improving sleep quality and TBI symptoms. Systematic research testing assessments and interventions that target sleep disturbances for improving sleep, TBI symptoms, and long-term functional outcomes were identified as critical knowledge gaps., CONCLUSION: Findings unequivocally establish that sleep disturbances are highly prevalent in SMs and veterans with TBI. However, studies testing the effectiveness of treatments for improving sleep in military groups with TBI have been limited and their results inconsistent. This review highlights a critical opportunity for advancing military medicine through future research aimed at identifying and testing sleep-focused treatments in SMs and veterans with combat-related TBI.

3550. McKinlay, J. and J. E. Smith (2013). "Penetrating brain injury: a case of survival following blast fragmentation injuries to the head." Journal of the Royal Naval Medical Service **99**(2): 55-56.

We present a case of penetrating head injuries caused by blast fragmentation, along with other serious injuries (including to the arms, face and neck), where a good recovery was made despite an Injury Severity Score (ISS) of 75. We suggest that survival and outcome are reliant on several factors and cannot be predicted from ISS, velocity of penetrating injury or presenting Glasgow Coma Scale (GCS) alone.

3551. McKinley, W. O., et al. (1999). "Clinical presentations, medical complications, and functional outcomes of individuals with gunshot wound-induced spinal cord injury." American journal of physical medicine & rehabilitation **78**(2): 102-107.

Gunshot wounds are currently the second leading cause of spinal cord injury in the United States, and coexisting injuries or complications accompanying penetrating wounds often increase patient morbidity. A review of 217 traumatic spinal cord injury rehabilitation admissions to a tertiary care hospital during a 5-yr period revealed 49 individuals (23%) with gunshot wound-induced spinal cord injury. A single bullet entry site was seen in 54%, whereas 17% had greater than 3 sites of entry. Common (>25%) sites of bullet entry included the back, abdomen, neck, and chest. Common gunshot wound-related medical complications included pain (54%), infections (40%), pneumothorax (24%), nonspinal fractures (22%), colonic perforation (17%), cerebrospinal fluid leak (10%), and retroperitoneal hematoma (10%). When compared with nonviolence-related traumatic spinal cord injury (motor vehicle accidents and falls), patients with gunshot wound-induced spinal cord injury were significantly more frequently ($P < 0.01$) younger, non-Caucasian, unmarried, and unemployed. Injury characteristics revealed significantly ($P < 0.01$) more paraplegia and complete spinal cord injury within the gunshot wound-induced spinal cord injury group. Gunshot wound-induced spinal cord injury and nonviolent traumatic spinal cord injury groups had similar lengths of stay, Functional Independence Measure scores, and discharge to home rates. This article adds to the growing body of literature examining clinical, medical, and functional outcome characteristics of individuals with spinal cord injury secondary to violence-related cause.

3552. McKinney, R. A. (2017). "Maxillofacial gunshot wound & delayed psuedoaneurysm: Recognition & endovascular intervention." Journal of oral and maxillofacial surgery **75**(10): e409.

Introduction: Pseudoaneurysms of the extracranial head and neck vasculature are rarely encountered. However, they bring significant risks when present. There is an adequate buffer of soft tissue in the maxillofacial region reducing the incidence. Most trauma to the external carotid artery and its branches will predominately cause complete transection rather than partial laceration. The process of a pseudoaneurysm formation is a partial vessel wall breach resulting in leakage of arterial blood into surrounding tissues. Tamponade with partial clot formation will follow. Some pseudoaneurysms self-resolve, however others require treatment to prevent uncontrolled hemorrhage. The most vulnerable of the External Carotid Artery branches are the superficial temporal, internal maxillary, and facial arteries. Case Description: This case reviews the initial treatment and perioperative management of a young healthy male who sustained a .40 caliber handgun round to the left midface. Consistent with most low velocity gunshot injuries, there was no exit wound. His injuries included: avulsion of left midface epidermis and lateral nasal ala, comminution of left maxillary sinus and pterygoid plate, obliteration of left posterior dentition with dentoalveolar fractures, left mandibular coronoid process fracture, and C1 fracture of foramen transversarium. Carotid space involvement was noted through the tract of the projectile. Vascular lacerations or psuedoaneurysms of cervical circulation could not be ruled out until angiogram on post injury day 4. He was then taken to the operating room for facial debridement and archbar placement for DA fractures. His clinical progression improved daily until PID 10 when delayed clinical signs lead to an additional angiogram order. Likely due to late cavitation injury, an 8.5mm traumatic pseudoaneurysm of the distal segment of left IMAX artery was discovered. The psuedoaneurysm was embolized and the distal IMAX artery was occluded with a combination of detachable coils and Onyx liquid embolic agent. Discussion: This case exemplifies the importance of vigilant perioperative patient management. It also displays the strengths of angiography and catheter based embolization, which can be both diagnostic and therapeutic. This alternative allows rapid access to surgically inaccessible vessels, as well as superior cosmesis by preventing facial scars and wound-related complications. Parent vessel sacrifice (IMAX) in this case proved to be a safe and effective treatment alternative.

3553. McKintosh, E., et al. (2011). "Delayed and spontaneous intracranial foreign body migration." British journal of neurosurgery **25**(1): 140-141.

We present a case of spontaneous migration of a metal rod into the brain. No causative factor was identified but possible mechanisms for this occurrence are considered, and the importance of correct early management of this unusual injury emphasised.

3554. McLean, J. N., et al. (2005). "Gunshot wounds to the face--acute management." Facial plastic surgery : FPS **21**(3): 191-198.

The complex facial trauma victim poses a genuine therapeutic challenge as a whole, and may be particularly challenging to the medical team. The literature on acute management of gunshot wounds to the face is scarce. We performed an extensive review of the English-language literature in an effort to better delineate the diagnosis and acute management of these injuries. Most of these injuries do not present with initial threat to life and can safely be managed non-operatively. Definitive treatment is often deferred in patients with multiple, or more severe, injuries. Airway compromise is the most frequent and most life-threatening early problem reported in most series. CT scan remains the most useful method in the evaluation of these types of injuries and associated cervical spine lesions. Facial bleeding is best controlled by angiography and subsequent embolization. Anatomic repair of soft tissue and bony injuries is recommended to obtain an optimal functional and aesthetic outcome. Despite the creation of some algorithms, no clear correlation has been found between the site of entrance wound and the injuries and outcome of gunshot wounds to the face.

3555. McLoughlin, R. J., et al. (2020). "Toy Guns, Real Danger: An Update on Pediatric Injury Patterns Related to Nonpowder Weapons." Journal of pediatric surgery **55**(1): 146-152.

BACKGROUND: Design changes of nonpowder guns, including BB and air guns, have significantly increased their potential to injure. We sought to characterize the demographics of children injured with nonpowder weapons and the specific injuries suffered., METHODS: A cross-sectional analysis of the study years 2006, 2009, and 2012 was performed by combining the Kids' Inpatient Database into a single dataset. We identified cases (age<21years) of air gun injuries

using external cause of injury codes. Patient characteristics and injuries were analyzed using ICD-9 codes, and national estimates were obtained using case weighting., RESULTS: There were 1028 pediatric admissions for nonpowder weapon related injuries. The victims were predominately male (87.0%), non-Hispanic white (52.3%), resided in the South (47.3%), and in the lowest income quartile (39.2%). Half required a major surgical procedure. The predominant injuries were open wounds to the head, neck, or trunk (40.3%), and contusion (22.5%). Notable other injuries were intracranial injury (9.1%) and blindness or vision defects (3.3%)., CONCLUSIONS: The nonpowder weapons available to this generation can paralyze, blind, and cause lasting injury to children. Injuries frequently require surgical intervention, and these weapons should no longer be considered toys. Further research and legislation should be aimed at limiting children's access to these weapons., LEVEL OF EVIDENCE: III.

3556. McMullan, J. T., et al. (2011). "Prevalence of hypoxemia and oxygen use in trauma patients prior to hospital arrival." Annals of emergency medicine **58**(4): S242.

Background: Trauma patients of ten receive oxygen (O2) before hospital arrival but the true need for O2 is unknown. Knowing the prevalence of O2 need would assist logistical planning for care delivery in mass casualty, military, and austere environments. Methods: An IRB-approved study prospectivelyenrolled a convenience sample of injured adults taken to a trauma center by 6 EMS agencies in 2010. During transport, O2 saturation (SpO2) was recorded every 6 seconds by a Nonin oximeter. Study assistants noted in-hospital O2 use. Aconservative threshold for O2 need was used to estimate maximum prevalence and defined per local EMS protocols as SpO2<95%, traumatic brain injury, hemorrhagic shock, EMS intubation, or hospital O2 use within 24 hours. Analysis using the Trauma Combat CasualtyCare threshold ofSpO2<90% was also performed. Categorical comparisons used Chi-Square or Fisher's Exact tests; medians were compared with the Mann-Whitney U test. Results: Of 290 screened patients, 154 met inclusion criteria, consented and had complete data. Median age was 37 (range 18-84) years, 77/154 (50%) were white, 121/154 (79%) were male. Median injury severity score (ISS) was 5 (range 1-43), 55/154 (36%) had a penetrating injury, 82/154 (53%) were admitted. 128 of 154 subjects (83%, 95%CI 76-88%) had a need for O2. 113/154 (73%) had SpO2<95% and 52 (34%) were <90%. 86/154 subjects (67%) received O2 during EMS transport. Those with O2 need were older (38 v 27 years; p= 0.019) and had higher ISS scores (9 v 1; p= 0.001). There was no difference in O2 need for those with or without penetrating (36% v 40%, p= 0.684) or chest (27% v 19%, p= 0.469) injuries. Conclusion: At thresholds ofSpO2<95% and SpO2<90%, manyinjured patients brought to a trauma center required O2. The need for O2 remains sufficient to deploy some oxygen into austere environments and have it available for mass casualty incidents. Further study is required to understand the effects of reducing oxygen availability on clinical outcomes and to forecast which casualties may benefit from supplemental oxygen.

3557. McNamara, J. J., et al. (1972). "Lipid metabolism after trauma. Role in the pathogenesis of fat embolism." The Journal of thoracic and cardiovascular surgery **63**(6): 968-972.

3558. McNamara, R. M. and J. J. Kelly (1992). "Impact of an emergency medicine residency program on the quality of care in an urban community hospital emergency department." Annals of emergency medicine **21**(5): 528-533.

STUDY OBJECTIVES: To assess the impact of the introduction of an emergency medicine residency program on the quality of care in an urban community hospital emergency department., DESIGN: A retrospective chart review of all ED encounters for a three-month period beginning six months before and six months after the introduction of an emergency medicine residency., SETTING: A 27,000-visit-per-year urban community hospital ED., TYPE OF PARTICIPANTS: All patients who presented to the ED with one of five complaints and subsequently were discharged home. The five presenting categories examined were nontraumatic chest pain when age 30 years or more, lower abdominal pain in women aged 15 to 40 years, recent head trauma, headache of nontraumatic origin, and extremity laceration., INTERVENTIONS: None., MEASUREMENTS AND MAIN RESULTS: The frequency of physician documentation on the ED record of explicit criteria related to the five presenting complaints was used as a measure of the quality of care. Items sought for documentation included elements of the history and physical examination and diagnostic evaluations. The explicit criteria lists were drawn from the literature, including clinical policy guidelines. For each of the presenting complaints evaluated, documentation of the majority of items reflecting the quality of care was higher during the residency period. In no instance did the level of documentation decrease., CONCLUSION: As measured by a process

evaluation, documentation of the medical record, the introduction of an emergency medicine residency significantly improved the quality of care in this urban community hospital ED.

3559. McNickle, A. G., et al. (2020). "Cervical Spine Injury is Rare in Self-Inflicted Craniofacial Gunshot Wounds: An Institutional Review and Comparison to the US National Trauma Data Bank (NTDB)." Prehospital and disaster medicine **35**(5): 524-527.

BACKGROUND: Cadaveric and older radiographic studies suggest that concurrent cervical spine fractures are rare in gunshot wounds (GSWs) to the head. Despite this knowledge, patients with craniofacial GSWs often arrive with spinal motion restriction (SMR) in place. This study quantifies the incidence of cervical spine injuries in GSWs to the head, identified using computerized tomography (CT). Fracture frequency is hypothesized to be lower in self-inflicted (SI) injuries., METHODS: Isolated craniofacial GSWs were queried from this Level I trauma center registry from 2013-2017 and the US National Trauma Data Bank (NTDB) from 2012-2016 (head or face abbreviated injury scale [AIS] >2). Datasets included age, gender, SI versus not, cervical spine injury, spinal surgery, and mortality. For this hospital's data, prehospital factors, SMR, and CTs performed were assessed. Statistical evaluation was done with Stata software, with P <.05 significant., RESULTS: Two-hundred forty-one patients from this hospital (mean age 39; 85% male; 66% SI) and 5,849 from the NTDB (mean age 38; 84% male; 53% SI) were included. For both cohorts, SI patients were older (P < .01) and had increased mortality (P < .01). Overall, cervical spine fractures occurred in 3.7%, with 5.4% requiring spinal surgery (0.2% of all patients). The frequency of fracture was five-fold greater in non-SI (P < .05). Locally, SMR was present in 121 (50.2%) prior to arrival with six collars (2.5%) placed in the trauma bay. Frequency of SMR was similar regardless of SI status (49.0% versus 51.0%; P = not significant) but less frequent in hypotensive patients and those receiving cardiopulmonary resuscitation (CPR). The presence of SMR was associated with an increased use of CT of the cervical spine (80.0% versus 33.0%; P < .01)., CONCLUSION: Cervical spine fractures were identified in less than four percent of isolated GSWs to the head and face, more frequently in non-SI cases. Prehospital SMR should be avoided in cases consistent with SI injury, and for all others, SMR should be discontinued once CT imaging is completed with negative results.

3560. McPherson, S. J. (2011). "Thorax and supra-aortic vessels." Cardiovascular and interventional radiology **34**: 346.

Learning Objectives: 1. To understand the relevant anatomy and mode of injury 2. To review the potential and results for stent graft in large and medium vessel trauma 3. To review the indications for embolization in smaller vessels using target vessel occlusion The reduced physiological insult of interventional radiology (IR) techniques, along with high rates of bleeding control, has led to them becoming the treatment of choice for most thoracic and supra-aortic vessel injuries. Stent-grafts (SG) of 3mm to 46mm are now widely available to treat vessels ranging from the vertebral artery to the thoracic aorta and have become the dominant device for injuries in this territory. Thoracic aortic injury (TAI) is the leading cause of death within 15 minutes of blunt and penetrating injuries. TAI occurs due to a complex of compression, horizontal shear and hydrostatic forces. Untreated the 10-20% pre-hospital survivors have a poor prognosis. The commonest injury site is at the aortic isthmus distal to the left subclavian artery but injuries to the aorta at the diaphragmatic hiatus should be looked for. A ductus diverticulum has obtuse angles and is readily distinguished from TAI. Great vessel injures may be coincident with TAI. Multislice CT has revealed the wide spectrum of injuries seen including intimal flaps, circumferential out-pouching (the group at highest risk of rupture), pseudo-coarctation and dissection. Not all require intervention. Even when intervention is indicated it should occur after control of other sites of active bleeding [1]. TAI is a potential site of catastrophic haemorrhage but rarely the cause of haemodynamic compromise in polytrauma patient. Young and female patients may have femoral arteries which are too small for SGs and iliac or abdominal aortic conduits may be necessary. Injuries to the iliac arteries on removal of SG systems are a significant cause of morbidity and mortality. Access for rapid balloon control must be available in every case. In lower risk TAI intervention can be delayed until the next working day if interval aggressive blood pressure control can be achieved this is not suitable for patients with traumatic brain injury who require augmentation of cerebral perfusion [2]. Smaller vessel injuries include active extravasation, pseudoaneurysms, dissection, complete transection with or without active bleeding, embolisation of metallic fragments and arterio-venous fistulation. The over-riding consideration for most great vessel injuries is to preserve ante-grade flow to vital structures whilst excluding the section of injured vessel from the circulation. SGs are the mainstay of endovascular treatment. Small subclavian branches and pulmonary arterial injuries can be treated by embolization. Uncovered stents may be used to treat occlusive dissections. Balloon tamponade may be used to control bleeding prior to IR or surgical treatment.

3561. McQuirter, J. L., et al. (2003). "Elevated blood lead resulting from maxillofacial gunshot injuries with lead ingestion." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **61**(5): 593-603.

PURPOSE: The purpose of this study was to identify the contribution of ingested lead particles to elevated blood lead concentrations in victims of gunshot injury to the maxillofacial region., PATIENTS AND METHODS: As part of a larger study of the effects of retained lead bullets on blood lead, a retrospective review of study findings was completed on 5 of 8 patients who sustained injuries to the maxillofacial region. These 5 patients were recruited into the larger study within 11 days of injury and showed a penetration path for the projectile that engaged the upper aerodigestive tract. All subjects were recruited from patients presenting for care of their gunshot injuries to a large inner-city trauma center with a retained bullet resulting from a gunshot injury. An initial blood lead level was measured for all recruited patients and repeated 1 to 17 weeks later. Medical history was taken along with a screening and risk factor questionnaire to determine other potential or actual sources (occupational/recreational) of lead exposure. (109)Cd K-shell x-ray fluorescence determinations of bone lead were completed to determine past lead exposure not revealed by medical history and risk factor questionnaire. Radiographs taken of the abdomen and chest, required as a part of the patient's hospital care, were retrospectively reviewed for signs of metallic fragments along the aerodigestive tract., RESULTS: All 5 patients retained multiple lead pellets or fragments at the site of injury, sustained fractures of the facial bones, and showed increases in blood lead. Three of the 5 study subjects who sustained maxillofacial gunshot injuries involving the mouth, nose, or throat region showed metallic densities along the gastrointestinal tract indicative of ingested bullet fragments. Each patient with ingested bullet fragments showed rapid elevation of blood lead exceeding 25 microg/dL and sustained increases well beyond the time when all ingested fragments were eliminated. A 3-year follow-up on these 3 patients showed significantly sustained elevation of blood lead but less than that observed during the initial 6 months after injury. None of the 5 study subjects showed any evidence of metallic foreign bodies within the tracheobronchial regions indicative of aspiration., CONCLUSION: Ingestion of lead fragments can result from gunshot injuries to the maxillofacial region and may substantially contribute to a rapid increase in blood lead level. Prompt diagnosis and elimination of ingested lead fragments are essential steps necessary to prevent lead being absorbed from the gastrointestinal tract. Increased blood lead in victims after gunshot injuries must be fully evaluated for all potential sources, including recent environmental exposure, absorption of lead from any remaining bullets in body tissues, and the possibility of mobilization of lead from long-term body stores such as bone. Copyright 2003 American Association of Oral and Maxillofacial Surgeons

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3562. Meco, C., et al. (2010). "Transfacial transsphenoidal gunshot wound: endonasal endoscopic management." The Journal of trauma **68**(4): E94-98.

3563. Medel, N. A., et al. (2014). "Comparing early and late reconstruction of gunshot injuries to the upper and lower face." Journal of oral and maxillofacial surgery **72**(9): e228-e229.

Gunshot injuries represent one of the most challenging injury patterns to the head and neck region because they are often complex depending on the velocity and caliber of the bullet and the type of firearm. Some surgeons prefer early reconstruction including open reduction and internal fixation of osseous deformities while others advocate delayed reconstruction. The purpose of this study examined the postoperative morbidity and mortality associated with early and late reconstruction of the upper and lower face associated with gunshot injuries. We conducted a chart review of 42 cases (33 male, 9 female) of gunshot injuries to the mandible and/or midface who required operative intervention from 2007- 2013 at Parkland Memorial Hospital in Dallas Texas. Patients were stratified into two groups depending on timing of reconstruction. Reconstruction was defined as closed or open reduction in an operating room enviorment with or without debridement. The following treatments were included: 34/42 with open reduction internal fixation, 2/42 with external fixation, and 6/42 cases in closed fashion with application of arch bars. The primary outcome, minor and severe adverse events in the post operative course were compared by dividing the patients into two groups. Group 1 including patients who underwent reconstruction within first week from injury (early reconstruction or group ER). Group 2 including patients who underwent reconstruction after the first week from injury (late reconstruction or group LR). There was a total of 24 subjects in group ER and 18 subjects in group LR. The primary outcome was further stratified by the event in the post-operative courses. Normal or no adverse events (NAE) including those patients who had no

adverse events during the postoperative period and patients who required additional surgical intervention due to minor or major adverse events (MAE). Minor adverse events were defined as wound dehiscence or infection requiring local debridement or washout, in contrast to major adverse events which were defined as wound infection requiring removal of hardware and/or failure of bone graft. There were 22 subjects in group NAE, and 20 subjects in group MAE. Of the 24 subjects within group ER- 13 were in NAE, 11 in MAE. Of the 18 subjects within group LR- 9 were in NE, 9 in MAE. We conclude that both early and late reconstruction of gunshot injuries had similar post-operative course in the occurances of postoperative presence or absence of minor and major adverse events.

3564. Medicke, I. and K. Muller-Jensen (1998). "[Prognosis in orbital gunshot injuries]." Prognose orbitaler Schussverletzungen. **95**(3): 172-175.

UNLABELLED: No reviews of orbital gunshot injuries have been published in German ophthalmological journals. In this article biomechanical and prognostic factors of this rare type of injury are analysed., PATIENTS AND METHODS: We report on 4 patients, aged 20-63 years, who tried to commit suicide by shooting themselves in the right temple. Clinical and radiological diagnosis as well as treatment by an interdisciplinary team are reported., RESULTS: All patients became blind on the right side despite immediate surgery including reconstruction of the injured bones and soft tissues. Three of four patients suffered severe functional defects in the left eye; one of them is now blind., CONCLUSION: Orbital gunshot wounds are severe injuries. The prognosis depends on the course of the bullet and the interdisciplinary care.

3565. Medina, M., et al. (1992). "Clinical and neuroradiological correlations in a patient with a wandering retained air gun pellet in the brain." Surgical neurology **38**(6): 441-444.

The authors present the case of a patient with an air gun pellet that moved from the ventricular system into the subarachnoid space of C2-C3, from where it was successfully removed by interlaminotomy.

3566. Medina-Pestana, J. O., et al. (2007). "Deceased organ donation in Brazil: how can we improve?" Transplantation proceedings **39**(2): 401-402.

METHODS: We retrospectively analyzed the registry data from one organ procurement organization obtained between January 1 and December 31, 2005., RESULTS: Among the 378 potential deceased donors, 182 (48.2%) were lost, mainly due to clinical conditions (27%) or cardiac arrest (19.3%). Of the remaining 196 (51.8%) potential donors, family consent was obtained in 94 cases (48%). Family refusal was higher for potential donors aged between 18 and 59 years (70%). Of the 94 donors, 72 (77%) had their organs harvested. Cardiac arrest before harvesting (56.5%) and positive viral serology (26%) were the main reasons for further losses. The mean donor age was 40 years and 51% were men. Causes of death were cerebral vascular accidents (55.5%), cranium encephalic traumas (29%), and gun shot wounds (8%). The rate of organ donation was 100% for kidneys and livers, 96% for hearts, 86% for pancreatas, 76% for lungs, and 74% for corneas. After assessment of organ viability, 94% of corneas, 91% of kidneys, and 88% of livers were transplanted, but only 52% of pancreata and 42% of hearts. The most frequent causes of discarded organs were age and concomitant donor infection., CONCLUSION: Areas for potential improvements are: (1) earlier identification and adequate maintenance of potential donors; (2) campaigns for organ donation; and (3) careful evaluation of donated organs and selection of a suitable population to increase utilization of expanded criteria organs.

3567. Medzon, R., et al. (2005). "Stability of cervical spine fractures after gunshot wounds to the head and neck." Spine **30**(20): 2274-2279.

STUDY DESIGN: Retrospective chart review., OBJECTIVES: To determine the frequency of stable and unstable cervical spine fractures after gunshot wounds to the head or neck; to identify potential risk factor(s) for an unstable versus stable cervical spine fracture., SUMMARY OF BACKGROUND DATA: Cervical spine fractures after gunshot wounds to the head and neck are common. Because of the nature of their injuries, patients often present with concomitant airway obstruction and large blood vessel injury that can necessitate emergent procedures. In some cases, acute treatment of these problems can be hindered by the presence of a cervical collar or strict adherence to spinal precautions (i.e., patient laying supine). In such situations, information regarding the probability of a stable versus unstable cervical spine fracture would be useful in emergency treatment decision making., METHODS: A search for patients with gunshot wounds to the head or neck potentially involving the cervical spine over a 13-year period was

performed using a trauma registry. Individuals with cervical spine fractures were identified and their records reviewed in detail. Data collected included information about neurologic deficits, mental status, airway treatment, entrance wounds, fracture level/type, initial/definitive fracture treatment, and final disposition at hospital discharge., RESULTS: A total of 81 patients were identified; 19 had cervical spine fractures. There were 5 patients who were not examinable because of altered mental status (severe head trauma, hemorrhagic shock, or intoxication). All 5 patients had stable cervical spine fractures. There were 11 patients who had an acute spinal cord injury, 3 (30%) of whom underwent surgery for an unstable fracture. Of the 65 awake, alert patients without a neurologic deficit, only 3 (5%) had a fracture, none of which were unstable., CONCLUSIONS: Gunshot wounds to the head and neck had a high rate of concomitant cervical spine fracture. Neurologically intact patients have a lower rate of fracture than those presenting with a spinal cord injury or altered mental status. In this small series of patients, the only unstable cervical spine injuries were detected in patients with a spinal cord injury. The data suggest that spinal precautions and/or a hard cervical collar should not be maintained at the expense of delaying or hindering emergent life-saving airway or hemodynamically stabilizing procedures, particularly in awake, neurologically intact patients. However, the cervical collar and spinal precautions should be resumed after such procedures are completed and continued until a more definitive evaluation of spinal stability can be performed.

3568. Meer, E., et al. (2021). "Clinical presentation and outcomes for gunshot wounds to the orbit." Investigative Ophthalmology and Visual Science **62**(8).

Purpose : To characterize the clinical presentation, surgical management, long-term complications and outcomes of gunshot wounds to the orbit. Methods : A retrospective chart review was conducted of all cases of gunshot wounds involving the orbit at an academic institution with a level 1 trauma center. Data included patient demographics, clinical presentation and exam over time, surgical intervention, and long-term outcomes. Descriptive statistics were calculated using mean and standard deviation for continuous measures and frequency and percentage for categorical measures. Tests of associations included Fishers exact tests for categorical data, KruskalWallis rank sum tests, ANOVA, and in the case of repeated measures, generalized estimating equations. Results : 88 patients with a history of gunshot wound involving the orbit were included with average age of 32.6 years old. Patient were 85.2% male, 75% African-American, 25% Caucasian, and 5.7% Hispanic. Mean follow up was 8.25 years. While injury varied, 53.4% presented with intracranial injury, 21.6% presented with open globe rupture, 80.7% with orbital fracture, 89.8% with lid laceration, 88.6% with vision loss, 92% with pain, and 76.1% with bullet fragments in the orbit on imaging.Surgery occurred for 59.1% of patients, of which 26.9% underwent primary enucleation, 11.5% evisceration, 44.2% fracture repair, and 17.3% another procedure (craniotomy, complex laceration repair, etc). Long-term complications included abnormal lid or globe position in 26.1% of patients, reduced visual acuity in 55.2%, and persistent pain in 50.6%. Predictors on initial presentation for persistent pain included intracranial injury (p=.003), pain (p=.006), presence of radiographic intraorbital foreign body (bullet/ bullet fragments) (p=.002), abnormal CNV2 sensation (p=.041), and corneal abrasion (p=.031) on clinical exam. Visual acuity improvement over time in individuals who did not receive enucleation or evisceration on presentation was not significant (p = .09). Worsening visual acuity was significantly associated with hyphema, vision loss, and presence of intraorbital foreign body on presentation (p<.05) Conclusions : To our knowledge, this represents the first, largest clinical epidemiologic study that serves to provide insight into the clinical presentation, surgical intervention, and long-term outcomes of gunshot wounds to the orbit, which will guide both ophthalmologists and trauma physicians.

3569. Meer, M., et al. (2010). "Knife inflicted penetrating injuries of the maxillofacial region: a descriptive, record-based study." Injury **41**(1): 77-81.

UNLABELLED: Penetrating knife injuries of the face are more common in South Africa than the rest of the world. These injuries can be life-threatening, especially where the major blood vessels of the face are involved. The approach to treatment should be multidisciplinary, beginning with the trauma unit to provide airway maintenance and haemodynamic stabilisation. An interventional radiologist may be consulted for angiography. The aim of the present study was to retrospectively analyse all cases of knife-inflicted penetrating injuries to the maxillofacial region with the knife in situ and subsequently develop a management protocol to be used by maxillofacial surgery registrars when presented with such cases., MATERIALS AND METHODS: It was a retrospective, cross-sectional and record-based study, analysing all penetrating knife injuries reported at various hospitals for a period of 11 years. In this study, 24 cases of knife injuries were analysed., RESULTS: Twenty-one patients (87.5%) in this series were male and three (12.5%) were

female. Of these 24 patients, 13 (54.2%) were coloured and 11 (45.8%) were black. There were no white or Indian patients. Post-surgical recovery of all patients was rapid and uneventful, and there were no fatalities., CONCLUSION: Patients with knife injuries to the face with no definite signs of vascular injury can thus be safely and accurately managed on the basis of physical examination and plain-film radiography. An angiogram is mandatory if the patient presents with excessive bleeding, an expanding haematoma or if the knife blade is in the region of any large vessels.

3570. Megele, R., et al. (1990). "[Trans-sphenoid gunshot injury of the head. Anatomic viewpoints]." Die transsphenoidale Kopfschussverletzung. Anatomische Gesichtspunkte. **20**(1): 44-47.

The transsphenoidal gunshot injury of the head is a subgroup of the temporal gunshot injury, generally with a bad prognosis quoad vitam. Important neural and vascular structures could be damaged by penetration of the missile. In our case the important structures were "missed" exactly and the patient survived without severe neurological deficits. With this case anatomical considerations of the transsphenoidal gunshot injury are made.

3571. Meguro, K. and D. W. Rowed (1985). "Traumatic aneurysm of the posterior inferior cerebellar artery caused by fracture of the clivus." Neurosurgery **16**(5): 666-668.

The authors present a case of traumatic aneurysm of the posterior inferior cerebellar artery produced by fracture of the clivus. Varieties of clival fractures reported in the literature are reviewed. Associated basilar or carotid arterial lesions have been reported, but traumatic aneurysm, so far as we are aware, has not. The authors emphasize the importance of a high index of suspicion of undetected traumatic intracranial aneurysm when an unusual amount of subarachnoid hemorrhage is noted on the initial computed tomographic scan, particularly if associated with displaced basal skull fracture.

3572. Mehendale, R. A. and L. R. Dagi (2011). "Amniotic membrane implantation to reduce extraocular muscle adhesions to a titanium implant." Journal of AAPOS : the official publication of the American Association for Pediatric Ophthalmology and Strabismus **15**(4): 404-406.

Amniotic membrane grafts are used extensively for ocular surface reconstruction. We describe the case of a 66-year-old man with traumatic, restrictive strabismus. Amniotic membrane was applied to resolve symblepharon between the globe and lids and also to prevent re-formation of adhesions between extraocular muscles and adjacent titanium plates placed during prior surgery.

3573. Mehta, A. I. and C. A. Bagley (2011). "Gunshot wound to the clivus." British journal of neurosurgery **25**(1): 136-137.

A 14 year old boy presents with a gunshot wound into the roof of his mouth to lodge into the clivus, and miraculously he is neurologically intact.

3574. Mehta, Z. and F. Newcombe (1996). "Dissociable contributions of the two cerebral hemispheres to judgments of line orientation." Journal of the International Neuropsychological Society : JINS **2**(4): 335-339.

A previous study of the performance of men with chronic unilateral focal brain lesions (due to wartime missile injury) on a standard test of line orientation suggested a left hemisphere (LH) as well as a right hemisphere (RH) contribution to visuospatial processing. The present study was designed to fractionate the variables that could underlie this unexpected finding and thereby to tease out the mechanisms involved in LH as compared with RH processing. A simpler ("purer") version of the standard line orientation task was used, as were two other versions in which matching in an array and matching with distractors were measured. The findings confirmed the hypothesis of RH involvement in the purer task of metric measurement and suggested that the LH has an important role in keeping track decisions and updating decisions in more complex aspects of line orientation judgment.

3575. Mehta, Z. and F. Newcombe (1996). "Selective loss of verbal imagery." Neuropsychologia **34**(5): 441-447.

This single case study of the ability to generate verbal and non-verbal imagery in a woman who sustained a gunshot wound to the brain reports a significant difficulty in generating images of word shapes but not a significant problem in generating object images. Further dissociation, however, was observed in her ability to generate images of living vs non-living material. She made more errors in imagery and factual information tasks for non-living items than for living items. This pattern contrasts with our previous report of the agnosic patient, M.S., who had severe difficulty in generating images of living material, whereas his ability to image the shape of words was comparable to that of normal control subjects. Furthermore, with regard to the generation of images of living compared with non-living material, M.S. shows more errors with living than nonliving items. In contrast, the present patient, S.M., made significantly more errors with non-living relative to living items. There appear to be two types of double dissociation which reinforce the growing evidence of dissociable impairments in the ability to generate images for different types of verbal and non-verbal material. Such dissociations, presumably related to sensory and cognitive processing demands, address the problem of the neural basis of imagery.

3576. Mehvari, J., et al. (2014). "Cardiac arrest associated with epileptic seizures: A case report with simultaneous EEG and ECG." Epilepsy & behavior case reports **2**: 145-151.

Ictal asystole is a rare, probably underestimated manifestation of epileptic seizures whose pathophysiology is still debated. This report describes two patients who had cardiac asystole at the end of their seizure. The first patient was a 13-year-old boy with complex partial seizures.. His MRI showed symmetrical signal abnormality in the bilateral parietooccipital lobe accompanied by mild gliosis and volume loss. During a 3-day long-term video-EEG monitoring, he had cardiac arrest at the end of one of his seizures that was secondarily generalized. The second one was a 42-year-old veteran with penetrating head trauma in the left frontal lobe due to shell injury. During long-term video-EEG monitoring, he had one generalized tonic-clonic seizure accompanied by bradycardia and cardiac asystole. Asystoles could have a role in the incidence of sudden unexpected death in epilepsy (SUDEP), meaning that the presence of ictal bradycardia is a risk factor for SUDEP. In cases of epileptic cardiac dysrhythmia, prolonged simultaneous EEG/ECG monitoring may be required. Cardiological investigation should be included in epilepsy management.

3577. Mei, Q.-Y., et al. (2017). "Combination of dura turning-over and decompressive craniectomy: a new pattern of surgery for cerebral infarction caused by craniocerebral gunshot injury." Military Medical Research **4**: 26.

BACKGROUND: Craniocerebral gunshot injury refers to a wound caused by a bullet passing through or lodged in brain tissue, resulting in the loss of function of a certain area or other fatal damage to the human brain. Craniocerebral gunshot injury is usually life-threatening and is very common in modern warfare, accounting for the majority of battle casualties. Most of the patients suffer from acute cerebral infarction caused by vascular injury. Lack of early and solid battlefield emergency medical interference adds to the risk of death among the wounded., CASE PRESENTATION: We present a 24-year-old man who was shot with a shotgun from a distance of 15 m in an accidental injury. Forty-seven grapeshots were found on his body surface by physical examination. A computed tomography (CT) scan demonstrated large areas of low-density shadows in his right parietal lobe and right temporal lobe with the midline shifting to the left side 2 days later. Afterwards, the patient was transferred to our emergency medical center at Changzheng Hospital in Shanghai. Cranial computed tomography angiography (CTA) showed a high-density shadow in the initial part of the right middle cerebral artery. The branches after the initial part were obliterated. Prompt medical attention and decompressive craniotomy (DC) surgery contributed to the final recovery from cerebral infarction of this patient., CONCLUSION: Bullets can penetrate or be lodged in the brain, causing intracranial hypertension. The bullets lodged in the brain can result in stenosis and embolism of a cerebral artery, causing acute cerebral infarction. Combining dura turning-over surgery with DC surgery can not only decrease intracranial pressure, which can increase the blood supply for hypertension-induced vessel stenosis, but also help vessels outside the dura mater grow into ischemic areas of the cerebral cortex. However, this new pattern of surgery needs further support from evidence-based medicine.

3578. Meier, U., et al. (1987). "[Penetrating craniocerebral injury]." Die penetrierende Schadel-Hirn-Verletzung. **112**(23): 1473-1480.

Through a ten-year period, treatment was applied to 145 patients for open craniocerebral injuries in the calottal region. Mortality amounted to 35 per cent and postoperative infections to 16 per cent. Early or, in cases of intracranial invasive growths, immediate surgery with purpose-oriented osteoplastic trepanation is the optional method.

3579. Meirowsky, A. M. (1956). "Increased intracranial pressure in penetrating craniocerebral trauma." Military medicine **118**(5): 488-492.

3580. Meirowsky, A. M. (1968). "The retention of bone fragments in brain wounds." Military medicine **133**(11): 887-890.

3581. Meirowsky, A. M. (1982). "Secondary removal of retained bone fragments in missile wounds of the brain." Journal of neurosurgery **57**(5): 617-621.

Secondary operations for the removal of retained bone fragments have been performed in 116 of the 1133 casualties with craniocerebral missile wounds incurred in the war in Vietnam, 1967 to 1970. Various complications developed in 19 of these 116 casualties. Dehiscence of the wound occurred in eight patients, five of whom developed a cerebrospinal fluid fistula. Infection manifested itself in 16 cases with retained bone fragments prior to their secondary removal; however, infection first became apparent after the secondary operation in seven patients. Two of the seven patients with infection died. The neurological deficit became worse in four of the 116 patients following the secondary removal of a bone fragment: there was complete resolution of that deficit in one, and return to the neurological status existing after the initial operation in another; the other two patients developed a permanently disabling neurological deficit, an incidence of 1.7%.

3582. Meirowsky, A. M., et al. (1981). "Cerebrospinal fluid fistulas complicating missile wounds of the brain." Journal of neurosurgery **54**(1): 44-48.

The records of 101 casualties of the war in Vietnam have been analyzed, with particular attention to missile wounds of the brain complicated by a cerebrospinal fluid (CSF) fistula. Fifty-four developed CSF drainage at the wound site, 30 presented with rhinorrhea, and 23 with otorrhea. Fifty of the 101 men developed infection, an incidence of 49.5%. The occurrence of a fistula in vertex wounds can usually be traced to failure to close the dura, or to achieve watertight closure of the dura primarily, or by graft. Approximately two-thirds of compound basilar fractures, complicated by rhinorrhea or otorrhea, are due to direct fractures of the anterior, middle, or posterior fossa. The remaining one-third are due to elusive "discrete" fractures of the base of the skull, occurring at a distance from the entry wound, and not in continuity with the fracture of the vault. While direct basilar fractures can readily be recognized, facilitating repair of the dura overlying the basilar fractures, "discontinuous" fractures pose a challenging diagnostic problem. More commonly occurring in vertex wounds crossing the midline, discontinuous fractures producing rhinorrhea or otorrhea may be identified with the aid of tomograms of the base of the skull. Their early diagnosis may well prove to be a significant factor in the reduction of morbidity and mortality of missile wounds of the brain complicated by a CSF fistula.

3583. Meizoso, J. P., et al. (2016). "Effect of time to operation on mortality for hypotensive patients with gunshot wounds to the torso: The golden 10 minutes." The journal of trauma and acute care surgery **81**(4): 685-691.

INTRODUCTION: Timely hemorrhage control is paramount in trauma; however, a critical time interval from emergency department arrival to operation for hypotensive gunshot wound (GSW) victims is not established. We hypothesize that delaying surgery for more than 10 minutes from arrival increases all-cause mortality in hypotensive patients with GSW., METHODS: Data of adults (n = 309) with hypotension and GSW to the torso requiring immediate operation from January 2004 to September 2013 were retrospectively reviewed. Patients with resuscitative thoracotomies, traumatic brain injury, transfer from outside institutions, and operations occurring more than 1 hour after arrival were excluded. Survival analysis using multivariate Cox regression models was used for comparison. Hazard ratios (HRs) and 95% confidence intervals (CIs) are reported. Statistical significance was considered at $p <= 0.05$., RESULTS: The study population was aged 32 +/- 12 years, 92% were male, Injury Severity Score was 24 +/- 15, systolic blood pressure was 81 +/- 29 mm Hg, Glasgow Coma Scale score was 13 +/- 4. Overall mortality was 27%. Mean time to operation was 19 +/- 13 minutes. After controlling for organ injury, patients who arrived to the operating room after 10 minutes had a higher likelihood of mortality compared with those who arrived in 10 minutes or less (HR, 1.89; 95% CI, 1.10-3.26; $p = 0.02$); this was also true in the severely hypotensive patients with systolic blood pressure of 70 mm Hg or

less (HR, 2.67; 95% CI, 0.97-7.34; p = 0.05). The time associated with a 50% cumulative mortality was 16 minutes., CONCLUSIONS: Delay to the operating room of more than 10 minutes increases the risk of mortality by almost threefold in hypotensive patients with GSW. Protocols should be designed to shorten time in the emergency department. Further prospective observational studies are required to validate these findings., LEVEL OF EVIDENCE: Therapeutic study, level IV.

3584. Melada, A., et al. (2002). "Cerebrospinal fluid fistula as a consequence of war head injury." Military medicine **167**(8): 666-670.

Cerebrospinal fluid (CSF) fistula as a consequence of brain missile injury and following infectious complications has been recognized for years. Different methods of treatment have been advocated. Missiles used in war cause extensive destruction of the skull and brain as a result of their high kinetic energy. On its transfer through the skull, such high kinetic energy causes fractures called "discontinuous fractures," which are distant from the entry wound and not related to the fracture of the vault. The role of the timely diagnosis of CSF fistulas and their early repair in the management of these wounds is emphasized. Data on 312 patients with missile injuries of the brain inflicted during the war in Croatia were retrieved and analyzed, with special reference to the complications of CSF fistulas and infection. Forty-five patients developed CSF fistula, 15 (33%) of them at the wound site, 23 (51%) as CSF rhinorrhea, and seven (15%) as CSF otorrhea. Six patients developed infectious complications. The presented strategy and operative approach resulted in a low incidence of infectious complications in the study series.

3585. Melada, A., et al. (1993). "Analysis of projectile destructive effect in missile injury to the brain." Acta medica Croatica : casopis Hravatske akademije medicinskih znanosti **47**(3): 135-140.

During the war in Croatia so far, more than 250 casualties having missile wounds of the brain, spinal chord and peripheral nervous system were admitted to the Neurosurgical Clinic, University Hospital-Rebro. These injuries were mainly caused by low-velocity missiles. However, the high-velocity ones, used nowadays, in direct injury to the head, cause destruction of the brain that is incompatible with survival in most of the cases. This paper deals with a patient injured by a 7.62 mm projectile. The mechanism of the brain destruction is not completely clear since the missile was found at the very entrance of the missile wound, while the brain was destroyed up to the opposite side of the endocranium. Four mechanisms of the missile's effect aimed at explaining the cause of death of the patient, as well as the bizarre position of the missile, were taken into consideration. The review shows how perilous a wound from a direct missile injury to the head could be, regardless of its speed.

3586. Melinosky, C., et al. (2018). "Modeling autonomic dysfunction during acute resuscitation to predict neurological worsening after isolated head injury." Journal of neurotrauma **35**(16): A149-A150.

Introduction: Early recognition of neurologic worsening (NW) after traumatic brain injury (TBI) could allow for the development of targeted therapies aimed at preventing secondary injury after TBI. We hypothesized that autonomic nervous system (ANS) dysfunction measured by variables derived from electrocardiogram (ECG) or photoplethysmogram (PPG) within first hour of arrival to the Trauma Resuscitation Unit (TRU) may enhance the ability to predict NW in the initial 48 hours after TBI. Methods: Patients enrolled in the prospective study Oximetry and Noninvasive Predictors Of Intervention Need after Trauma (ONPOINT) who had isolated head injury were analyzed. NW was defined as any of the following occurring in the first 48 hours: new asymmetric pupillary dilatation(>2mm), 2 point GCS decline, interval worsening of CT scan as assessed by the Marshall score, or intervention for cerebral edema. Beat-to-beat variation of ECG or PPG, as well as waveform features during the first 15 minutes and 60 minutes after arrival in the TRU were analyzed to determine physiologic parameters associated with future NW. Physiologic factors along with admission clinical variables were combined in multivariable logistic regression models predicting NW and inpatient mortality. Results: There were 191 patients (mean age 43 years old, GCS 13, ISS 12, 69% men) who met study criteria. NW occurred in 33(17%) patients and was associated a greater likelihood of ICU admission (P < 0.001) and inpatient mortality (P < 0.001). Both ECG (AUROC: 0.84, 95% CI: 0.76,0.93) and PPG (AUROC: 0.87, 95% CI: 0.80, 0.93) analyses during the first 15 minutes of resuscitation demonstrated a greater ability to predict NW then clinical characteristics alone (AUROC: 0.69, 95% CI: 0.59, 0.8). Age (P = 0.02), Marshall score (P = 0.001), penetrating injury(P = 0.02), and predictive probability for NW by PPG analysis at 15 minutes (P = 0.03) were independently associated with inpatient mortality. Conclusion: ANS

dysfunction assessed by continuous ECG or PPG variability and waveform analysis in the first hour of resuscitation may represent a non-invasive early marker of future neurological deterioration and inpatient mortality after TBI.

3587. Melinosky, C., et al. (2018). "Continuous vital sign analysis to predict secondary neurological decline after traumatic brain injury." Frontiers in neurology **9**(SEP).

Background: In the acute resuscitation period after traumatic brain injury (TBI), one of the goals is to identify those at risk for secondary neurological decline (ND), represented by a constellation of clinical signs that can be identified as objective events related to secondary brain injury and independently impact outcome. We investigated whether continuous vital sign variability and waveform analysis of the electrocardiogram (ECG) or photoplethysmogram (PPG) within the first hour of resuscitation may enhance the ability to predict ND in the initial 48 hours after traumatic brain injury (TBI). Methods: Retrospective analysis of ND in TBI patients enrolled in the prospective Oximetry and Noninvasive Predictors Of Intervention Need after Trauma (ONPOINT) study. ND was defined as any of the following occurring in the first 48 h: New asymmetric pupillary dilatation (>2 mm), 2 point GCS decline, interval worsening of CT scan as assessed by the Marshall score, or intervention for cerebral edema. Beat-to-beat variation of ECG or PPG, as well as waveform features during the first 15 and 60 min after arrival in the TRU were analyzed to determine physiologic parameters associated with future ND. Physiologic and admission clinical variables were combined in multivariable logistic regression models predicting ND and inpatient mortality. Results: There were 33 (17%) patients with ND among 191 patients (mean age 43 years old, GCS 13, ISS 12, 69% men) who met study criteria. ND was associated with ICU admission ($P < 0.001$) and inpatient mortality ($P < 0.001$). Both ECG (AUROC: 0.84, 95% CI: 0.76,0.93) and PPG (AUROC: 0.87, 95% CI: 0.80, 0.93) analyses during the first 15 min of resuscitation demonstrated a greater ability to predict ND then clinical characteristics alone (AUROC: 0.69, 95% CI: 0.59, 0.8). Age ($P = 0.02$), Marshall score ($P = 0.001$), penetrating injury ($P = 0.02$), and predictive probability for ND by PPG analysis at 15 min ($P = 0.03$) were independently associated with inpatient mortality. Conclusions: Analysis of variability and ECG or PPG waveform in the first minutes of resuscitation may represent a non-invasive early marker of future ND.?

3588. Melki, J. A. D., et al. (2011). "Scanning electron microscopy as an auxiliary method in the study of exhumed bones." Forensic science international **206**(1-3): e67-70.

Scanning electron microscopy (SEM) has been used in forensic science in many ways. The reports of cases in which SEM has been used as an auxiliary method in the investigation of exhumed bones are rare. In this article, we report an exhumation that was made to determine if a seized weapon could have been used in a homicide. We used SEM to analyze a fracture in the interior of the skull of the victim. The findings described in this article showed us that it is possible to develop new researches in this field.

3589. Meller, D., et al. (1993). "Immunohistochemical studies with antibodies to neurofilament proteins on axonal damage in experimental focal lesions in rat." Journal of the neurological sciences **117**(1-2): 164-174.

Immunohistochemistry with monoclonal antibodies against neurofilament (NF) proteins of middle and high molecular weight class, NF-M and NF-H, was used to study axonal injury in the borderzone of focal lesions in rats. Focal injury in the cortex was produced by infusion of lactate at acid pH or by stab caused by needle insertion. Infarcts in substantia nigra pars reticulata were evoked by prolonged pilocarpine-induced status epilepticus. Immunohistochemical staining for NFs showed characteristic terminal clubs of axons in the borderzone of lesions. Differences in the labelling pattern occurred with different antibodies which apparently depended on molecular weight class of NFs and phosphorylation state. These immunohistochemical changes of NFs can serve as a marker for axonal damage in various experimental traumatic or ischemic lesions.

3590. Mellington, F. E., et al. (2014). "Orbital compressed air and petroleum injury mimicking necrotizing fasciitis." The Journal of emergency medicine **47**(3): e69-72.

BACKGROUND: Orbital injury secondary to petroleum-based products is rare. We report the first case, to our knowledge, of a combined compressed air and chemical orbital injury, which mimicked necrotizing fasciitis., CASE REPORT: A 58-year-old man was repairing his motorcycle engine when a piston inadvertently fired, discharging compressed air and petroleum-based carburetor cleaner into his left eye. He developed surgical emphysema, skin

necrosis, and a chemical cellulitis, causing an orbital compartment syndrome. He was treated initially with antibiotics and subsequently with intravenous steroid and orbital decompression surgery. There was almost complete recovery by 4 weeks postsurgery. WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?: Petroleum-based products can cause severe skin irritation and necrosis. Compressed air injury can cause surgical emphysema. When these two mechanisms of injury are combined, the resulting orbitopathy and skin necrosis can mimic necrotizing fasciitis and cause diagnostic confusion. A favorable outcome is achievable with aggressive timely management.

3591. Melmer, P., et al. (2021). "Managing Craniomaxillofacial Injury Without Inpatient Consult: Outcomes and Patient Cost Savings." The American surgeon **87**(11): 1836-1838.

BACKGROUND: We hypothesized that trauma surgeons can safely selectively manage traumatic craniomaxillofacial injuries (CMF) without specialist consult, thereby decreasing the overall cost burden to patients., METHODS: A 4-year retrospective analysis of all CMF fractures diagnosed on facial CT scans. CMF consultation was compared with no-CMF consultation. Demographics, injury severity, and specialty consultation charges were recorded. Penetrating injuries, skull fractures, or patients completing inpatient craniofacial surgery were excluded., RESULTS: 303 patients were studied (124 CMF consultation vs 179 no-CMF consultation), mean age was 47.8 years, with 70% males. Mean Glasgow Coma Scale and Injury Severity Score (ISS) was 14 +/- 3.4 and 10 +/- 9, respectively. Patients with CMF consults had higher ISS ($P < .001$) and needed surgery on admission ($P < .001$), while no-CMF consults had shorter length of stay ($P < .002$). No in-hospital mortality or 30-day readmission rates were related to no-CMF consult. Total patient charges saved with no-CMF consultation was $26 539.96., DISCUSSION: Trauma surgeons can selectively manage acute CMF injuries without inpatient specialist consultation. Additional guidelines can be established to avoid tertiary transfers for specialty consultation and decrease patient charges.

3592. Melo, A. R., et al. (2012). "Conservative treatment of comminuted mandibular fracture involving maxillomandibular fixation with miniplates." The Journal of craniofacial surgery **23**(3): 893-895.

Bars and steel wires are the most commonly used methods to achieve maxillomandibular fixation, although there are numerous alternatives described for this same purpose. In cases of edentulous candidates for the conservative treatment of facial fractures, none of the conventional methods can be instituted for maxillomandibular fixation. Fixation in such cases is achieved with the aid of the total dentures of the patient or the confection of splints, but these methods lead to eating and oral hygiene problems. This article reports the case of an edentulous patient with a comminuted mandible fracture treated with a rarely described technique in which intermaxillary fixation was achieved with titanium miniplates.

3593. Meloni, S. M., et al. (2015). "Guided implant surgery after free-flap reconstruction: Four-year results from a prospective clinical trial." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **43**(8): 1348-1355.

AIM: The aim of this prospective clinical study is to assess the 4-year outcomes of implant-supported restorations performed using a computer-guided template-assisted flapless implant surgery approach in patients reconstructed with fibula or iliac crest free flaps., MATERIALS AND METHODS: Twelve jaws in 10 patients were reconstructed with osteomyocutaneous free flap after tumour resection or gunshot wound, after complete healing computer-assisted template-based flapless implant placement, based on prosthetic and aesthetic analysis, was performed using a customized protocol. Treatment success was evaluated using the following parameters: survival of implants/prostheses, prosthetic and biologic complications, marginal bone remodelling, soft tissue parameters and patient satisfaction., RESULTS: A total of 56 implants were placed; the implants ranged between 8 and 16 mm in length and were either 3.5, 4.3 or 5 mm wide. All the patients have reached the 4-year follow-up. Three implants were lost accounting for an overall implant survival rate of 94.6%. No prosthesis were lost. Some complications were recorded. Four years after loading the mean marginal bone loss was 1.43 +/- 0.49 mm at the palatal/lingual site and 1.48 +/- 0.46 mm at the vestibular site. All the patients showed healthy soft tissues with stable probing depth (4 .93 +/- 0.75%) and successful bleeding on probing values (12 +/- 5.8%); 90% of patients were satisfied of the treatment at the 4-year follow-up., CONCLUSIONS: Computer-guided template-assisted flapless implant surgery seems to be a viable option for patients undergoing reconstruction with free flaps after tumour resection or gunshot trauma, although many challenges remain.

A high degree of patient satisfactorily was reported.

3594. Menawat, S. S., et al. (1992). "Are arteriograms necessary in penetrating zone II neck injuries?" Journal of vascular surgery **16**(3): 397-391.

The evaluation and management of potential arterial injuries in penetrating neck trauma are controversial. Routine surgical exploration or arteriography can be very expensive and time-consuming and can overburden available resources if used in all patients. We reviewed the records of 4035 patients seen in our trauma center during a 20-month period and identified a total of 110 patients (2.7%) with penetrating wounds to zone II of the neck; 50 were from gunshot wounds, 43 from stab wounds, 7 from shotgun injuries, and 10 from lacerations. In 42 (39%) patients there was no arteriogram or surgery based on location of the wounds or lack of any physical findings. None of these patients later had any evidence of an arterial injury. Forty-five patients (40%) had arteriograms based on proximity or a "soft" sign of vascular injury, which included evidence of significant bleeding or a stable hematoma. A total of 15 injuries to major arteries were identified: 3 common carotid, 5 internal carotid, and 7 vertebral. One patient died during initial resuscitation, and four patients went directly to surgery with no preoperative arteriogram for active bleeding and expanding hematoma (n = 1), an expanding hematoma (n = 2), and a large, stable hematoma (n = 1). Only one patient (of the 110) had a significant major arterial injury requiring surgery that was not predicted by physical findings. Nine arterial injuries were treated nonoperatively: six vertebral, two common carotid intimal flaps, and one small distal internal carotid pseudoaneurysm (diagnosed late). Three additional minor external carotid artery injuries were observed with no adverse sequelae.(ABSTRACT TRUNCATED AT 250 WORDS)

3595. Meng, F.-W., et al. (2021). "New lymphatic cell formation is associated with damaged brain tissue clearance after penetrating traumatic brain injury." Scientific reports **11**(1): 10193.

We characterized the tissue repair response after penetrating traumatic brain injury (pTBI) in this study. Seventy specific pathogen-free Kunming mice were randomly divided into the following groups: normal control, 1, 3, 7, 15, 21, and 30 days after pTBI. Hematoxylin and eosin (H&E) staining, immunohistochemistry, and immunofluorescence were performed to examine and monitor brain tissue morphology, and the distribution and expression of lymphatic-specific markers lymphatic vessel endothelial receptor-1 (LYVE-1), hematopoietic precursor cluster of differentiation 34 (CD34) antigen, and Prospero-related homeobox-1 (PROX1) protein. H&E staining revealed that damaged and necrotic tissues observed on day 1 at and around the injury site disappeared on day 7, and there was gradual shrinkage and disappearance of the lesion on day 30, suggesting a clearance mechanism. We explored the possibility of lymphangiogenesis causing this clearance as part of the post-injury response. Notably, expression of lymphangiogenesis markers LYVE-1, CD34, and PROX1 was detected in damaged mouse brain tissue but not in normal tissue. Moreover, new lymphatic cells and colocalization of LYVE-1/CD34 and LYVE-1/PROX1 were also observed. Our findings of the formation of new lymphatic cells following pTBI provide preliminary insights into a post-injury clearance mechanism in the brain. Although we showed that lymphatic cells are implicated in brain tissue repair, further research is required to clarify the origin of these cells.

3596. Meng, X., et al. (2013). "A telemetry-based neuromonitoring system: Validation in a swine model of closed-head rotational acceleration-induced TBI." Journal of neurotrauma **30**(15): A127.

Introduction Invasive neuromonitoring is common practice in neurointensive care, sometimes involving intracranial pressure (ICP), brain temperature, pH, and oxygen measurements. These currently use wired probes that penetrate the brain for short periods; however, an implanted wireless monitor may simplify clinical and research protocols by offering semi-invasive, long-term measurement following brain injury. Methods A custom-built, fully implantable, wireless device was used to measure ICP and temperature that consisted of a 2.4 GHz transceiver and ultra-low-power microcontroller, a custom designed PIFA/Annular Slot antenna (to transmit data up to 17m), with pressure readings from a capacitive MEMS sensor. All electronics and battery were maintained in a titanium case (2.2cm × 2.8cm) and encapsulated with medical grade epoxy. Devices were implanted into anesthetized Yorkshire swine ~24 hours prior to injury, which required a minimally invasive surgical procedure with the device placed over the skull with a 5.1-mm diameter transcranial burr hole to allow sensor contact with the cerebrospinal fluid (CSF). Non-impact TBI was induced via rapid head rotational velocity/acceleration using the Hyge pneumatic actuator. Head rotation was in the sagittal

plane at levels established to be moderate-to-severe (peak rotational velocities: 105 ± 138 rad/s). Animals were sacrificed within 6 hours and the brains processed for gross and histopathology. Results We developed a small fully embedded wireless device capable of continuously measuring ICP following brain injury. In particular, brain injury may result in devastating increases in ICP due to vascular compromise and secondary sequelae causing edema, and the control of increased ICP is a major therapeutic goal across a range of TBI severities. To validate these custom-built devices, dynamic ICP changes were measured in a swine model of closed-head rotational TBI. Following implant, baseline ICP readings were relatively stable over the 8 hours prior to injury at 16.7 ± 4.6mm Hg (mean - standard deviation). We found that closed-head rotation TBI induced a rapid and extreme ICP spike occurring directly upon injury (max ICP > 115mm Hg). Notably, device integrity and positioning remained suitable for dynamic post-injury ICP readings, which is impressive given the forces necessary to generate the rapid head rotation in swine (peak angular acceleration of over 50,000 rad/sec2). The acute elevation in ICP generally lasted for 40-60 minutes, followed by a gradual decline to maintain an elevated level over several hours post-injury. This trend of an immediate ICP spike before decreasing to persist at elevated levels has not previously been observed following closed-head injury. To confirm our measurements, the gold standard Camino ICP monitor (1104B, Integra Life Sciences) was introduced into the parenchyma 1-3 hours post-injury (placed contralateral to wireless device). Over multiple trials, Camino measurements were within 10% of concurrent measurements with wireless devices, with discrepancies potentially attributed to different placement (intraparenchyma versus subdural). Gross pathology revealed subdural hematoma in animals experiencing immediate ICP changes, whereas persistently elevated ICP was likely influenced by both cytotoxic and vasogenic edema. Conclusions We have validated a novel implantable wireless device capable of measuring ICP changes following brain injury. Specifically, we have demonstrated dynamic ICP increases as an immediate consequence of moderate-to-severe head rotational acceleration-induced TBI in swine. This miniature, implantable device may be utilized as a tool to diagnose and track ICP changes following TBI for a range of severities with diminished risk of infection. Moreover, this telemetrybased neuromonitoring system serves as a robust platform that may be expanded to include other critical physiological modalities such as cerebral oxygen and blood flow. Based on experimental objectives, these data can be transmitted continuously (up to 17 meters) o er extended time periods following injures at a range of severities, during acute recovery as well as later in awake, behaving animals post-injury.

3597. Menger, R., et al. (2017). "A Political Case of Penetrating Cranial Trauma: The Injury of James Scott Brady." Neurosurgery **81**(3): 545-551.

James Brady, the White House press secretary during President Ronald Reagan's first term in office, was 1 of 4 people (including the President) wounded during an attempted assassination attempt on President Reagan's life on March 30, 1981. John Hinckley, Jr. was found not guilty of this attempt by reason of insanity. The assassination attempt was a ploy by Hinckley, Jr. to impress the actress Jodie Foster. Brady was the most seriously injured of the 4 who were wounded. He suffered a gunshot wound to the left forehead that traveled through the left frontal lobe, corpus callosum, and then into the right frontal and temporal lobes. He initially required a bifrontal craniotomy for evacuation of a right frontotemporal intraparenchymal hemorrhage and debridement of tract. His postoperative course was complicated by seizures, cerebrospinal fluid leakage (necessitating multiple reparative procedures), aspiration pneumonia, and pulmonary emboli. Despite the severity of his injury and perioperative morbidities, Mr. Brady made good recovery. Although permanently left with residual weakness on the left side of his body, making a wheelchair necessary, Brady maintained cognitive and personality traits that were very close to his preinjury baseline. As a result, James Brady and his wife, Sarah, led a call to create legislative reform subsequently known as the "Brady Bill." This bill controversially made mandatory background checks for the purchase of firearms from licensed dealers. Our work aims to describe the assassination attempt, the neurosurgical injury and management of Mr. Brady's case, and the brief historical sequel that followed.

3598. Mennel, S. and S. Peter (2005). "Images in clinical medicine. Air-pressure injury of the eye and intracranial structures." The New England journal of medicine **353**(9): e8.

3599. Mennig, H. (1967). "[Difficult foreign bodies in the orbit and their removal]." Schwierige Fremdkorper der Orbita und ihre Entfernung. **151**(2): 145-157.

3600. Menon, D. K. (2009). "Unique challenges in clinical trials in traumatic brain injury." Critical care medicine **37**(1 Suppl): S129-135.

Clinical trials in traumatic brain injury have shown little success in providing an evidence base for the introduction of successful new therapies into clinical practice. In addition to the problems that are common to all such studies in critical illness, trials in traumatic brain injury are complicated by the extremely short temporal window for intervention, failure of many candidate drugs to cross the blood-brain barrier, ethical and regulatory obstacles associated with research in subjects who cannot provide consent, the tendency to use small sample sizes in anticipation of unrealistic treatment benefits, and difficulty in translating experimental success into clinical practice. This article reviews the potential causes of these problems and suggests some solutions. These include the changes in regulatory frameworks that are making waived consent an acceptable strategy once more, and an increasing trend toward appropriately large trials. Other encouraging developments include the increasing use of human experimental medicine strategies before phase III trials to assess blood-brain barrier penetration and dose ranging, and provide proof of concept and proof of mechanism. Novel approaches to trial design, such as sliding dichotomy, coupled with robust outcome prediction models, can increase statistical power and improve trial design.

3601. Menon, K. V., et al. (2015). "Orbital roof fracture and orbital cellulitis secondary to halo pin penetration: Case report." Global Spine Journal **5**(1): 63-67.

Study Design Case report. Objective To report and discuss a rare complication after a patient was treated conservatively with a halo vest. Methods A 51-year-old man sustained a hangman's injury of the C2 vertebra following a motor vehicle collision. He was treated conservatively in a halo vest appliance and following mobilization was discharged from the hospital. Two weeks after discharge, the patient presented to the emergency department complaining of proptosis, ptosis, diplopia, and pin loosening. He was readmitted to the hospital, the halo vest was removed, and urgent imaging studies including computed tomography scan and magnetic resonance imaging were performed. They revealed that one of the halo pins had penetrated the orbital roof with active infection of the extraocular soft tissues. In consultation with the ophthalmologist, he was treated conservatively with antibiotics for 10 days. Results His ophthalmologic complaints resolved gradually and his eye returned to normal appearance and function. In the meantime, he was immobilized in a sterno-occipital mandibular immobilizer brace. Conclusion Though rare, penetrating injuries after cranial pin insertion can occur. Halo devices must be applied by, or under close supervision of, experienced personnel to avoid such complications, and halo vests should be reviewed frequently to detect such incidents early.

3602. Mercier, F., et al. (2012). "Meninges as potential organizers of neurogenesis, neuro-inflammation, neuro-immune axis, response to injury, and key players in neurological disorders." Journal of Neuroimmune Pharmacology **7**: S73-S74.

Meninges are typically described as brain coverings without a role in brain function. In fact, meninges deeply penetrate the brain structure as the falx cerebri, tentorium cerebelli, vascular adventitia, choroid plexus stroma, and sulci. Meningeal cells connect to each other by gap junctions to form a continuous network throughout the dura, pia-arachnoid, and internal meninges. We found that internal meninges comprise a developed system of extracellular matrix (ECM), including fractones, the specialized ECM of the subventricular zone (SVZ). Fractones contain collagens, laminins, and heparin sulfate proteoglycans (HSPG), and appear as ultrastructurally visible fragments (fractals) contacting multiple processes of glia, neurons, and neural stem cells. We have shown that fractone-associated HSPG capture and promote growth factor activity in the brain ventricle walls; 6O HDA ablation of meningeal cells at the brain surface modifies neurogenesis in the SVZ, the principal neurogenic niche; mechanical brain injury raises expression of HSPG in the meninges of the wounded site. We also found deep anatomical alterations of the meninges and fractones in BTBR T+tf/J mice, an animal model for autism. Together, our results support the view that meninges and fractones form a functional apparatus that organizes growth factor/cytokine activity throughout the brain and plays a crucial role in autism.We are currently investigating whether meninges/fractones are deteriorated by substances of abuse, and are developing mathematical models to understand the role of meninges/fractones in neural alterations leading to autism.

3603. Merck, L. H., et al. (2011). "Physiologic parameters in goal-directed therapy for traumatic brain injury at a level I trauma center." Academic emergency medicine **18**(5): S179.

Background: 1.2 million cases of traumatic brain injury (TBI) are reported per year in the United States (U.S.), or 1/3 of U.S. trauma-related mortality. The Brain Trauma Foundation has published goal-directed therapy (GDT) guidelines to mitigate secondary brain injury from TBI. Provider utilization of GDT is variable. Objectives: The relationship between the physiologic parameters de?ned in GDT and outcome is assessed in an urban emergency department (ED). Methods: Retrospective chart review of ED encounters from 1/1/2008-1/1/2010 was conducted at a Level I trauma center (census >100,000 patients/year). Patients (n=210) with diagnosis of blunt head trauma and initial GCS 3-12 were identi?ed via the Trauma Registry of the American College of Surgeons. Patients (n=41) age <18 years, with penetrating trauma, initial GCS >12, or missing ED charts were excluded. In the total sample of 169 patients, data were collected on demographics, physical exam, clinical management, and disposition (ordinal outcome: discharge home, discharge to rehabilitation, and death). The relationships between physiologic goals and outcome were assessed via ordinal regression analysis (95% CI), adjusting for age, ISS, and polytrauma (SAS software version 9.2). This study was IRB-approved. Results: Absence of hypoxia (80.5%) and/or hypotension (65.1%) was associated with an 84% and 52% decrease in the odds of death, respectively (ordinal regression analyses $p<0.001$, $p<0.05$). GCS score was inversely related to mortality ($p=0.003$). Lab abnormalities were not related to outcome. ED documentation of intracranial pressure was limited, precluding analysis. Conclusion: Prior research has documented variability in management of TBI. In our sample of patients with moderate/severe TBI, patients whose physiological parameters met the recommended guidelines had improved patient outcome. Future research is needed to prospectively apply GDT for treatment of moderate/severe TBI in the ED setting.

3604. Mercurio, I., et al. (2019). "Suicide by a rifle with a muzzle brake: a particular entrance wound." Australian Journal of Forensic Sciences **51**(4): 395-406.

The authors describe a case in which a 21-year-old male committed suicide using a rifle equipped with a muzzle brake, placed in contact with his head. A muzzle brake for firearms is a device positioned at the mouth of a weapon, which dissipates the gases, that are generated subsequent to the gun being discharged. Generally, when a gun is pressed against an anatomical region, where the skin lies on the bone surface without interposition of other soft parts, the entrance wound consists of many lacerated branches, originating from a central lack of tissue. In this case report, the use of a rifle with a muzzle brake generated an unexpected wound, circular in shape, with a diameter of 0.8 cm. This lesion was surrounded by a bruised area, circular in shape, and an abrasion collar of the height of 0.5 cm. In addition, a muzzle imprint mark consisting of intradermal bruises, composed of a narrow red line concentrically encircling the entrance hole, was found. In order to analyze in detail if this particular entrance wound could be associated with a weapon equipped with the muzzle brake, ballistic tests–with weapons compatible with that used by the victim–were performed.

3605. Mertz, M. (1986). "[Traumatology of the midface--diagnostic and therapeutic guidelines for the practicing ENT physician from the viewpoint of the ophthalmologist]." Traumatologie des Mittelgesichts--Diagnostische und therapeutische Leitlinien fur den praktizierenden HNO-Arzt aus der Sicht des Ophthalmologen. **34**(1): 15-20.

Fractures of the midface combined with orbital injuries endanger vision, binocular vision, and the lacrimal system. The best results of primary surgical management are advised if the surgeon adheres to a strict time schedule. For example, a perforating injury of the eye must be diagnosed as early as possible, and be repaired immediately. Otherwise, all manipulations necessary for reconstruction of the bone and soft tissue of the face worsen the condition of the opened eyeball, including loss of its contents and function. On the other hand, competent repair of the lacrimal system may be done at the end of the operation, and management of disordered eye mobility as seen in the "blow-out" fracture may sometimes be postponed for days or even weeks. The optimal chronological order of diagnostic and surgical management as seen from the ophthalmologist's view is given in tables, and discussed in detail.

3606. Merville, L. C. and J. P. Real (1981). "Fronto-orbito nasal dislocations. Initial total reconstruction." Scandinavian journal of plastic and reconstructive surgery **15**(3): 287-297.

The craniofacial trauma can produce compound fractures with bone displacement in the central part of the upper face, i.e. the bones constituting the forehead, orbit, and nose. such dislocations are called fronto-orbito-nasal dislocations. A total and definite surgical reconstruction in one stage offers advantages such as good aesthetic and functional results. An injured person can enter professional and social life without further delay. A major advantage is also the minimizing of the risk of meningeal fistula with infectious mortal risk. A prerequisite for this surgery is accurate

clinical and radiological examination to permit a preoperative three-dimensional visualization of the lesions as a basis for careful planning of the operation. The surgical team should include neurosurgeons and plastic surgeons with experience in the maxillofacial area. The operative procedure should start with repair of the orbital frame, beginning at the upper and lateral side, followed by exploration of the four walls of the orbital chamber and of the lacrimal system. The reconstruction then proceeds with the eyelid ligaments and the nervous and vascular pedicles, especially the infra-orbital one, followed by reconstruction of the sinus maxillaris. Afterwards transnasal internal canthopexy wires are placed, the nose reconstructed and bone grafts are used to restore the orbital chamber behind the frame. The lacrimal system is repaired before the tightening of the canthopexies. In cases where neurosurgical intervention is necessary, such as suturing of dura sores or reconstruction of the anterior cranial fossa by bone grafting, this will precede the facial reconstruction. Without a strong frontal cornice it is impossible to restore the nose and orbit. Ocular injuries are treated by ophthalmic surgeons when the orbit is repaired. The last phase of the reconstruction is suturing of the muscular, mucosal and cutaneous lacerations.

3607. Messina, A. D., et al. (2013). "Fatal cranial injury in an individual from Messina (Sicily) during the times of the Roman Empire." Journal of forensic and legal medicine **20**(8): 1018-1023.

Forensic and archaeological examinations of human skeletons can provide us with evidence of violence. In this paper, we present the patterns of two cranial lesions found on an adult male (T173) buried in a grave in the necropolis 'Isolato 96', Messina, Sicily, dating back to the Roman Empire (1st century BC - 1st century AD). The skull reveals two perimortem traumatic lesions, one produced by a sharp object on the right parietal bone and the other one on the left parietal bone, presumably the result of a fall. The interpretation of fracture patterns found in this cranium are an illustration of how forensic approaches can be applied with great benefit to archaeological specimens.

3608. Messmer, J. M. (1984). "Massive head trauma as a cause of intravascular air." Journal of forensic sciences **29**(2): 418-424.

Three examples of intravascular air caused by massive head trauma are presented. The basic types of air embolism are discussed and the pathophysiology in the three cases is offered. The association should be recognized to avoid misinterpretation of the radiographs.

3609. Metter, D., et al. (1989). "[Forensic medicine roentgen studies in gunshot wounds of the skull]." Rechtsmedizinische Rontgenuntersuchungen bei Schadelschussen. **47**: 473-477.

14 X-ray examined deaths caused by cranial bullet injuries are described. Three of them are demonstrated. In all cases with bullet injuries X-ray examination should be done prior to the post mortem. With radiographs bullets can be localised quickly. An antero-posterior and a lateral view are necessary. Little parts of the bullet and bone meal particles may be visible in radiographs along the path of the bullet; using normal technique of autopsy those details may not be visible.

3610. Metzger, K., et al. (2016). "Epidemiologic Investigation of Injuries Associated With the 2013 Fertilizer Plant Explosion in West, Texas." Disaster medicine and public health preparedness **10**(4): 583-590.

OBJECTIVE: On April 17, 2013, a fire and subsequent explosion occurred at the West Fertilizer Company plant in West, Texas, and caused extensive damage to the adjacent neighborhood. This investigation described the fatal and nonfatal injuries caused by the explosion., METHODS: Persons injured by the fertilizer plant explosion were identified through death certificates, medical examination reports, medical records, and survivor interviews. Data on patient characteristics, type of injury, and location of injury were collected., RESULTS: Medical record review indicated that 252 individuals sought medical care for nonfatal injuries directly related to the explosion immediately after the explosion. Fifteen patients died of injuries sustained by the blast. Almost one-quarter of patients were admitted for treatment of injuries. Injuries sustained in the explosion included abrasions/contusions, lacerations/penetrating trauma, traumatic brain injuries/concussions, tinnitus/hearing problems, eye injuries, and inhalational injuries. Patients located closer to the explosion were more likely to be admitted to the hospital for treatment of injuries than were those who were located further away., CONCLUSION: Explosions of this magnitude are rare, but can inflict severe damage to a

community and its residents. This investigation could be a useful planning resource for other communities, public health agencies, first responders, and medical facilities. (Disaster Med Public Health Preparedness. 2016;10:583-590).

3611. Meyer, C., et al. (2003). "Indication for and technical refinements of submental intubation in oral and maxillofacial surgery." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **31**(6): 383-388.

INTRODUCTION: In maxillofacial injuries, a choice has often to be made between different ways of intubation when surgical access to both the nasal and the oral cavities is necessary. Submental intubation is an interesting alternative to tracheotomy, especially when short-term postoperative control of the airway is foreseeable, and as control of the dental occlusion is complete, and access to the nose and mouth is undisturbed., MATERIAL: This kind of intubation has been used in our department in 25 cases since 1997. All patients had fractures disturbing the dental occlusion plus either an associated fracture of the skull base, or a displaced nasal fracture., RESULTS: There was no intra-operative complication, average intubation duration was 1.5 days. Post-operative complications consisted of one case with hypertrophic scarring and two cases of abscess formation in the floor of the mouth. All these completely healed following local conservative treatment., CONCLUSION: Submental intubation demands certain technical skills but it is simple, rapid and may avoid tracheotomy in selected patients.

3612. Meyer, J., et al. (2016). "Initial characterization of [11C]-GSK1482160 as radioligand for P2X7 receptors." Journal of Nuclear Medicine **57**.

Objectives Neuroinflammation is an essential step in the progression of brain diseases [1], where pro-inflammatory cytokines play a central role [2]. Recent work has shown that the pathogenesis of neuroinflammation is mediated in part by the release of adenosine/uridine derivatives from the damage site, involving a family of ionotropic purinergic receptors including P2X7 with elevated receptor expression [3], microglial proliferation and phagocytosis of the injured site [4, 5]. This mechanism is common amongst a wide array of neurodegenerative inflammatory diseases which include: Alzheimer's, Parkinson's, Huntington's Disease, frontotemporal dementia, Atrophic Lateral Sclerosis, Multiple Sclerosis, and Traumatic Brain Injury [6-8]. The P2X7 receptors represent a novel molecular target for imaging neuroinflammation via PET. GSK1482160 is an ideal starting point for evaluation of the P2X7 receptors, has high receptor affinity, and ideal blood-brain barrier penetration [9]. Moreover, recent work from our institution has radiolabeled this compound [11C]-GSK1482160 [10] yielding a potential biomarker for neuroinflammation. Therefore, we report the initial physical and biological characterization of this novel ligand. Methods Radiosynthesis of [11C]-GSK1482160 was according to published methods [10]. To determine receptor density (Bmax), saturation kinetics was employed with using cell membrane homogenate from human embryonic kidney cells (HEK) transfected with human P2X7R gene. Receptor binding potential (Bp) was determined by association kinetics. Secondary confirmation was performed via Radiologic-IHC (RIHC) on facing sections, probed with P2X7R monoclonal antibodies (mAb), and detected via [125I]-Protein-A. Tertiary confirmation was performed via Immuno-fluorescence Assay (IFA) using P2X7 mAb conjugated to NIR-fluorophore. Whole animal biodistribution was performed in 3 mice/time point at 15, 30, and 60min post IV injection. Tissue activity (%ID/g) was determined for brain, blood, heart, lung, liver, spleen, intestines, kidney, and muscle. In addition, in vivo PET/CT (n=3) images were acquired dynamically in listmode, regions segmented manually, and time series analyzed with a 2 compartment 4 parameter tracer kinetic models. Results Using high specific activity [11C]-GSK1482160, saturation kinetics revealed a Bmax and Kd of 923fmol/mg and 1.1nm in hP2X7R-HEK cells, respectively. Association kinetic determination of kon, koff, and Bp in hP2X7R-HEK cells were 0.231/min[asterisk]nM, 0.272/min, and 0.91, respectively. These results were confirmed via P2X7 binding and IFA in hP2X7R-HEK cell blocks, showing high sensitivity and specificity in this system. Biodistribution of [11C]-GSK1482160 showed a time dependent tissue distribution in all tissues studied, with the liver (36.8±5.0), intestines (16.9±2.6) and kidney (29.1±5.4) showing the highest uptake by 30min. The brain, blood, heart, lung, spleen, and skeletal muscle all had uptake which showed similar temporal patterns, and uptake levels of 2.5±0.27, 8.16±0.90, 11.6±1.25, 12.1±1.5, 8.2±1.1, and 6.9±0.82%ID/g at 30min. To characterize tracer kinetics, in vivo PET/CT [11C]-GSK1482160 was performed in normal mice and time courses modeled for brain, liver, intestines, kidney, muscle and bladder (R2=0.933±0.021). Determination of total volumes of distributions (Vt) for brain, heart, liver, intestine, kidney, and muscle were 0.068±.0008, 0.2±0.003, 0.45±0.02, 0.21±0.02, 0.24±0.02, and 0.11±0.04, respectively. Conclusions Initial characterization of [11C]-GSK1482160 shows high affinity and favorable association/disassociation kinetics, and were confirmed via two different in vitro assays. In vivo

biodistribution indicated that the liver, intestine and kidney uptake were maximal by 30 min, and in vivo PET/CT tracer kinetic modeling indicated that Vt followed expected trends for non-diseased mice.

3613. Meyer, K., et al. (2008). "Severe and penetrating traumatic brain injury in the context of war." Journal of trauma nursing : the official journal of the Society of Trauma Nurses **15**(4): 185-181.

Our data suggests that traumatic brain injury (TBI) may account for up to one third of battle-related injuries in today's war. Although the majority of these injuries are classified as mild in severity, service members with severe or penetrating TBI can be faced with many challenges. Injuries sustained on the battlefield require a slightly different approach than the TBI care that is traditionally seen in a civilian setting. This article presents the range of care that occurs beginning on the battlefield and continuing to state-of-the-art rehabilitation within the Department of Defense and Veterans Affairs Polytrauma System of Care.

3614. Meyer, R. M., et al. (2016). "Early venous thromboembolism chemoprophylaxis in combat related penetrating brain injury." Journal of neurosurgery **124**(4): A1176.

Introduction: Traumatic Brain Injury (TBI) is independently associated with deep vein thrombosis and pulmonary embolism (DVT/PE). Based upon numerous studies of civilian closed head injury, the Brain Trauma Foundation recommends venous thromboembolism chemoprophylaxis (VTC) in severe TBI. There have been no studies to date examining this practice in penetrating brain injury (PBI). Methods: The Kandahar Airfield neurosurgery service managed over 900 consults January 2010-March 2013. 156 patients were US active-duty members; 80 of these suffered PBI, 13 of whom were excluded because they presented with frankly non-survivable CNS injury, or died during initial resuscitation from other causes. This is a retrospective analysis of the remaining 67 US active-duty PBI patients, examining the safety and efficacy of early VTC with respect to worsened intracranial hematoma (ICH) and DVT/PE. Results: 32 patients received early VTC (intervention), 35 did not (control). Mean time to first dose was 24 hours. 29 received LMWH, 3 UFH. 52 had blast mechanism PBI, 15 had gunshot wounds to the head. The incidence of worsened ICH was 16% in the intervention group and 17% amongst the controls, with the relative risk approaching one (RR=0.91, 95% CI 0.31-2.7). The incidence of DVT/PE was 12% in the intervention group, and 17% in the controls, for absolute risk reduction of 5% and number needed to treat to prevent one DVT/PE of 22; however, this was not statistically significant (RR=0.73, 95% CI 0.23-2.4). Conclusion: Early VTC was safe in this population with regards to worsened ICH. The data suggest early VTC may be efficacious for preventing DVT/PE, though not statistically significantly. This is the first study to examine early VTC in PBI, and though the results are non-generalizable (military trauma, mostly blast mechanism) there is no other data available to guide practice.

3615. Meyer, R. M., et al. (2017). "Early venous thromboembolism chemoprophylaxis in combat-related penetrating brain injury." Journal of neurosurgery **126**(4): 1047-1055.

OBJECTIVE Traumatic brain injury (TBI) is independently associated with deep vein thrombosis (DVT) and pulmonary embolism (PE). Given the numerous studies of civilian closed-head injury, the Brain Trauma Foundation recommends venous thromboembolism chemoprophylaxis (VTC) after severe TBI. No studies have specifically examined this practice in penetrating brain injury (PBI). Therefore, the authors examined the safety and effectiveness of early VTC after PBI with respect to worsening intracranial hemorrhage and DVT or PE. METHODS The Kandahar Airfield neurosurgery service managed 908 consults between January 2010 and March 2013. Eighty of these were US active duty members with PBI, 13 of whom were excluded from analysis because they presented with frankly nonsurvivable CNS injury or they died during initial resuscitation. This is a retrospective analysis of the remaining 67 patients. RESULTS Thirty-two patients received early VTC and 35 did not. Mean time to the first dose was 24 hours. Fifty-two patients had blast-related PBI and 15 had gunshot wounds (GSWs) to the head. The incidence of worsened intracranial hemorrhage was 16% after early VTC and 17% when it was not given, with the relative risk approaching 1 (RR = 0.91). The incidence of DVT or PE was 12% after early VTC and 17% when it was not given (RR = 0.73), though this difference was not statistically significant. CONCLUSIONS Early VTC was safe with regard to the progression of intracranial hemorrhage in this cohort of combat-related PBI patients. Data in this study suggest that this intervention may have been effective for the prevention of DVT or PE but not statistically significantly so. More research is needed to clarify the safety and efficacy of this practice.

3616. Mezue, W. C., et al. (1991). "Barbed spear injury to the skull base: case report." Neurosurgery **28**(3): 428-430.

A case of a barbed spear injury to the left orbit and skull base is presented. The unusual nature and circumstances of the injury and the management problems related to the proximate neurovascular bundles are discussed.

3617. Michael, A. P., et al. (2020). "The clinical efficacy and direct healthcare cost of repeat head CT in mild traumatic brain injury." Journal of neurosurgery **132**(4): 56.

Introduction: Intracranial hemorrhage (ICH) is frequently found on head CT imaging after mild traumatic brain injury (mTBI), prompting transfer to a trauma center with repeat imaging to confirm hemorrhage stability.1,2 Several studies suggest that repeat imaging has little clinical utility in patients with minimal ICH, who do not use anticoagulant/antiplatelets and who have no change in neurologic status.3-7 We sought to assess the clinical utility and cost effectiveness of repeat head CT's in low-risk mTBI patients. Methods: A retrospective evaluation of patients receiving a neurosurgical consultation for mTBI during a 5-year period was performed at a level 1 trauma center. Exclusion criteria included GCS≤13, current anticoagulant/antiplatelet use, displaced skull fracture, ≥ 8 mm ICH, scattered subarachnoid hemorrhage or intraventricular hemorrhage. Clinical efficacy and associated healthcare costs of repeat head CT and transfer from outlying hospitals were assessed. Results: Of 531 eligible patients, 121 met inclusion criteria. Thirty-one patients (25.6%) had one head CT, 90 patients (74.4%) received two or more. Direct cost of all repeat imaging was $281,111. Thirty-seven patients (30.6%) were transferred from tertiary medical centers. Direct cost of ground transfer via emergency medical services was $55,944. Four patients developed evolution of ICH on repeat CT. No patient had neurosurgical intervention (i.e. craniotomy, placement of intracranial pressure monitor) or in-hospital mortality. Two patients had a mTBI related 30-day readmission for seizure. Conclusion: Repeat head CT did not change management of low risk mTBI patients in this study. Serial neurological examinations without repeat imaging appears to be safe and effective for select mTBI patients. Additionally, telemedicine may eliminate the need to transfer low-risk mTBI patients from small outlying hospitals and could provide future cost savings. A larger prospective analysis is warranted for further evaluation.

3618. Michaud, L. J. and A. C. Duhaime (1995). "Gunshot wounds to the brain in children." Journal of Head Trauma Rehabilitation **10**(5): 25-35.

Firearm injuries to children, including those involving the brain, are increasing in frequency. Most studies of brain injury in children, from epidemiological through outcome studies, have excluded gunshot wounds. The literature available on gunshot wounds to the brain in children will be reviewed, as well as pertinent literature on gunshot wounds to the brain in adult civilian and military populations. Ballistics, epidemiology, types and mechanisms of primary and secondary injuries resulting from gunshot wounds to the brain, management, and prognostic factors associated with outcome will be discussed. Cases with outcomes that would not have been predicted from information available in the literature will be presented and discussed, along with the implications for need for further research.

3619. Michon, J. and D. Liu (1994). "Intraorbital foreign bodies." Seminars in ophthalmology **9**(3): 193-199.

A high index of suspicion is important in evaluating any penetrating orbital injury. Likewise, any chronically infected orbit must be suspected of harboring an IOrbFB. Careful history and examination are mandatory for both clinical and medicolegal purposes. Appropriate imaging studies, usually including CT scanning, must be employed. Antibiotic therapy may be crucial in preventing infectious complications, including those involving the central nervous system. The decision regarding surgery must be individualized and should consider visual status, form and composition, and localization of an IOrbFB. The possibility of orbitocranial extension should always be considered and ruled out. Following these general rules, an injury with a small but real potential for clinical disaster may be mitigated, and visual and neurological outcome may be optimized.

3620. Michon, J. J. and N. R. Miller (1993). "Management of combined penetrating intraorbital and intracranial trauma." Archives of ophthalmology (Chicago, Ill. : 1960) **111**(4): 438-439.

3621. Midlenko, A. I., et al. (2000). "[Circulating immune complexes in acute concussion of the brain]." Tsirkuliruiushchie immunnye kompleksy v ostrom periode sotriaseniia golovnogo mozga u detei.(4): 21-23.

The aim of the study was to study the count of circulating immune complexes (CIC) in the blood of children with acute concussion of the brain. The fact that CIC at high concentrations that can penetrate into the brain through the blood-brain barrier and cause complications as vasculitis, microangiopathy, proliferative processes in the meninges, enlarged ventricles of the brain, and atrophy of its tissue was borne in mind. The studies revealed a significant progressive CIC increase within 3 weeks. For correction of blood CIC levels, laser exposure was applied to the carotid and vertebral arteries and acupuncture points. For comparison, thymaline in age-specific doses was used. Laser radiation showed a significant fall of CIC at days 19-21, particular when applied to the acupuncture points. Thymaline did not affect blood CIC levels. Laser application to the acupuncture points in children with acute brain concussion should reduce the incidence of complications of brain injury disease.

3622. Mielniczek, P., et al. (2016). "[Treatment methods of atypical gunshot wounds to the head--case reports]." Sposoby leczenia nietypowych obrazen postrzalowych glowy--opisy przypadkow. **40**(239): 318-324.

Due to a high mortality rate, headshot injuries pose serious diagnostic and clinical problems. In this work, we wanted to describe four atypical headshot injuries. The first patient with a headshot injury using a nail gun mishap; the second one after a headshot injury, as a result of attempted murder (the bullet came to a parasagittal halt in the left parietal area); the third victim, after a suicide attempt (the bullet was removed from clivus area, below the pituitary gland); in the case of the fourth patient, after shooting himself with a self-constructed weapon in the chin, the metal body was surgically removed - a bearing pellet from the corpus callosum. Males dominate among victims of headshot injuries. Alcohol is one of the elements that facilitate suicidal behaviour. Anti-spasm, antibacterial, anti-tetanus prophylaxes are incredibly important. In some cases, the metallic body does not have to be removed from the brain. Pulmonary embolism can be a cause of death after 7 days from injury.

3623. Migliaro, M., et al. (2016). "[Post traumatic pneumoencephalus]." Neumoencefalo postraumatico. **76**(3): 192.

3624. Mihailovic, Z., et al. (2007). "Firearm suicide committed using an unusual combination of tandem missiles: a bullet, a nail, and a screw." The American journal of forensic medicine and pathology **28**(3): 220-222.

An interesting case of firearm suicide carried out using an unusual type of handmade weapon and a peculiar combination of tandem missiles is presented. A nail and a screw were placed in the rifle barrel ahead of a bullet, and all 3 were simultaneously discharged. The inflicted injury began with 1 common channel, which later split in 2 separate channels, both directed backwards and upwards; one was caused by the screw, ending in the epistropheal body, and the other, caused by the bullet and the nail, penetrated into the cranial cavity, where it bifurcated in 2 branches, one from the bullet, ending in the cerebellar tissue, and the other from the nail, penetrated through the brain stem. The established site of the entrance suicidal wound, the appearance of the weapon, and the unusual missiles are discussed with regard to the available references dealing with different types of nail injuries to the head.

3625. Mihic, J., et al. (2011). "Head injury in children." Acta clinica Croatica **50**(4): 539-548.

Nowadays, head injuries are becoming more frequent in children. The most common cause of head injuries in children is fall, and, in more severe injuries, traffic accident trauma. In traumatic brain injuries in infants and small children, the most common symptoms are paleness, somnolence and vomiting, the so called "pediatric contusion syndrome". After the first year of age, light head trauma occurs after minor falls, whereas the most severe injuries are caused by car accidents, including pedestrians, or fall from the height. As the child grows, severe head trauma is more likely to occur after bicycle or car accidents. Brain injuries involving or penetrating the brain by broken bone fragments include contusions and lacerations of the brain. Unconsciousness need not always occur during contusion, as it may also appear after swelling of the brain or high intracranial pressure complications. Despite comprehensive injuries in such types of accidents, the outcome of survivors is surprisingly good. Such severe neurocranium injuries usually include heavy bleeding with hematoma (epidural bleeding, subdural bleeding, intracerebral bleeding, and traumatic subarachnoid hemorrhage). Improved prehospital care, readiness and accessibility of multidisciplinary teams,

establishment of regional centers, and efforts to prevent and decrease traffic accidents contribute to mortality rate reduction.

3626. Mikati, A. G., et al. (2018). "Validation of the survival after acute civilian penetrating brain injuries (SPIN) score in a multi-center cohort." Annals of neurology **84**: S111.

Introduction Using a large two-center cohort of 413 pene-trating traumatic brain injury (pTBI) patients, we previously developed the Survival after Acute Civilian Penetrating Brain Injuries (SPIN) Score, a logistic regression-based parsimonious risk stratification scale for estimating survival after civilian pTBI. The objective of the present study was to externally validate the SPIN-Score. Methods Our multi-center validation cohort comprised 362 pTBI patients retrospectively identified from the local trauma registries at three U.S. level-1 trauma centers. The SPIN score variables (motor GCS, sex, pupillary reactivity, self-inflicted pTBI, transfer status, Injury Severity Score (ISS) and INR) were collected from the trauma registries supplemented by chart review. Using the SPIN-score multivariable logistic regression model from the original study, receiver-operating-characteristic area-under-the-curve (ROC-AUC) analysis and Hosmer-Lemeshow Goodness-of-fit testing was performed. Results The mean age was 32 ± 15 years, and patients were predominantly male (85%), with 41% white and 28% black. In-hospital mortality was 52%, and 6-month mortality of hospital survivors was 3.1%. INR was missing in 105 patients, leaving 257 pTBI patients for full SPIN-model validation. The full SPIN-model with numerical variables entered linearly had a ROC-AUC of 0.88 with a Hosmer-Lemeshow Goodness-of-fit p-value=0.43, with p>0.05 indicating excellent model calibration. In a post-hoc sensitivity analysis, we removed INR from the model to include all 362 patients (SPINminus-INR), resulting in a ROC-AUC of 0.82 with a Hosmer-Lemeshow Goodness-of-fit p-value=0.007, indicating less ideal calibration. Validation of the full SPIN-model at 6-months resulted in similar discrimination and calibration (ROC-AUC=0.91; Hosmer-Lemeshow Goodness-of-fit p-value=0.92). Conclusions In this multi-center external validation study, the full SPIN-model predicts in-hospital and 6-month survival after pTBI with excellent discrimination and calibration. After removing INR from the model, discrimination remained excellent, but model calibration diminished. The full SPIN-score may provide important information to guide families and physicians after civilian pTBI.

3627. Mikati, A. G., et al. (2017). "Validation of the survival after acute civilian penetrating brain injuries (SPIN) score in a multicenter cohort." Neurocritical care **27**(2): S100-S101.

Introduction Using a large two-center cohort of 413 penetrating traumatic brain injury (pTBI) patients, we previously developed the Survival after Acute Civilian Penetrating Brain Injuries (SPIN) Score, a logistic regressionbased parsimonious risk stratification scale for estimating survival after civilian pTBI. The objective of the present study was to externally validate the SPIN-Score. Methods Our multicenter validation cohort comprised 362 pTBI patients retrospectively identified from three U.S. Level-1 trauma center registries. The SPIN score variables (motor GCS [mGCS], sex, pupillary reactivity, self-inflicted pTBI, transfer status, Injury Severity Score [ISS] and INR) were collected from the trauma registries supplemented by chart review. Using the SPIN-score multivariable logistic regression model from the original study, receiver-operating-characteristic area-under-the-curve (ROC-AUC) analysis and Hosmer-Lemeshow Goodness-of-fit testing was performed. Results The mean age was 32±15 years, and patients were predominantly male (85%), with 41% white and 28% black. In-hospital mortality was 52%, and 6-month mortality of discharge survivors was 3.1%. INR was missing in 105 patients, leaving 257 pTBI patients for full SPIN-model validation. The full SPIN-model with numerical variables entered linearly had a ROC-AUC of 0.88 with a Hosmer-Lemeshow Goodnessof- fit p-value=0.43, with p>0.05 indicating good model calibration. In a post-hoc sensitivity analysis, we removed INR from the model to include all 362 patients (SPINminus-INR), resulting in a ROC-AUC of 0.82 with a Hosmer-Lemeshow Goodness-of-fit p-value=0.007, indicating less ideal calibration. Using mGCS, Neurocrit Care (2017) 27:S1-S491 S101 POSTER PRESENTATIONS INR and ISS as categorical variables (as applied in the SPIN-score) resulted in ROC-AUC of 0.89 with a Hosmer-Lemeshow Goodness-of-fit p-value=0.67 (good calibration). Conclusions In this multicenter external validation study, the full SPIN-model predicts in-hospital survival after pTBI with excellent discrimination and calibration. After removing INR from the model, discrimination remained excellent, but model calibration diminished. The full SPIN-score may provide important information to guide families and physicians after civilian pTBI.

3628. Mikati, A. G., et al. (2018). "Validation of the survival after acute civilian penetrating brain injuries (SPIN) score in a multi-center cohort." Journal of neurotrauma **35**(16): A109.

Introduction: Using a large two-center cohort of 413 penetrating traumatic brain injury (pTBI) patients, we previously developed the Survival after Acute Civilian Penetrating Brain Injuries (SPIN) Score, a logistic regression-based parsimonious risk stratification scale for estimating survival after civilian pTBI. The objective of the present study was to externally validate the SPIN-Score. Methods: Our multi-center validation cohort comprised 362 pTBI patients retrospectively identified from the local trauma registries at three U.S. level-1 trauma centers. The SPIN score variables (motor GCS, sex, pupillary reactivity, self-inflicted pTBI, transfer status, Injury Severity Score (ISS) and INR) were collected from the trauma registries supplemented by chart review. Using the SPINscore multivariable logistic regression model from the original study, receiver-operating-characteristic area-under-the-curve (ROCAUC) analysis and Hosmer-Lemeshow Goodness-of-fit testing was performed. Results: The mean age was 32±15 years, and patients were predominantly male (85%), with 41% white and 28% black. In-hospital mortality was 52%, and 6-month mortality of hospital survivors was 3.1%. INR was missing in 105 patients, leaving 257 pTBI patients for full SPIN-model validation. The full SPIN-model with numerical variables entered linearly had a ROC-AUC of 0.88 with a Hosmer-Lemeshow Goodness-of-fit p-value = 0.43, with $p > 0.05$ indicating excellent model calibration. In a post-hoc sensitivity analysis, we removed INR from the model to include all 362 patients (SPINminus-INR), resulting in a ROCAUC of 0.82 with a Hosmer-Lemeshow Goodness-of-fit p-value = 0.007, indicating less ideal calibration. Validation of the full SPIN-model at 6-months resulted in similar discrimination and calibration (ROCAUC= 0.91; Hosmer-Lemeshow Goodness-of-fit p-value = 0.92). Conclusions: In this multi-center external validation study, the full SPIN-model predicts in-hospital and 6-month survival after pTBI with excellent discrimination and calibration. After removing INR from the model, discrimination remained excellent, but model calibration diminished. The full SPIN-score may provide important information to guide families and physicians after civilian pTBI.

3629. Mikati, A. G., et al. (2019). "Multicenter Validation of the Survival After Acute Civilian Penetrating Brain Injuries (SPIN) Score." Neurosurgery **85**(5): E872-E879.

BACKGROUND: Civilian penetrating traumatic brain injury (pTBI) is a serious public health problem in the United States, but predictors of outcome remain largely understudied. We previously developed the Survival After Acute Civilian Penetrating Brain Injuries (SPIN) score, a logistic, regression-based risk stratification scale for estimating in-hospital and 6-mo survival after civilian pTBI with excellent discrimination (area under the receiver operating curve [AUC-ROC = 0.96]) and calibration, but it has not been validated., OBJECTIVE: To validate the SPIN score in a multicenter cohort., METHODS: We identified pTBI patients from 3 United States level-1 trauma centers. The SPIN score variables (motor Glasgow Coma Scale [mGCS], sex, admission pupillary reactivity, self-inflicted pTBI, transfer status, injury severity score, and admission international normalized ratio [INR]) were retrospectively collected from local trauma registries and chart review. Using the original SPIN score multivariable logistic regression model, AUC-ROC analysis and Hosmer-Lemeshow goodness of fit testing were performed to determine discrimination and calibration., RESULTS: Of 362 pTBI patients available for analysis, 105 patients were lacking INR, leaving 257 patients for the full SPIN model validation. Discrimination (AUC-ROC = 0.88) and calibration (Hosmer-Lemeshow goodness of fit, P value = .58) were excellent. In a post hoc sensitivity analysis, we removed INR from the SPIN model to include all 362 patients (SPINNo-INR), still resulting in very good discrimination (AUC-ROC = 0.82), but reduced calibration (Hosmer-Lemeshow goodness of fit, P value = .04)., CONCLUSION: This multicenter pTBI study confirmed that the full SPIN score predicts survival after civilian pTBI with excellent discrimination and calibration. Admission INR significantly adds to the prediction model discrimination and should be routinely measured in pTBI patients.

3630. Mikhael, M., et al. (2018). "Perioperative Care for Pediatric Patients With Penetrating Brain Injury: A Review." Journal of neurosurgical anesthesiology **30**(4): 290-298.

Traumatic brain injury (TBI) continues to be the leading cause of death and acquired disability in young children and adolescents, due to blunt or penetrating trauma, the latter being less common but more lethal. Penetrating brain injury (PBI) has not been studied extensively, mainly reported as case reports or case series, due to the assumption that both types of brain injury have common pathophysiology and consequently common management. However, recommendations and guidelines for the management of PBI differ from those of blunt TBI in regards to neuroimaging, intracranial pressure (ICP) monitoring, and surgical management including those pertaining to vascular injury. PBI was one of the exclusion criteria in the second edition of guidelines for the acute medical management of severe TBI in infants, children, and adolescents that was published in 2012 (it is referred to as "pediatric guidelines" in this review).

Many reviews of TBI do not differentiate between the mechanisms of injury. We present an overview of PBI, its presenting features, epidemiology, and causes as well as an analysis of case series and the conclusions that may be drawn from those and other studies. More clinical trials specific to penetrating head injuries in children, focusing mainly on pathophysiology and management, are needed. The term PBI is specific to penetrating injury only, whereas TBI, a more inclusive term, describes mainly, but not only, blunt injury.

3631. Miki, K., et al. (2019). "How to Remove a Penetrating Intracranial Large Nail." World neurosurgery **127**: 442-445.

BACKGROUND: The incidence of penetrating intracranial foreign bodies is rare, and to date, not many relevant studies have been published worldwide. In particular, a nail penetrating intracranially, just near the superior sagittal sinus (SSS), is extremely rare. We treated the case of a large nail that penetrated the middle of the head and strategized its removal., CASE DESCRIPTION: A 70-year-old man had experienced headache lasting a day. Computed tomography of the brain revealed a nail penetrating the middle of his head; in particular, the tip of the nail had penetrated the right ventricle, causing a slight subarachnoid hemorrhage. Angiography showed that the nail was very close to the SSS and that the venous flow was normal. However, there was a risk of the nail penetrating through the SSS or injuring other arteries, and we removed the nail directly from the intracranial view to stop bleeding from the SSS or other vessels. Fortunately, there was no bleeding, and we washed the hole created by the nail penetration and concluded the surgery., CONCLUSIONS: Our technique is useful and safe for removing large nails penetrating the head.

3632. Milano, F., et al. (2019). "A rare case of suicide by multiple gunshot wounds to the head." Medico-Legal Update **19**(1): 99-103.

Firearm injuries represent a significant topic of forensic pathology. The literature in this regard is innumerable, and can seem to have extensively covered the topic of this paper. However, the biological reality and the unpredictability of the concrete cases, continue and will always continue to present unusual circumstances that are worth examining for forensic pathologists. In this case report, we performed a comparative analysis between a particular case and the scientific literature. The case in question concerns suicide by single-shot short firearm, in which the subject shot himself three times on two sides of the head, without affecting the brain during its self-suppressive intent. Cases similar to this are always cause for reasonable doubt, which can only be solved with the contribution of forensic pathology and in-depth research.

3633. Milhorat, T. H., et al. (1993). "Spontaneous movement of bullets in the brain." Neurosurgery **32**(1): 140-143.

We report two patients in whom bullets in the brain migrated into the adjacent lateral ventricle and moved freely as a consequence of gravity. A review of the literature suggests that the spontaneous migration of intracerebral bullets is influenced by cerebral softening, the specific gravity of the bullet compared with brain tissue, and the sink function of the cerebral ventricles. In patients undergoing the surgical removal of intracerebral or intraventricular bullets, it is recommended that an x-ray be obtained after the final positioning of the head.

3634. Miller, C. F., et al. (1977). "The danger of intracranial wood." Surgical neurology **7**(2): 95-103.

Peri-orbital puncture wounds by sharp wooden objects are not rare, but can be dangerous when there is intracranial penetration by and retention of the wooden foreign body. Days to years after an apparently trivial initial wounding, serious intracranial complications can occur. The authors have reviewed 42 case reports from the literature. Morbidity-defined as permanent neurologic sequelae-occurred in 74% of the cases. Intracranial suppuration was the major complication, with brain abscess having occurred in nearly one-half of the cases. Mortality occurred in 25% of 28 cases occurring in the post-antibiotic era. The qualities of wood which make it especially hazardous as a wounding agent and foreign body are discussed. The role of orbital anatomy in affording easy access to the cranial contents is described. Surgical exploration in all those cases in which there is a reasonable suspicion of intracranial injury is recommended.

3635. Miller, K. E. and E. B. Coan (2016). "Penetrating Orbital Injury From a Needlefish." Military medicine **181**(8): e962-964.

Orbital penetrating injuries are an unfortunately common occurrence; however, those from marine animals are rare. Injuries from marine animals can be quite profound and there are no known reports of complete visual recovery after an orbital penetrating injury. Complications range from secondary infection to a carotid-cavernous fistula, which can complicate the management of these patients. We report a case of penetrating orbital injury from a needlefish with complete return of visual function after surgical removal of foreign debris and an extended course of antibiotics. Reprint & Copyright © 2016 Association of Military Surgeons of the U.S.

3636. Miller, K. R., et al. (2011). "The evolving management of venous bullet emboli: a case series and literature review." Injury **42**(5): 441-446.

Bullet emboli are an infrequent and unique complication of penetrating trauma. Complications of venous and arterial bullet emboli can be devastating and commonly include limb-threatening ischaemia,pulmonary embolism, cardiac valvular incompetence, and cerebrovascular accidents. Bullets from penetrating wounds can gain access to the venous circulation and embolise to nearly every large vascular bed. Venous emboli are often occult phenomenon and may remain unrecognised until migration leads to vascular injury or flow obstruction with resultant oedema. The majority of arterial emboli present early with end-organ or limb ischaemia. We describe four separate cases involving venous bullet embolism and the subsequent management of each case. Review of the literature focusing on the reported management of these injuries, comparison of techniques of management, as well as the evolving role of endovascular techniques in the management of bullet emboli is provided. Copyright 2010 Elsevier Ltd. All rights reserved.

3637. Miller, P. and R. Lipschitz (1987). "Transclival penetrating injury." Neurosurgery **21**(1): 92-94.

A case of a stab wound of the cranium with a retained knife blade is presented. The blade had an unusual course through the base of the skull--the point of the knife penetrated the clival line to end in the posterior fossa. Although the blade was in close proximity to the basilar artery, it was judged safe to extract the knife by blind removal. The patient had no neurological deficit postoperatively.

3638. Miller, R., et al. (2014). "Pediatric falls from open windows: What are the injuries a radiologist will encounter?" Emergency radiology **21**(5): 448-449.

Purpose: A recent national public awareness issue has been pediatric falls from building windows. To our knowledge, no case series identifying the types of injuries incurred due to accidental falls from windows has been published. The purpose of this study is to review the injuries the radiologist may encounter and to correlate with clinical outcomes. Materials and Methods: Consecutive patients evaluated at our institution from 1/1/2011-12/31/2012 were retrospectively reviewed. The study included patients aged 0-8 years with a trauma history of fall from an open building window. Demographics analyzed included age, sex, fall height, type of surface landed on, types of injury sustained, length of stay in hospital, emergent interventions, and long term clinical outcomes. Results: Thirty-six pediatric patients populated our trauma registry database query. Thirty-two met inclusion criteria. The average age was 3.3 years, with the majority of patients male (22/32). The majority (24/ 32) fell from 2nd story windows, with a screen present in 10/32 falls. The majority of accidents occurred during the summer months (17/32). Twenty-nine patients were imaged. The most commonly encountered radiologic findings included: scalp contusion (12), non-displaced/minimally displaced skull fracture (12), epidural hematoma (6), subdural hematoma (6), subarachnoid hemorrhage (5), and lung contusion (4). Disposition included 9 discharges from ED, 12 overnight observations, and 11 extended hospitalizations-the majority (7) due to intracranial hemorrhage. All patients survived, with one patient requiring a decompressive craniectomy and long-term neurosurgical follow-up. Conclusion: Accidental falls from windows in the pediatric population are a relatively common, but preventable trauma encountered by the radiologist. Awide variety of injuries are sustained, with the potential for serious trauma even from relatively short heights. This study shows that the majority of injuries presenting in the emergency setting include skull fractures and associated intra- and extra-axial hemorrhage, with the majority of patients requiring hospitalization. Severalmajormetropolitan areas have successfully curtailed accidental falls from windows.With increased awareness, the goal is to eliminate these preventable accidents across the country.

3639. Millis, S. R. and J. H. Ricker (1995). "Verbal learning and memory impairment in adult civilians following penetrating missile wounds." Brain injury **9**(5): 509-515.

Verbal memory and learning patterns, as measured by the California Verbal Learning Test (CVLT), following penetrating head injury (PHI) from gunshot wound were studied in 10 acutely injured patients (mean age 25.3 years) at a mean of 2.1 months post-injury. Primary impairment was found on measures of free recall of new verbal information which appeared to be related to deficits in organisational and retrieval functions: (1) the group's learning characteristics were marked by disorganization and an underutilization of active learning strategies; (2) rate of acquisition also appeared to be mildly decreased; (3) nevertheless, the PHI group did not show severe disruption in all aspects of learning and memory. In fact, the group showed a relatively intact capacity to store new information in memory.

3640. Mills, V. A., et al. (1982). "Central nervous system Nocardia infection." Clinical pediatrics **21**(4): 248-250.

3641. Milne, E. and J. Grafman (2001). "Ventromedial prefrontal cortex lesions in humans eliminate implicit gender stereotyping." Journal of neuroscience **21**(12): RC150.

Patients with prefrontal cortex lesions and controls were administered an implicit association task (IAT) that measured the degree of association between male and female names and their stereotypical attributes of strength and weakness. They also completed three questionnaires measuring their explicit judgment regarding gender-related stereotypical attributes. There were no between-group differences on the explicit measures. On the IAT, patients with dorsolateral lesions and controls showed a strong association, whereas patients with ventromedial prefrontal cortex lesions had a significantly lower association, between the stereotypical attributes of men and women and their concepts of gender. This finding provides support for the hypothesis that patients with ventromedial prefrontal lesions have a deficit in automatically accessing certain aspects of overlearned associated social knowledge.

3642. Milton, J. and V. Awuor (2017). "A Unique Presentation of an Intracranial Abscess Secondary to Retained Projectile after Debridement with Dural Closure." Cureus **9**(6): e1328.

Patients with penetrating head trauma with retained projectiles develop intracranial abscesses as a common complication. The most common presentation is a suddenly worsening headache. The most common pathogen identified is staphylococcus. Outcomes are related to adherence of Matson's tenets. This case study details the presentation of a 19-year-old patient that presented to the neurological surgery clinic without neurologic deficits. Further questioning revealed complaints of intermittent diffuse headaches with bilateral upper extremity shock-like sensation for two weeks. Eight weeks prior he had undergone right craniotomy, after a gunshot wound, for debridement and watertight dural closure. The patient denied symptoms of fever, chills, nausea, vomiting, diarrhea, or seizure. The patient presented with a noncontrast head computed tomography (CT) which revealed retained projectile fragments without clear evidence of abscess. On physical exam, the patient was without any neurological deficit. Laboratory investigation revealed normal white blood cell count, erythrocyte sedimentation rate, C-reactive protein, and negative blood cultures. Head CT with contrast revealed a large intracerebral abscess adjacent to the thalamus. The patient was taken to the operating room for repeat craniotomy with resection of the abscess and removal of the intracranial projectile fragments. Post-operatively, the patient remained neurology intact. Intraoperative cultures were not significant for the growth of any bacteria. In eight weeks time, the patient returned to his employment and his baseline level of activity. This case underscores the importance of thorough assessment in patients with retained intracranial projectiles as well as the need to routine follow-up. The unique presentation of this patient prompted further investigation which elucidated a lesion which correlated to his symptoms although laboratory assessment was without abnormality.

3643. Milton, J., et al. (2017). "A Case-Based Review of the Management of Penetrating Brain Trauma." Cureus **9**(6): e1342.

Principles of penetrating head trauma management were established by Harvey Cushing in relation to the management of penetrating brain injuries of World War One. Cushing radically debrided the scalp and skull and aggressively irrigated wound tracks to remove foreign bodies. He would then obtain water-tight closure. Cushing significantly decreased infection rates which reportedly limited the major cause of mortality due to penetrating head

injuries. Many advances have been made by contributions from World War Two, Korean War, Vietnam War, and Iran/Iraq conflicts. Early radical decompression, with conservative debridement and duraplasty applied to blast-induced penetrating injuries during Operation Iraqi Freedom, has resulted in increased survivability and neurological improvement. Each advance in the management of these injuries is based upon more effectively addressing one or more components of Matson's tenets. This case series reviews the successful management of three patients that presented to a level I trauma center with a penetrating head injury from high-velocity projectiles. Management principles of each patient begin with a proper patient assessment, application of Matson's tenets from the time of injury, and airway control. Surgical management is based upon adherence to Grahm's Guidelines which emphasize criteria centered upon post-resuscitative Glasgow Coma Scale score and appropriate imaging. This case series suggests that proper patient evaluation, adherence to Matson's tenets and to Grahm's Guidelines, and appropriate patient selection for operative management leads to improved survival of patients with penetrating head trauma from high-velocity projectiles.

3644. Milwood Hargrave, J., et al. (2019). "Blast injuries in children: A mixed-methods narrative review." BMJ Paediatrics Open **3**(1).

Background and significance Blast injuries arising from high explosive weaponry is common in conflict areas. While blast injury characteristics are well recognised in the adults, there is a lack of consensus as to whether these characteristics translate to the paediatric population. Understanding blast injury patterns in this cohort is essential for providing appropriate provision of services and care for this vulnerable cohort. Methods In this mixed-methods review, original papers were screened for data pertaining to paediatric injuries following blasts. Information on demographics, morbidity and mortality, and service requirements were evaluated. The papers were written and published in English from a range of international specialists in the field. Results Children affected by blast injuries are predominantly male and their injuries arise from explosive remnants of war, particularly unexploded ordinance. Blasts show increased morbidity and mortality in younger children, while older children have injury patterns similar to adults. Head and burn injuries represent a significant cause of mortality in young children, while lower limb morbidity is reduced compared with adults. Children have a disproportionate requirement for both operative and non-operative service resources, and provisions for this burden are essential. Conclusions Certain characteristics of paediatric injuries arising from blasts are distinct from that of the adult cohort, while the intensive demands on services highlight the importance of understanding the diverse injury patterns in order to optimise future service provisions in caring for this child blast survivor.

3645. Mimbella, P. C., et al. (2016). "Remarkable recovery of function in a young adult female after low-velocity penetrating head injury and arrival with retained foreign body: A case report." PM and R **8**(9): S241.

Case/Program Description: This is a 29-year-old woman with severe, open, penetrating, traumatic brain injury and a hammer embedded 3.5cm into the cranial vault after assault. She was GCS3T in the field. Upon her presentation to the emergency department, she was noted to have a foreign object 'stuck' in her left occipital skull. Her injuries included: depressed calvarial fracture with intrusion of the hammer mallet, multiple depressed, displaced, comminuted facial fractures, pneumocephalus, traumatic subarachnoid hemorrhage, bilateral frontal hemorrhagic contusions, malignant hypertension, and frontal/ superior sagittal sinus injuries. She was emergently taken to the OR and underwent hemicraniectomy, removal of foreign body, sinus repair, and insertion of ICP monitor. On post-operative day 10, the patient was admitted to the rehabilitation unit. On admission, her functional scores were max-assist. Setting: Tertiary Care Hospital. Results: The patient required a 14-day acute inpatient rehabilitation stay. Her functional scores improved to supervision/modified-independent. She demonstrated increased problem solving and abstract reasoning. She ambulated 5,000ft on discharge with supervision. Her neuropsychiatric scores significantly improved. Further developments will be discussed. Discussion: Low velocity penetrating head injuries, especially those with retained foreign bodies, are rare. These injuries pose significant challenges to the care of these victims and, if not managed properly, can lead to serious consequences. One such consequence developed in this patient during her rehabilitative stay but was rapidly identified and treated appropriately, relieving any further burden for the patient. Conclusions: Accurate initial prognosis following low velocity penetrating TBI remains exceedingly challenging. This is not only due to the rarity of such injuries in non-developing countries, but also due to the serious potential associated complications. Remarkable neurological recovery remains possible even in the face of exceptionally violent cranial injuries. Appropriate medical, surgical, and rehabilitative treatment can combine to yield extraordinary functional recovery.

3646. Minard, G., et al. (2000). "Early versus delayed feeding with an immune-enhancing diet in patients with severe head injuries." JPEN. Journal of parenteral and enteral nutrition **24**(3): 145.

BACKGROUND: Although early enteral feeding clearly reduces septic morbidity after blunt and penetrating trauma, data for head-injured patients are conflicting. This study examines the effects of early vs delayed enteral feedings on outcome in patients with severe closed-head injuries with a Glasgow Coma Scale (GCS) score greater than 3 and less than 11., METHODS: Thirty patients were prospectively randomized to receive an immune-enhancing diet (Impact with fiber) early (initiated < 72 hours after trauma) delivered via an endoscopically placed nasoenteric tube (Stay-Put) or late (administered after gastric ileus resolved). This formula was continued for 14 days or until the patient tolerated oral feeding. Goal rate of nutrition was 21 nonprotein cal/kg/d and 0.3 g N/kg/d., RESULTS: Two patients in the early group were excluded due to inability to place the tube, and one patient in the late group died before 72 hours. Five of the remaining 27 died, 1 in the early group and 4 in the late group. There were no significant differences between the groups in length of stay, intensive care unit (ICU) days, significant infection, or GCS score. However, major infection correlated inversely with admission GCS score ($R = -0.6$, $p < .003$). Time to reach a GCS score of 14 was significantly longer in patients with significant infections compared with those without ($p < .02$)., CONCLUSIONS: No difference in length of stay or infectious complications is shown in patients with severe closed-head injury when they are given early vs delayed feeding using an immune-enhancing formula. Severity of the head injury is closely associated with significant infection.

3647. Miner, A. and A. T. Smith (2018). "A Suicide Attempt by Nail Gun." The Journal of emergency medicine **55**(3): 415-416.

3648. Miner, M. E., et al. (1986). "Intracranial penetration due to BB air rifle injuries." Neurosurgery **19**(6): 952-954.

The toy BB gun that was commonly available 20 years ago has been modernized into a weapon with lethal potential. We report four children who had intracranial penetration by BBs. Three were shot by another young child, and the fourth child was injured by an intoxicated adult. Two of the children have permanent, severe neurological sequelae. BB rifles should require the same safety precautions and considerations as more traditional firearms.

3649. Miner, M. E., et al. (1990). "The results of treatment of gunshot wounds to the brain in children." Neurosurgery **26**(1): 20-25.

Thirty-three children ranging in age from 8 months to 15 years were treated for gunshot wounds to the brain. Half of the children were less than 10 years old. Fifty-eight percent died. Mortality was influenced by the trajectory of the bullet, intent to commit suicide, and the neurological status immediately after injury. The age and sex of the child and the caliber of the bullet did not influence survival. Three-fourths of the deaths occurred within 24 hours of injury, suggesting these patients had a mortal wound from the onset. Eleven of the children were attempting suicide, 9 of whom died; 13 were playing with a gun, 5 of whom died; 2 were shot as innocent bystanders to crimes in progress; 1 was shot while involved in a criminal act; 1 was shot in a hunting accident; and in 2 who died within minutes of arrival, the circumstances of the shooting were not documented. Of the survivors, none was left vegetative after 6 months, 3 had severe disabilities, 9 were moderately disabled, and 2 had a good outcome. The mortality rate is strikingly similar to that of adults with similar injuries; however, the morbidity appears to be less. On the other hand, with simple preventative measures, virtually each injury would have been avoided.

3650. Ming-Kun, Y., et al. (2011). "Treatment strategies for penetrating orbitocranial injuries: Two case reports and literature review." Journal of neurotrauma **28**(5): A40.

Background: Here we report two cases of penetrating orbito-cranial injuries. One case was operated by early surgical debridement. The other patient experienced a third operation for cellulitis in the orbit, brain abscess, and subperiosteal abscess present after two operations. We discuss key points of treatment of penetrating orbito-cranial injuries and infectious complications. Methods: The relationship of preoperative evaluation and treatment strategies with curative effect is analyzed in a case of early debridement. At the same time, the treatment process and operative strategy of another patient with cellulitis of the orbit, brain abscess, and subperiosteal abscess, are also discussed. The

second patient initially experienced debridement for orbito-cranial penetrating wounds, followed by resection of a right frontal brain abscess, and then was transferred to our hospital for the third operation. Results: The first patient experienced early complete debridement, foreign body excision, optic canal and supraorbital split decompression, and cranium reconstruction at the same time, and his wound was healed at phase 1. Follow-up has been for 11 months post-surgery. He had good recovery of eyesight, eye movement, and satisfactory appearance, and with no postoperative complications. The second patient experienced one operation for puncture drainage of brain abscesses, surgical debridement, and drainage of intraorbital and frontal subperiosteal abscesses, and was cured with good recovery without relapse at 10 months follow-up. Conclusion: The treatment of penetrating orbito-cranial wounds is complicated, and they can cause brain injury, accompanied by ocular trauma, cranial nerve and vascular injury, and may lead to orbitocranial deformities and nerve dysfunction. Thus treatment is very difficult. Once infectious complications occur, they are difficult to handle and may directly endanger life. The ideal treatment of penetrating orbitcranial wounds includes early thorough debridement, effective hemostasis, and skull base reconstruction, in order to recover a satisfactory appearance and to prevent complications. Early complete debridement is the key, and often requires multidisciplinary cooperation.

3651. Minkley, A. R., et al. (2020). "Holocord post-traumatic syringomyelia presenting with bulbar involvement: A case report." PM and R **12**(SUPPL 1): S129.

Case Description: 41-year-old male with a 23-year history of incomplete lumbar paraplegia presenting with progressive sensory and motor deficits, urinary retention, dysphagia and diplopia whose symptoms initially started 15 years prior to presentation. Setting: Tertiary Care Center Patient: 41-year-old male with L2 ASIA impairment scale (AIS) D spinal cord injury secondary to a gunshot wound Assessment/Results: MRI of the brain was unremarkable, with no evidence of infarction, Chiari malformation or hydrocephalus. However, MRI of the entire spine demonstrated a holocord syrinx extending from the medulla through the conus at L2-3. A videofluoroscopic swallow study showed mild pharyngeal dysphagia without evidence of aspiration. Despite a successful syringosubarachnoid shunt placement and subsequent inpatient rehabilitation stay, the patient did not show any significant return of motor or sensory function, though he did report subjective improvement in his swallowing function. ISNCSCI was C1 AIS D at the time of discharge from rehabilitation. Discussion: Post-traumatic syringomyelia is a well-recognized late complication of spinal cord injury, with an estimated prevalence of over 50% in all spinal cord injury cases. Symptomatic syringomyelia only presents in 1-7% of cases, and holocord involvement of the syrinx occurs even more rarely, with only a few cases reported in the literature. Here we present a rare case of holocord syringomyelia with bulbar involvement. Conclusion: Timely recognition of the signs and symptoms of progressive syringomyelia is important to prevent extensive and potentially irreversible neurologic damage, particularly in those demonstrating bulbar dysfunction and signs of holocord involvement. Clinicians must remain vigilant when working up new neurologic deficits in a patient with distant spinal cord injury.

3652. Minnick, J. M., et al. (2013). "The incidence of fever in US Critical Care Air Transport Team combat trauma patients evacuated from the theater between March 2009 and March 2010." Journal of emergency nursing **39**(6): e101-106.

INTRODUCTION: Most critically ill injured patients are transported out of the theater by Critical Care Air Transport Teams (CCATTs). Fever after trauma is correlated with surgical complications and infection. The purposes of this study are to identify the incidence of elevated temperature in patients managed in the CCATT environment and to describe the complications reported and the treatments used in these patients., METHODS: We performed a retrospective review of available records of trauma patients from the combat theater between March 1, 2009, and March 31, 2010, who were transported by the US Air Force CCATT and had an incidence of hyperthermia. We then divided the cohort into 2 groups, patients transported with an elevation in temperature greater than 100.4degreeF and patients with no documented elevation in temperature. We used a standardized, secure electronic data collection form to abstract the outcomes. Descriptive data collected included injury type, temperature, use of a mechanical ventilator, cooling treatment modalities, antipyretics, intravenous fluid administration, and use of blood products. We also evaluated the incidence of complications during the transport in patients who had a recorded elevation in temperature greater than 100.4degreeF., RESULTS: A total of 248 trauma patients met the inclusion criteria, and 101 trauma patients (40%) had fever. The mean age was 28 years, and 98% of patients were men. The mechanism of injury was an explosion in 156 patients (63%), blunt injury in 11 (4%), and penetrating injury in 45 (18%), whereas other trauma-related injuries accounted for 36 patients (15%). Of the patients, 209 (84%) had battle-related injuries and 39 (16%) had non-battle-

related injuries. Traumatic brain injury was found in 24 patients (24%) with an incidence of elevated temperature. The mean temperature was 101.6degreeF (range, 100.5degreeF-103.9degreeF). After evaluation of therapies and treatments, 80 trauma patients (51%) were intubated on a mechanical ventilator (P < .001). Of the trauma patients with documented fever, 22 (22%) received administration of blood products. Nineteen patients received antipyretics during their flight (19%), 9 received intravenous fluids (9%), and 2 received nonpharmacologic cooling interventions, such as cooling blankets or icepacks. We identified 1 trauma patient with neurologic changes (1%), 6 with hypotension (6%), 48 with tachycardia (48%), 33 with decreased urinary output (33%), and 1 with an episode of shivering or sweating (1%). We did not detect any transfusion reactions or deaths during flight., CONCLUSION: Fever occurred in 41% of critically ill combat-injured patients evacuated out of the combat theater in Iraq and Afghanistan. Fewer than 20% of patients with a documented elevated temperature received treatments to reduce the temperature. Intubation of patients with ventilators in use during the transport was the only factor significantly associated with fever. Serious complications were rare, and there were no deaths during these transports.

3653. Mirabet, V., et al. (2021). "Cranioplasty with Autologous Bone Flaps Cryopreserved with Dimethylsulphoxide: Does Tissue Processing Matter." World neurosurgery **149**: e582-e591.

OBJECTIVE: The aim of this article was to study the outcome of patients who underwent cranioplasty with cryopreserved autologous bone after decompressive craniectomy., METHODS: Data from 74 patients were retrospectively analyzed. They were divided into groups according to the storage time and the age at cranioplasty. To assess the predictive potential for complication, factors were related to successive stages (preoperative, craniectomy, tissue processing, cranioplasty, and postoperative). Cooling and warming rates applied on bone flap were calculated. The ability to inhibit microbial growth was determined exposing bone fragments to a panel of microorganisms. The concentration of antibiotics eluted from the bone was also determined. A bone explant culture method was used to detect living cells in the thawed cranial bone., RESULTS: Hydrocephalus was significantly more frequent in pediatric patients (26.7%) than in adults (5.1%). The overall rate of bone flap resorption was 21.6% (43.7% of which required reoperation). Surgical site infection after cranioplasty was detected in 6.8% of patients. There was no correlation between infection as a postoperative complication and previous microbiological-positive culture during processing. The cause of craniectomy did not influence the risk of bone flap contamination. Vancomycin was the only antibiotic detected in the supernatant where the bone was incubated. Outgrowth from bone explants was observed in 36.8% of thawed skulls. An early start of bone flap processing at the tissue bank had a positive effect on cell viability., CONCLUSIONS: The outcome after autologous cranioplasty is a multifactorial process, which is modulated by patient-related, surgery-related, and bone-related factors.

3654. Miraflor, E., et al. (2011). "Timing is everything: delayed intubation is associated with increased mortality in initially stable trauma patients." The Journal of surgical research **170**(2): 286-290.

BACKGROUND: The indications for immediate intubation in trauma are not controversial, but some patients who initially appear stable later deteriorate and require intubation. We postulated that initially stable, moderately injured trauma patients who experienced delayed intubation have higher mortality than those intubated earlier., METHODS: Medical records of trauma patients intubated within 3 h of arrival in the emergency department at our university-based trauma center were reviewed. Moderately injured patients were defined as an ISS < 20. Early intubation was defined as patients intubated from 10-24 min of arrival. Delayed intubation was defined as patients intubated >=25 min after arrival. Patients requiring immediate intubation, within 10 min of arrival, were excluded., RESULTS: From February 2006 to December 2007, 279 trauma patients were intubated in the emergency department. In moderately injured patients, mortality was higher with delayed intubation than with early intubation, 11.8% versus 1.8% (P = 0.045). Patients with delayed intubations had greater frequency of rib fractures than their early intubation counterparts, 23.5% versus 3.6% (P = 0.004). Patients in the delayed intubation group had lower rates of cervical gunshot wounds than the early intubation group, 0% versus 10.7% (P = 0.048) and a trend toward fewer of skull fractures 2.9% versus 16.1%, (P = 0.054)., CONCLUSIONS: These findings suggest that delayed intubation is associated with increased mortality in moderately injured patients who are initially stable but later require intubation and can be predicted by the presence of rib fractures.

3655. Mirza, G. E., et al. (1993). "Diagnosis and management of a biorbital pencil injury." Acta ophthalmologica **71**(2): 266-269.

A 9-year-old girl was wounded by a pencil which entered the right orbit and passed towards the left. The broken part remained inside. The diagnosis was delayed for 9 months since the history and the symptoms were misleading. The pencil, which could not be detected with plain X-rays, was demonstrated with computerized tomography (CT) and removed from the orbit successfully. The case is presented to emphasize the contribution of CT to the perforating injuries of the orbit with wooden particles. Importance of orbital foreign bodies in the differential diagnosis of proptosis in the pediatric age group is also discussed.

3656. Mirzadeh, S. M. (2021). "Endoscopic management gunshot wound at the face: Fact or fiction?" Trauma case reports **35**.

Shrapnel or gunshot injuries in Maxillofacial Region are highly considered to be challenging which leads to death in most cases, and even in the case of no mortality, they will cause morbidity and appearance impairment due to complex injuries to bone and soft tissue. Herein, in a particular case, the patient was a person injured by a gunshot of a Kalashnikovs bullet in his face; the bullet was located at the end of the medial wall of the maxillary sinus and was removed through the functional endoscopy of the nose and sinuses. The bullet was removed without causing any additional incisions on the face and further damage through endoscopic ligation of severe bleeding from the sphenopalatine artery. The clinical approach to patients with penetrating trauma from a bullet to head and face demands prompt action. Functional endoscopic nasal and sinus surgery can maintain the patient's face cosmetic appearance.

3657. Mirzaei, F., et al. (2019). "An unusual case of intra orbital foreign body; diagnosis, management, and outcome: a case report." BMC surgery **19**(1): 76.

BACKGROUND: An orbitocranial injury with a penetrating Intraorbital Foreign Body (IOFB) is listed as a rare cause of penetrating trauma. Since this type of trauma is considered a surgical emergency, taking a thorough history along with careful examination to find out the mechanism and cause of the trauma is crucial towards correct diagnosis and management of the disease., CASE PRESENTATION: A 35-year-old male patient was presented to the ER with an occupational craniofacial injury because of an IOFB. The patient underwent an extra-dural orbitocranial craniotomy procedure to remove the foreign body. Interestingly, a plastic foreign body (a piece of a plastic pipe) was removed from the orbital cavity, which was suspected to be a fractured orbital bone, at first place., CONCLUSION: In this study, we demonstrated that plastics could mimic bone structure in a Computerized Tomography (CT) scan leading to possible initial misdiagnosis. Hence high clinical suspicion is necessary for the correct diagnosis of such cases. However, despite the prompt intervention, our patient ended up with permanent vision loss in his injured eye.

3658. Mishaeva, N. P., et al. (2013). "[A new approach to postexposure treatment of rabies by complex of immuno- and chemotherapy in belarus]." Antibiotiki i khimioterapiia = Antibiotics and chemoterapy [sic] **58**(11-12): 31-37.

A method for preventive treatment of rabies with a complex of immuno- and chemotherapeutics was developed. Rifampicin was used a an etiotropic drug. In the experiments on laboratory animals infected with fixed and street strains of rabies virus it was shown to prolong the incubation period and to increase the survival rate. The protective mechanisms of rifampicin against rabies should be associated with inhibition of RNA transcription, as well as immunomodulating function of macrophages, dendritic cells, B- and T-cells. Since 1992, after the approval of the Ministry of Health of Belarus rifampicin is used in complex with antirabic vaccine for postexposure treatment of rabies in people after severe bites by infected animals (wolves, foxes, dogs). For an 18-year period (1992-2009) of integrated application of chemo- and immunotherapy in Belarus there was not registered any case of hydrophobia in people even after the heaviest wolf bites, incompatible with life (penetrating injuries of the skull, scalping, multiple bites).

3659. Misis, M., et al. (2008). "Bispectral index monitoring for early detection of brain death." Transplantation proceedings **40**(5): 1279-1281.

OBJECTIVE: We sought to determine the utility of the bispectral index (BIS) as a tool for clinical evaluation of the moment of brain death (BD)., MATERIALS AND METHODS: During a period of 12 months, 54 BDs were registered in our

unit, of which 28 were included in the organ donation protocol; 24 fulfilled the requirements of our retrospective observational study. Continuous BIS monitoring was performed using an XP BIS monitor and BIS Quatro sensor evaluating the BIS and the suppression ratio (SR). In almost all cases, sonographic monitoring with transcranial Doppler ultrasound (TCD) was performed every 8 to 12 hours until the diagnosis of BD., RESULTS: We detected a gradual decrease in BIS and increase in SR when the patients underwent clinical progression to BD. At the moment of BD diagnosis, all cases showed BIS 0 and SR 100. In 9 cases the follow-up TCD showed a BD pattern, moments before a BIS 0 and SR 100 appeared. In 18 cases, at the moment of BIS 0/SR 100, TCD showed BD. In all 24 cases, BD diagnosis was confirmed by means of neurological examination and electroencephalogram (EEG)., CONCLUSIONS: BIS monitoring is a continuous, simple method that is easy to interpret. It can help in clinical evolution and the decision of the BD moment. In our series, cerebral circulatory cessation (TCD) preceded BIS 0 and SR 100 values. The BIS prematurely detected the start of cerebral circulatory cessation, alerting us of BD.

3660. Misra, M., et al. (1992). "An unusual orbito-cranial foreign body." Indian journal of ophthalmology **40**(3): 94-95.

The rarity of orbito-cranial gun shot injury in both war and civilian practice has been reported. In a large series of 351 missile head injuries in the Vietnam war, orbital penetration was noted in 0.6% cases only. Review of literature shows that orbital injury was ipsilateral to the cerebral injury in most reported cases. We have previously reported a rare case of left parieto-occipital lobe injury due to gun shot wound of the contralateral (right) orbit. The case reported here sustained a bullet injury to the left frontal bone but the missile was located below the contralateral (right) optic canal. The rarity of the case prompted this report.

3661. Misra, S., et al. (2010). "An arrow penetrating at base of the skull successfully removed." Journal of the Indian Medical Association **108**(3): 176-177.

A 30-year-old male presented with accidental injury with an arrow which referred to us from a peripheral village hospital. It was found that the arrow was penetrating through the nasal bones. An xray skull lateral view showed the tip of the arrow penetrating into the posterior wall of the sphenoid sinus. As the patient had no clinical evidence of neurological or vascular injury, he was immediately operated upon and the arrow was removed. Patient was discharged in good condition and a 3-month follow-up was normal.

3662. Misrahi, S. and K. Reuter-Rice (2020). "Transcranial Doppler Ultrasound Use in Pediatric Patients With Penetrating Traumatic Brain Injuries." Journal of Radiology Nursing **39**(1): 39-43.

The purpose of this article is to increase awareness of the usefulness of transcranial Doppler (TCD) ultrasound as a noninvasive neuromonitor and bedside ultrasound in pediatric patients who have experienced a penetrative traumatic brain injury (TBI) as a result of a firearm. To date, the use of TCD is not standard of care in pediatric TBI patients. TCD is a portable ultrasound that can be performed in any care environment. The use of TCD in pediatric TBI studies have demonstrated abnormalities in cerebral blood flow velocity, autoregulation, and embolic events; all of which have been associated with poor neurocognitive and functional outcomes. A penetrating brain injury as a result of a firearm is associated with ongoing vascular injury and thereby an increased risk for poor neurologic sequelae. We discuss two exemplars of TCD use in children who experienced a firearm-related penetrating TBI and their TCD findings. Both exemplars identified the unique insights provided by TCD that were unappreciated by clinical observation. This article provides early evidence for the use of TCD as a neuromonitor in pediatric penetrating TBI.

3663. Missaka, H., et al. (2009). "Implementation of the protocol of decompressive craniectomy: Does it really improve outcome?" Critical Care **13**.

Introduction: Treatment of traumatic brain injury (TBI) and other conditions that increase intracranial pressure (ICP) continues to be a challenge for intensivists and neurosurgeons. Despite adequate monitoring, the mortality and morbidity rate remain high. Decompressive craniectomy (DC) can be performed where maximum medical therapy has failed to reduce ICP. Objective: To analyze the viability of the DC protocol, since implementation, in the former 23 months. To identify the applicability of the protocol as an instrument for DC indication. Methods: A prospective, descriptive, series study, realized by the UPG-UCI of the Emergency and Neurosurgery Service. Criteria for ICU admission: age >18 years and <60 years, <48 hours at admission (except patients with tumor), Glasgow Coma Scale (GCS)

>4, decline for 3 points with the first GCS, extensive unilateral brain trauma, intraoperative evidence of brain swelling; image evidence of intracranial hypertension (ICH), stroke or brain trauma with mass effect and midline shift. Maximum medical therapy to reduce ICP, when possible: drainage of cerebrospinal (figure presented) fluid; induced hyperventilation; intravenous hyperosmotic solutions; head elevation; sedation and neuromuscular paralysis; barbiturate coma; and hypothermia. The protocol includes clinical, neurological and image signs. The patients' evolution was appraised by 3-month mortality, GCS and modified Rankin Scale. Results: Since the implementation of the DC protocol, from January 2007 to November 2008, seven clinical cases were admitted, all males, mean age of 39 years (21 to 60). Amongst them, three patients (42.8%) received specialized neurointensive care since admission. The primary mechanisms of injury include: fall of 2 m with severe concussion, fall of 6 m with subdural hematoma, carotid occlusion with hemispheric ischemia, tumor (glioblastoma multiforme), two motorcycle collisions with TBI, and gunshot with temporal contusion and subdural hematoma. The mean time between the admittance and DC was 29 hours 30 minutes (2 to 48 hours) (one tumor). None of the patients died. The mean GCS was: on admittance, 12 (8 to 15); pre-DC, 9 (6 to 15); 1 week, 12 (9 to 15); 3 months, 14 (11 to 15). The admittance GCS was higher than the pre-DC in all patients, and also the 1-week GCS was higher than the pre-DC. The mean modified Rankin scale was 1.75 (0 to 3). (See Figure 1.) Conclusions: Implementation of the protocol, based on recent studies, allows one to establish, with more accuracy, the best indication for DC, improving outcome. Despite small casualties, DC was effective to treat otherwise uncontrollable ICH and improved cerebral perfusion pressure. All patients presented a satisfactory clinical evolution and outcome after the procedure. The neurointensive care unit allowed an adequate treatment indication and management of these complex patients.

3664. Missault, S., et al. (2016). "Evaluation of [18F]BR420 and [18F]BR351 as potential PET ligands for in vivo imaging of MMP-9 activity in an animal model of traumatic brain injury." European Journal of Nuclear Medicine and Molecular Imaging **43**(1): S228-S229.

Aim: Matrix metalloproteinase-9 (MMP-9), a zinc-dependent endopeptidase, is a modulator of the brain extracellular matrix. Increased expression and activity ofMMP-9 has been reported after traumatic brain injury (TBI) and is associated with blood-brain barrier disruption and inflammation. Due to its involvement in synaptic plasticity, a role forMMP-9 in the development of posttraumatic epilepsy has been proposed. This study evaluated the potential of radiolabeled broad-spectrum MMP inhibitors [18F]BR420 and [18F]BR351 for in vivo visualisation of MMP-9 after TBI. Methods: Adolescent male Sprague-Dawley (SD) rats were subjected to either Controlled Cortical Impact (CCI) injury over the left parietal cortex (impact depth: 2.5mm, velocity: 4m/s, dwell time: 500ms; n=10) or sham injury (craniotomy only; n=10). Metabolite studies were performed for both [18F]BR420 (IC50= 7nM) and [18F]BR351 (IC50= 50nM) in healthy rats sacrificed at 5min and 1h post-intravenous (iv) tracer injection (35.2±0.3MBq; n=3/time point). Plasma and brain were analysed by reversed-phase HPLC and collected fractions were counted in an automated γ-counter. CCI and sham-operated rats were subjected to T2-weighted MR imaging, followed by 60min dynamic PET-CT imaging at 7d post-injury. Rats were injected iv with either [18F]BR420 (24.9±3.7MBq; n=7/group) or [18F]BR351 (37.1±0.7MBq; n=3/group). After scanning, brains were resected, counted and processed for ex vivo autoradiography. Tracer uptake in different brain regions was quantified by region of interest (ROI) analysis using PMOD software and expressed as Standardised Uptake Values (SUV). Results: In plasma, [18F]BR420 proved to be more stable than [18F]BR351 (50.3±15.7% and 3.5±3.7% of intact tracer remaining 1h post injection (pi), respectively). However, both compounds presented a relatively fast metabolism in the brain with a polar brain penetratingmetabolite (≥40%) already present for both tracers 5min pi. Furthermore, at 1h pi, only 11.4±0.3% and 6.1 ±4.1% of intact [18F]BR420 and [18F]BR351 were measured. However, due to low brain extraction yields (respectively 43% and 46%) those results might be misinterpreted. PET imaging revealed no difference in [18F]BR420 or [18F]BR351 uptake at the lesion site, in perilesional cortex, ipsilateral hippocampus, contralateral cortex and contralateral hippocampus between CCI- and sham-injured rats. Brain uptake was 0.069 ±0.012 %ID/g and 0.055±0.002 %ID/g for [18F]BR420 and [18F]BR351 respectively. Ex vivo autoradiography revealed a homogeneous tracer distribution throughout the brain. Conclusion: Studies are ongoing to confirm the increase ofMMP-9 at this time point in our model. Due to the rather fast metabolism of these tracers, it seems unlikely that they will be suited for in vivo brain imaging of MMP-9.

3665. Misser, S. K., et al. (2005). "Migrating intracranial missile." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde **95**(9): 661-664.

3666. Missmann, M., et al. (2010). "Impaled head." Lancet (London, England) **375**(9711): 317.

3667. Mitchell, B. D., et al. (2012). "Phineas Gage revisited: Modern management of large-calibre penetrating brain injury." Trauma (United Kingdom) **14**(3): 263-269.

We present the case of a 19-year-old man who suffered a penetrating injury to the brain with a large-calibre steel industrial prybar approximately 1 m long and 2.5 cm wide that was retained in his cranium. The management of this type of injury is discussed, based on our experience with penetrating brain injuries with large-calibre retained objects, from initial presentation to surgical removal of the object to post-operative care. Additionally, given the similarities of the injuries suffered by our patient with those of Phineas Gage, we discuss the extensive lessons learned in treating this type of large-calibre injury. © The Author(s) 2012.

3668. Mitchell, K.-A. S., et al. (2020). "First-In-Human Experience With Integration of Wireless Intracranial Pressure Monitoring Device Within a Customized Cranial Implant." Operative neurosurgery (Hagerstown, Md.) **19**(3): 341-350.

BACKGROUND: Decompressive craniectomy is a lifesaving treatment for intractable intracranial hypertension. For patients who survive, a second surgery for cranial reconstruction (cranioplasty) is required. The effect of cranioplasty on intracranial pressure (ICP) is unknown., OBJECTIVE: To integrate the recently Food and Drug Administration-approved, fully implantable, noninvasive ICP sensor within a customized cranial implant (CCI) for postoperative monitoring in patients at high risk for intracranial hypertension., METHODS: A 16-yr-old female presented for cranioplasty 4-mo after decompressive hemicraniectomy for craniocerebral gunshot wound. Given the persistent transcranial herniation with concomitant subdural hygroma, there was concern for intracranial hypertension following cranioplasty. Thus, cranial reconstruction was performed utilizing a CCI with an integrated wireless ICP sensor, and noninvasive postoperative monitoring was performed., RESULTS: Intermittent ICP measurements were obtained twice daily using a wireless, handheld monitor. The ICP ranged from 2 to 10 mmHg in the supine position and from -5 to 4 mmHg in the sitting position. Interestingly, an average of 7 mmHg difference was consistently noted between the sitting and supine measurements., CONCLUSION: This first-in-human experience demonstrates several notable findings, including (1) newfound safety and efficacy of integrating a wireless ICP sensor within a CCI for perioperative neuromonitoring; (2) proven restoration of normal ICP postcranioplasty despite severe preoperative transcranial herniation; and (3) proven restoration of postural ICP adaptations following cranioplasty. To the best of our knowledge, this is the first case demonstrating these intriguing findings with the potential to fundamentally alter the paradigm of cranial reconstruction. Copyright © Congress of Neurological Surgeons 2020.

3669. Mitchum, B. (2018). "Interprofessional pediatric treatment model plays critical role in recovery process: Case study of 8-year-old child with catastrophic brain injury from gunshot." Journal of Head Trauma Rehabilitation **33**(3): E88.

Too often a child with traumatic brain injury is discharged to home once a hospital deems him medically stable even if that child is still incontinent, wheelchair-bound, on a Gtube, hearing and vision impaired, and has severe language deficits. This is understandable from the hospital's perspective of medical cost. It is understandable also that parents would want nothing more than to tuck their child in his own bed again every night. For the child who goes directly from the hospital to home, however, there is no way to measure the functional gains missed by skipping the step of post-acute inpatient rehabilitation where an interprofessional pediatric team guides the intervention: one cannot quantify what one doesn't have. Children with traumatic brain injury who are discharged straight to home can present a burden of dependence on caregivers already buckling under tremendous financial and emotional strain. The less able a child is to participate in life independently, the greater the burden on communities, families, and health care providers alike. The scope of dependence in childhood post injury can have an inverse relationship to the scope of independence in adulthood: the less dependent a child becomes, the better the prognosis for independence in adulthood. This presentation will report on a case study of a child who suffered unspeakable trauma at the hands of his mother, and will discuss the interprofessional pediatric treatment model which enabled the rehabilitation team to facilitate the child's recovery across every domain in ways it would be hard to argue could have been attained had he discharged straight to home from the hospital once he was medically stable.

3670. Mitilian, D., et al. (2009). "Removal of a chopstick out of the cavernous sinus, pons, and cerebellar vermis through the superior orbital fissure." Acta neurochirurgica **151**(10): 1295-1297.

Penetrating non-missile orbito cranial injuries are rare in a civilian pediatric setting. We describe a case of a trans-orbital penetration by a wooden chopstick deep down into the cerebellar vermis detected at neuroradiological examination in a child presenting for head injury. The foreign body was successfully pulled out in one piece surgically.

3671. Mitra, K., et al. (2002). "Self-inflicted transcranial stab wound of the pons." Injury **33**(4): 374-376.

3672. Mittendorf, E., et al. (1998). "Anomalous vertebral artery anatomy and the consequences of penetrating vascular injuries." The Journal of trauma **44**(3): 548-551.

3673. Miyagi, A., et al. (1996). "[Intraorbital conjunctival cyst after a penetrating orbital injury: a case report]." No shinkei geka. Neurological surgery **24**(7): 649-653.

We report a case of intraorbital conjunctival cyst following a penetrating orbitocranial injury. The patient was a 28-year-old male who was hospitalized with exophthalmos, retrobulbar pain and upper gaze disturbance of his left eye. When he was 4 years old, a thin iron rod had penetrated intracranially through the inner angle of his left orbit. He was hospitalized and treated conservatively for about two weeks. The left eye ball was intact and visual acuity was normal, although bloody fluid had continuously flowed out from the left inner angle of the conjunctival wound for a few days. He had been febrile to 39 degrees C and complained of headache for one week. Subsequentry, the symptoms gradually improved through conservative therapy. When he was a junior high school student, he noticed exophthalmos of his left eye. However, he had never been examined closely, until he was 28 years old. We suspect that he had suffered from meningitis caused by the penetrating orbitocranial injury, and had fortunately improved under the conservative therapy. On admission to our hospital, a craniogram showed fracture of the left orbital roof, and coronal and three-dimensional computed tomography (CT) scans clearly demonstrated the orbital fracture. CT revealed a cystic mass in the retrobulbar space, and a porencephalic cyst in the medial basal frontal lobe. On magnetic resonance imaging (MRI) scans, both cysts were of low intensity on T1-weighted imaging, and of high intensity on T2-weighted images. Coronal and sagittal MRI scans showed that the two cysts were connected with each other through the fracture in the orbital roof. We diagnosed therefore that the orbital cyst was a herniated porencephalic cyst of the frontal lobe. Surgery was performed by a transcranial approach. The porencephalic cyst adhered to the fractured lesion of the frontal base but did not extend into the orbita. The intraorbital cyst was totally removed by opening the orbital roof including the fractured lesion. The cyst contained milky fluid. Postoperatively, the exophthalmos, retrobulbar pain and upper gaze disturbance showed gradual improvement. On histological examination, the cyst was found to be lined by non-keratinized stratified squamous epithelium and was diagnosed as a conjunctival cyst. This case was considered to be one of traumatic conjunctival cysts caused by a penetrating orbitocranial injury. Orbital conjunctival cysts have been reported to comprise about 10% of orbital epidermoid and dermoid cysts. Of these cysts, traumatic conjunctival cysts are rare, and only a few cases have been described. The etiology and therapy of orbital conjunctival cysts are discussed.

3674. Miyahara, M., et al. (2016). "[An Extremely Rare Case of Penetrating Head Injury Caused by a Nasal Implant Made of an Ivory Chip and a Review of the Literature]." Brain and nerve = Shinkei kenkyu no shinpo **68**(6): 661-666.

Although penetrating head injuries are very rare in Japan, an extremely rare case is reported in which an ivory chip, embedded in the subcutaneous tissue by a cosmetic rhinoplasty, penetrated the cranium. A 69-year-old woman with a psychiatric disorder suddenly jumped down from a window and bruised her face. The ivory chip went into her left frontal lobe via the frontal sinus. At surgery, it was completely removed via the nasion. There were no postoperative complications after adequate frontal sinus repair and closure of dura mater with a piece of pericranium. The literature dealing with Japanese penetrating head injuries was also reviewed. (Received May 27, 2015; Accepted December 1, 2015; Published June 1, 2016).

3675. Miyaishi, S., et al. (1994). "Massive pulmonary embolization with cerebral tissue due to gunshot wound to the head." Brain injury **8**(6): 559-564.

Autopsy findings in a 22-year-old man who received a gunshot wound to the head and died at the scene are presented. Massive white-grey emboli were found in the pulmonary arteries, and these were identified as cerebral cortical or glial tissue by histological examination. It was thought that the momentary severe increase of intracranial pressure and simultaneous rupture of the superior sagittal sinus due to the kinetic energy of the bullet had caused the lacerated cerebral tissue to enter the blood stream.

3676. Miyake, Y., et al. (2009). "Treatment model of CNS lymphoma using complement-dependent cytotoxicity induced by rituximab and autoserum." Blood **114**(22).

Background: Primary central nervous system lymphoma (PCNSL) is almost exclusively CD20-positive non-Hodgkin lymphoma (NHL). Although rituximab (R) is widely used for CD20-positive NHL, it is not considered to reach brain lesions effectively beyond the blood brain barrier. Intraventricule administration (ivt) of R is reported to be effective in meningeal lymphoma but the effect on lesions in the brain parenchyma seems to be limited. Recently, a case of refractory PCNSL that was successfully treated with ivt of R with autologous serum was reported (Takami A, et al. Cancer Science, 2006). Because the cerebrospinal fluid does not contain complements which exists in the serum, induction of complement-dependent cytotoxicity by ivt of R plus autoserum was speculated. To investigate this effect, we developed an animal treatment model of CNSL. Materials and methods: Raji, CD20-positive Burkitt lymphoma cell line, was inoculated into the deep frontal lobe of the brain of 8-week old F344 (nru-/nru-) nude rats, using brain stereotaxic apparatus. At the same time, a cannula was placed into the ipsilateral lateral ventricle. After several days, R or control immunoglobulin (cIg), plus human serum or saline, was administrated into the lateral ventricle. Results: The brain was extracted 24 hours after the last administration and frozen section was made. Human CD20-positive Raji cell tumor was also positively stained with FITC-conjugated anti-human IgG antibody when R but not cIg was administrated. Consequently, R in the lateral ventricle was considered to penetrate ependymal cells and brain parenchyma, and bound to lymphoma cells. Next, these rats were treated with ivt of R plus serum (R + Serum), cIg plus serum (cIg + Serum), or R plus saline (R + saline). These were administrated once a day from day 5 to day 9 after inoculation of Raji, and then survival was monitored. When an obvious weakness, such as marked and consecutively loss of activity or weight, was observed, these rats were euthanized and this is defined as dead day. In each case, the brain was extirpated and examined whether lymphoma existed or not. Death without lymphoma or from technical problem was excluded from the analysis. Survival of each group was analyzed by Kaplan-Meier method and log-lank test. R + Serum group had longer survival than cIg + Serum ($p = 0.049$). Long-term survivors were only seen in R + Serum and this group seemed to be superior to R + saline but statistical difference was not detected ($p = 0.083$). There were no difference between cIg + Serum and R + saline ($p = 0.382$) and neither group had long-term survivor. Conclusion: The possibility of novel treatment of CNSL with ivt of R and autoserum was shown in the rat CNSL model. To confirm this approach, clinical trials are warranted.

3677. Miyamoto, S., et al. (2010). "Risks and causes of cervical cord and medulla oblongata injuries due to acupuncture." World neurosurgery **73**(6): 735-741.

BACKGROUND: Acupuncture has become one of the most popular alternative medicines in the world today. Some acupuncturists still intentionally embed entire needles deep in the tissue for treatments, and some patients stick needles into their own bodies on their own., CASE DESCRIPTION: Surgical removal of an accidentally broken acupuncture needle due to self-acupuncture that was embedded in the medulla oblongata and cerebellum was performed. The broken needle migrated further into the brain in a few days. Contrary to expectation, it was extremely laborious to find the needle, which turned out to be completely embedded in the brain. No postoperative complications developed. The patient denied any symptoms and was subsequently discharged., RESULTS: Previously reported cases of 25 patients, in addition to our patient, who suffered from cervical or brain injuries due to acupuncture needles, were retrospectively studied. Embedded needles were the most frequent cause of the injuries and comprised 15 patients (57.7%). Accidentally broken needles came in second, comprising 11 patients (42.3%). Five cases (19.2%) were attributed to self-acupuncture. Sixteen (61.5%) patients developed symptoms more than 30 days after the accident. Twenty-three (88.5%) patients complained of sensory deficits, whereas 11 (42.3%) presented with motor weakness. Surgical removals were performed in 21 patients (80.8%), and 10 patients showed signs of recovery. On the other hand, no patients showed improvements in conservatively treated cases., CONCLUSIONS: Embedded needles in the brain should be urgently removed if possible. Both embedded needle acupuncture and self-acupuncture are extremely dangerous and hazardous to health.

3678. Mizraji, R., et al. (2009). "Brain death epidemiology in Uruguay and utilization of the Glasgow coma score in acute brain injured patients as a predictor of brain death." Transplantation proceedings **41**(8): 3489-3491.

OBJECTIVE: The knowledge of brain death (BD) epidemiology and the acute brain injury (ABI) progression profile are relevant to improve public health programs, organ procurement strategies, as well as intensive care unit (ICU) protocols aiming to increase the detection of potential donors. The aim of this study was to analyze the BD epidemiology and the ABI progression profile among subjects admitted to ICUs with a Glasgow Coma Score (GCS) < or = 8., MATERIALS AND METHODS: This was a prospective, observational study of BD reported to the National Institute of Donation and Transplantation from 2000-2006. The patients with ABI and GCS < or = 8 who were admitted to 5 ICUs with In-hospital Transplant Coordination were analyzed over the period of 2005-2007., RESULTS: The BD detection increased from 28.7 in 2000 to 58.5 BD pmp in 2006. The real donor global rate increased from 10 to 24.6 pmp from 2000 to 2006. The ABI patients with GCS < or = 8 had a global mortality rate of 56%, including 23.4% who evolved to BD., CONCLUSIONS: This study showed a 200% increment of detected BD and 150% of real donors, although these results are still below the international figures. GCS follow-up appeared to be a good tool to predict the BD outcome. The follow-up of patients with ABI allowed us to improve our BD detection strategy.

3679. Mnejja, M., et al. (2012). "[Bronchoscopy for foreign body inhalation in the pediatric population: lessons learned from 223 cases]." Bronchoscopie pour inhalation de corps etrangers chez l'enfant : a propos de 223cas. **19**(6): 670-674.

INTRODUCTION: Inhalation of foreign body in children is a serious accident that may compromise the vital prognosis of the child. The diagnostic was difficult in the absence of a recognizable penetration syndrome. Bronchoscopy is still recommended as the appropriate diagnostic and treatment of foreign bodies. The purpose of this study was to analyze the diagnostic and the treatment result of bronchoscopy and discuss its indications., MATERIAL AND METHODS: [corrected] A retrospective study analyzing data related to 223 children undergoing bronchoscopy due to suspicion of foreign body aspiration over a period of 10 years (2000-2009). The average age of the children was 29 months (range: one month-13 years). Approximately, two thirds of these patients were boys. The penetration syndrome was reported in 79.8% of cases., RESULTS: During bronchoscopy, the foreign body was confirmed only in 57.4%. Foreign bodies were found in the bronchus in 79.7% of cases. Among the foreign bodies, 78.1% were of vegetal origin. The average time of stay of the foreign body was of 16.1 days. Penetration syndrome and abnormal physical exam were the most sensitive parameters (79.7% and 82.8%, respectively) but with low specificity (24.2% and 35.8%, respectively). The combination of clinical and radiological signs suggestive of foreign body was the most specific sign (74.7%). Similarly, we found a statistically significant correlation between positive bronchoscopy and simultaneous suggestive clinical and radiological signs (P=0.03). The multivariate study showed that predictors factors of positivity of the bronchoscopy were: abnormal physical exam (P=0.016), abnormal radiological exam (P=0.003) and type of indication (P=0.005)., DISCUSSION: The diagnosis of laryngotracheobronchial foreign body recures an array of arguments. It is suspected on the clinical interview specially penetration syndrome and on the clinical and radiological presentation. Any suspicion should lead to a bronchoscopy.

3680. Mobbs, R. J. and K. N. Chandran (2001). "Traumatic middle cerebral artery occlusion: case report and review of pathogenesis." Neurology India **49**(2): 158-161.

Traumatic occlusion of the middle cerebral artery (MCA) is a rare cause of cerebral infarct. We describe a case of MCA occlusion following blunt head trauma. The literature reports some 65 cases of MCA occlusion following non-penetrating blunt trauma to the head. Arterial dissection, cerebral vasospasm and thrombosis have been some of the theories discussed in the pathogenesis of this condition. We review the pathogenesis based on anatomy of the M1 segment.

3681. Moccio, C. L., et al. (1983). "Removal of foreign bodies using image intensifier fluoroscopy." The New York state dental journal **49**(9): 696-698.

3682. Modaboyina, S., et al. (2021). "Intraorbital wooden foreign body, legacy of a notorious scrap: a case report." BMJ case reports **14**(4).

Wooden foreign bodies are notorious to be fragile and get retained as bits and bobs in the orbit. A 50-year-old woman presented to casualty with complaints of loss of vision and pain in the right eye associated with discharge from a wound in right eye upper lid. On imaging, a wooden foreign body was seen as continuous track of air. Meticulous dissection and search were done to remove bits and bobs of the wood. Patient, however, after 15 days of primary surgery reported with pus collection over wound site. Keeping suspicion of remnant wooden body piece(s), imaging and further exploration were carried out, removal of a 1 cm residual wooden piece was done. Retained wooden foreign body should always be suspected in postoperative cases of intraorbital wooden foreign body with infection. A close follow-up and knowledge of the same stay useful to remove any needless apprehension both of patient and surgeon.

3683. Modi, H., et al. (2022). "POST-INJURY TIME-COURSE OF MITOCHONDRIAL CALCIUM DYNAMICS, MEMBRANE INTEGRITY AND APOPTOSIS MARKERS FOLLOWING SEVERE PENETRATING TBI." Journal of neurotrauma **39**(11-12): A65.

Traumatic brain injury (TBI) remains a significant and urgent medical concern for the US military. From moderate to severe TBI, the most common mitochondria-centered cellular excitotoxic responses involved are calcium (Ca2+), oxidative stress and energy homeostasis. Their imbalance subsequently prompt the downstream cellular processes such as apoptotic/ necrotic cell death and ultimately alters behavioral outcomes after TBI. However, the time-course analysis of mitochondrial excitotoxic responses are lacking in the pre-clinical penetrating TBI (PTBI). Anesthetized adult male Sprague-Dawley rats (280-350 g) were subjected to either 10% unilateral PTBI or Sham craniectomy, followed by excitotoxic responses evaluated at 30min, 3h, 6h, 24h, 3d, 7d and 14d (n = 6-10 animals/groupX7 time-points). At each-time point, animals were euthanized and mitochondria isolated from ipsilateral frontal cortex and striatum areas. Time-course of PTBI groupmitochondrialCa2+ dynamics resulted in a “U-shaped” loss in Ca2+ buffering capacity (12-76%, vs. Sham) during the 2 weeks postinjury period, with maximum loss noted at 24h post-PTBI. Mitochondrial membrane integrity markers cytochrome c (Cyt C) and voltage-dependent anion channel (VDAC) revealed significant loss (20-50% vs. Sham) during the 2 weeks post-injury period. Additionally, the glyceraldehyde 3- phosphate dehydrogenase (GAPDH) expression elevated significantly (∼2-4 folds) in the PTBI group, which was reported as an indicator of apoptosis following injury. Following PTBI, brain region mitochondria showed loss of Ca2+ dynamics and early opening of permeability transition pore following PTBI. The current time-course data demonstrated that an early therapeutic intervention is necessary to mitigate mitochondrial excitotoxic responses for achieving neuroprotection following PTBI.

3684. Modi, M., et al. (2014). "Penetrating brain injury with machete, stuck to calvarium: Hurdles in imaging and solutions." Journal of neurosciences in rural practice **5**(Suppl 1): S63-65.

Penetrating brain injury is a less common form of traumatic brain injury in civilian set up, with a higher mortality and morbidity. A detailed preoperative imaging is warranted to ascertain the extent of injury and involvement of neurovascular structures. We present a rare case of penetrating brain injury with a long machete, who underwent emergency craniotomy, removal of the weapon, debridement and evacuation of the brain contusion and dural repair. Due to the sheer size of the weapon stuck to the calvarium, only X-rays could be performed preoperatively. The difficulties posed by the case, requiring modifications in standard imaging, possible solutions to address the problem and individualized management techniques are discussed in this report.

3685. Moehrlen, U., et al. (2004). "An orbitocranial knife injury without functional deficit in a child." The Journal of trauma **57**(2): 396-398.

3686. Mohamed, H. A. R. (2019). "The neurotoxicity of titanium dioxide nanoparticles in mice." Research Journal of Pharmaceutical, Biological and Chemical Sciences **10**(6): 168-176.

Titanium dioxide (TiO2) nanoparticles (NPs) are the second NPs in the industry worldwide.TiO2 is widely used in chemical, electrical and electronic industries. TiO2NP penetrate directly into the brain through the olfactory bulb and can be deposited in the hippocampus region consequently, the present study was investigated the toxic effect of TiO2 NPs on brain of mice. Male mice were exposed to intraperitoneal injection (i.p) with (50 and 100 mg/kg body weight

(BW) TiO2 NPs for 21 successive days. At the end of experiment animals were sacrificed, brains were isolated for estimation of Neurotransmitters (dopamine (DA) and norepinephrine (NE)), Malondialdehyde (MDA), Antioxidant enzymes (superoxide dismutase (SOD) and glutathione peroxidase (GPx), Inflammatory mediators (interlukine-6 (IL-6) and tumor necrosis factor-α (TNF-α)) and Apoptosis biomarker (Bcl-2). The results showed that exposure to these nanoparticles induced a significant increase of DA and NE, decrease of SOD and GPx, raise of IL-6 and TNF-α and down regulation of Bcl-2 level. In conclusion, TiO2 nanoparticles could be translated to the brain and in turn caused the brain damage includes oxidative stress that leads to an change in the level neurotransmitters, lipid peroxidation, reduce the activities of antioxidative enzymes and activation of inflammatory cytokines resulted the stimulation of apoptosis.

3687. Mohamed, O. S., et al. (2022). "Effect of Dexmedetomedine on Oxidative Stress Accompanying Trumatic Brain Injury." NeuroQuantology **20**(8): 4185-4187.

Traumatic brain injury (TBI) is a leading cause of death and disability allover the world. It is caused by a blow to the head from blunt or penetrating trauma (1). The burden of TBI is more prominent in Developing Countries which face a higher prevelance of risk factors for causes of TBI and have inadequately prepared health systems (2). The major goals of anesthesia during craniotomy in patients with traumatic brain injury (TBI) are maintenance of hemodynamic stability, optimal cerebral perfusion pressure, lowering of ICP, and providing a relaxed brain (3). Although both inhalational and intravenous anesthetics are commonly employed, there is no clear consensus on which technique is better for the anesthetic management TBI (3). Oxidative stress is a disturbance in the balance between the production of reactive oxygen species (free radicals) and antioxidant defenses (4). Oxidative stress may contribute to many pathophysiological changes that occur after traumatic brain injury (4).

3688. Mohammadpour, M. and M. Soheilian (2005). "Concomitant optic nerve transection and chorioretinitis sclopetaria." BMC ophthalmology **5**: 29.

BACKGROUND: Optic nerve transection and chorioretinitis sclopetaria may occur following blunt ocular trauma. However, simultaneous occurrence has not yet been reported. We report the first case of concomitant optic nerve transection and chorioretinitis sclopetaria., CASE PRESENTATION: A 12-year-old boy with history of BB gun injury to his right eye was referred for loss of vision. His visual acuity was counting fingers at one meter in the right eye and with 3+ relative afferent pupillary defect (RAPD). On slit lamp examination, the right eye appeared normal except for 1+ vitreous reaction. Fundus examination of the right eye revealed a pale disc with superior retinal scar and diffuse submacular fibrosis compatible with chorioretinitis sclopetaria. Orbital CT-scans showed transection of the optic nerve by the BB gun pellet, which was lodged at the orbital apex., CONCLUSION: BB gun injury may cause concomitant optic nerve transection and chorioretinitis sclopetaria.

3689. Mohan, A. L., et al. (2005). "Knife wound to the posterior fossa in a child." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **21**(3): 255-258.

BACKGROUND: Knife wounds to the posterior fossa are a rare occurrence, especially in children. We report an 8-year-old girl who sustained a penetrating knife injury through the occipital bone into the posterior fossa. On presentation, the large knife blade was firmly embedded in her head., METHODS: Radiographic evaluation was limited to plain X-rays because of the large size and sharpness of the embedded blade. Innovative positioning was used during intubation and then the patient was positioned semi-prone on the operating room table. The blade was surgically removed and the dura was closed., CONCLUSIONS: Atypical penetrating cranial injuries in children may require the treatment team to take a creative approach to the evaluation and repair of the lesion in order to maximize patient safety and minimize the risk of neurological injury.

3690. Mohanty, S., et al. (1989). "Role of histamine in traumatic brain edema. An experimental study in the rat." Journal of the neurological sciences **90**(1): 87-97.

The possibility that histamine plays a role in the formation of traumatic brain edema was investigated in the rat. A 3 mm deep and 3 mm long stab injury was performed in the right parietal cortex under urethane anaesthesia. The brain water content and histamine levels in plasma and brain were measured at the end of 1, 2 and 5 h periods after trauma. There was a 3.46% increase in brain water content in the traumatized hemisphere from the value in the control

group at 5 h. The histamine content was increased by 107% in plasma and 51% in the traumatized brain hemisphere from the control value at this time period. The increased brain water content as well as the elevated plasma and brain histamine levels were prevented by prior treatment with the histamine H2-receptor antagonist cimetidine. Mepyramine (a histamine H1-receptor antagonist) failed to reduce the increased brain water content and the histamine levels in plasma and brain remained high. The results strongly indicate that histamine has a role in the formation of early traumatic brain edema and that this reaction can be influenced by pharmacological procedures.

3691. Mokhlesi, B. and M. Khan (2009). "Nail-gun narcolepsy." Lancet (London, England) **374**(9685): 238.

3692. Molina, D. K., et al. (2013). "Gunshot wounds: a review of firearm type, range, and location as pertaining to manner of death." The American journal of forensic medicine and pathology **34**(4): 366-371.

Many studies have examined the characteristics of gunshot wounds by manner of death; however, no published study has directly compared these characteristics for the different types of firearms. This study was designed to address that deficiency. Existing data sets of nonaccidental deaths by handguns, shotguns, and rifles were reviewed. The victim data were analyzed by age and sex of the victims, wound location, range of fire, manner of death, and type of firearm. Handguns were the most common firearm used in both suicides and homicides, followed by rifles and then shotguns. For both homicides and suicides, there were significant differences between the firearm types for age of victims, range of fire, and wound locations. Possible reasons for those differences are discussed. It is concluded that information about the type of firearm is crucial to have when examining the nature of a firearm injury and determining the manner of death.

3693. Molina, D. K., et al. (2013). "Handgun wounds: a review of range and location as pertaining to manner of death." The American journal of forensic medicine and pathology **34**(4): 342-347.

Citizens of the United States own more firearms than those in any other country, and the majority of the firearms owned are handguns. Given such prevalence, surprisingly few studies have been published describing the characteristics of deaths due to handguns. To address this gap, nonaccidental handgun deaths examined at the Bexar County Medical Examiner's Office between 2000 and 2010 were reviewed. A total of 1450 cases were identified, including 797 suicides and 653 homicides. Age, range of fire, location of wound, and manner of death were analyzed. The average age of suicide victims (46.7 years) was found to be greater than that of homicides (34.3 years). Suicidal wounds tended to be contact wounds to the head; abdominal, extremity, back, and multiple wound locations were more common in homicides as were distant and intermediate wounds. Handgun wounds to the forehead, side of head, submental, and intraoral locations were significantly more common in suicide, whereas those to the face, apex of the head, and back of the head were more common in homicides. Where possible, likelihood ratios were calculated to determine relative likelihood of suicide or homicide for specific wound locations and ranges. While each death should be analyzed based on its unique circumstances and not solely its statistical probability, these data may help inform the pathologist's conclusions.

3694. Molina, D. K., et al. (2012). "The atypical entrance wound: differential diagnosis and discussion of an unusual cause." The American journal of forensic medicine and pathology **33**(3): 250-252.

The appearance of gunshot entrance wounds on the body depends upon many factors including, the type of firearm, the type of ammunition, the location of the wound on the body, and the circumstances of how a wound was sustained. Atypical gunshot entrance wounds are usually created when the bullet is destabilized prior to entering the body and consequently does not enter the body nose first but sideways or at an angle. The most common causes of an atypical entrance wound are bullet ricochet and interaction with an intermediate target. A case is presented in which the decedent sustained a gunshot wound with an atypical entrance. The cause of the atypical nature of the wound was determined to be increased yaw due to bullet instability caused by the condition of the firearm used, not a ricochet or intermediate target. The case emphasizes the importance of collaborative investigation between the different forensic agencies in gunshot cases.

3695. Moll, J., et al. (2018). "Altruistic decisions following penetrating traumatic brain injury." Brain : a journal of neurology **141**(5): 1558-1569.

The cerebral correlates of altruistic decisions have increasingly attracted the interest of neuroscientists. To date, investigations on the neural underpinnings of altruistic decisions have primarily been conducted in healthy adults undergoing functional neuroimaging as they engaged in decisions to punish third parties. The chief purpose of the present study was to investigate altruistic decisions following focal brain damage with a novel altruistic decision task. In contrast to studies that have focused either on altruistic punishment or donation, the Altruistic Decision Task allows players to anonymously punish or donate to 30 charitable organizations involved with salient societal issues such as abortion, nuclear energy and civil rights. Ninety-four Vietnam War veterans with variable patterns of penetrating traumatic brain injury and 28 healthy veterans who also served in combat participated in the study as normal controls. Participants were asked to invest $1 to punish or reward real societal organizations, or keep the money for themselves. Associations between lesion distribution and performance on the task were analysed with multivariate support vector regression, which enables the assessment of the joint contribution of multiple regions in the determination of a given behaviour of interest. Our main findings were: (i) bilateral dorsomedial prefrontal lesions increased altruistic punishment, whereas lesions of the right perisylvian region and left temporo-insular cortex decreased punishment; (ii) altruistic donations were increased by bilateral lesions of the dorsomedial parietal cortex, whereas lesions of the right posterior superior temporal sulcus and middle temporal gyri decreased donations; (iii) altruistic punishment and donation were only weakly correlated, emphasizing their dissociable neuroanatomical associations; and (iv) altruistic decisions were not related to post-traumatic personality changes. These findings indicate that altruistic punishment and donation are determined by largely non-overlapping cerebral regions, which have previously been implicated in social cognition and moral experience such as evaluations of intentionality and intuitions of justice and morality.10.1093/brain/awy064_video1awy064media15758316955001.

3696. Moller, B. (1955). "Purulent Clostridium welchii meningitis originating from a penetrating cranial wound; report of a case cured with penicillin and anti-gas-gangrene serum." Acta chirurgica Scandinavica **109**(5): 394-399.

3697. Momeni Roochi, M. and F. Razmara (2020). "Maxillofacial gunshot injures and their therapeutic challenges: Case series." Clinical Case Reports **8**(6): 1094-1100.

Maxillofacial gunshot injuries require proficiency to determine a suitable treatment plan and surgical intervention. In this paper, present 4 gunshot cases. Treatment in these patients is very challenging. Moreover, post-treatment infections are a serious problem in such cases. Thus, step-by-step surgery is essential to obtain a better result in these patients.

3698. Momjian, S., et al. (2003). "Occipital condyle fractures in children. Case report and review of the literature." Pediatric neurosurgery **38**(5): 265-270.

Occipital condyle fractures (OCF) are seldom described in children, with only 14 cases reported in the literature. We report the observation of a 13-year-old child in whom such a fracture was diagnosed. A review of the paediatric cases allowed us to identify the clinical features of OCF in children. The average age was found to be 10 years, and the causative traumatism was most often related to road traffic or sporting accidents with associated head injury. The level of consciousness was depressed in 67% of the cases, and in 53%, an injury to the cranial nerves, brain stem or high spinal cord was present. Neck pain with reduction of head mobility was reported in 27% of the cases. Treatment was generally conservative, i.e. a hard collar or halo vest for an average of 8 weeks. The course was favourable with respect to osseous consolidation, mobility and pain. On the other hand, the neurological deficits improved, but sequelae remained. Early diagnosis and treatment is mandatory since the secondary displacement of fractured fragments can injure the cranial nerves in a delayed fashion or even be fatal due to compression of the brain stem. Copyright 2003 S. Karger AG, Basel

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3699. Mommsen, P., et al. (2012). "Comparison of different thoracic trauma scoring systems in regards to prediction of post-traumatic complications and outcome in blunt chest trauma." The Journal of surgical research **176**(1): 239-247.

BACKGROUND: As accurate assessment of thoracic injury severity in the early phase after trauma is difficult, we compared different thoracic trauma scores regarding their predictive ability for the development of post-traumatic

complications and mortality., MATERIALS AND METHODS: Two hundred seventy-eight multiple trauma patients (ISS >= 16) age > 16 y with severe blunt chest trauma (AIS(chest) >= 3) admitted between 2000 and 2009 to Level I Trauma center were included. Exclusion criteria were severe traumatic brain injury (AIS(head) >= 3) and penetrating thoracic trauma. The association between AIS(chest), Pulmonary Contusion score (PCS), Wagner-score and Thoracic Trauma Severity score (TTS), and duration of ventilation, length of ICU stay, development of post-traumatic complications, and mortality was investigated. Statistical analysis was performed with chi(2)-test, ANOVA, logistic regression, and receiver operating characteristic (ROC) curve., RESULTS: Patients' mean age was 42.7 +/- 17.0 y, the mean injury severity score was 28.7 +/- 9.3 points. Overall, 60 patients (21.6%) developed ARDS, 143 patients (51.4%) SIRS, 110 patients (39.6%) sepsis, and 36 patients (13.0%) MODS. Twenty-two patients (7.9%) died. Among the examined thoracic trauma scores only the TTS was an independent predictor of mortality. With the TTS showing the best prediction power, the TTS, PCS, and Wagner-score were independent predictors of ventilation time, length of ICU stay, and the development of post-traumatic ARDS and MODS., CONCLUSIONS: Thoracic trauma scores combining anatomical and physiologic parameters like the TTS seem to be most suitable for severity assessment and prediction of outcome in multiple trauma patients with concomitant blunt chest trauma.

3700. Mondello, S., et al. (2013). "Characterization of TBI models and evaluation of the therapeutic efficacy of nicotinamide, erythropoietin and cyclosporine a using biochemical markers of brain injury: Results from operation brain trauma therapy." Journal of neurotrauma **30**(15): A167-A168.

Introduction To successfully develop compounds for clinical TBI, the multicenter consortium Operation Brain Trauma Therapy evaluates promising therapies in TBI models using the state-of-the-art behavioral, histological and immunohistochemical methods and circulating biomarkers. Here, we report model characterization using biomarker profiles and the effect of the first three therapies on biomarker concentrations. Methods Adult male Sprague-Dawley rats were subjected to controlled cortical impact (CCI), fluid percussion (FPI), or penetrating ballistic-like brain injury (PBBI) and treated with low or high dose of nicotinamide, erythropoietin [EPO] and Cyclosporine A [CsA], or with vehicle. Sham rats underwent all manipulations except trauma. The glial marker glial fibrillary acidic protein (GFAP) and the neuronal marker ubiquitin C-terminal hydrolase (UCH-L1) were measured by ELISA in serum at 4, 24 hours and 21 days after injury. Results Comparing across experiments no differences were found among sham groups and TBI + Veh groups in the same model, while UCH-L1 was significantly higher in CCI vs. FPI and PBBI ($P < 0.01$ and $P< 0.001$, respectively) and GFAP was significantly lower in PBBI vs. CCI and FPI ($P < 0.001$). Significant differences were also found comparing shams across the models, with higher UCH-L1 levels in CCI vs. FPI and PBBI ($P < 0.001$) and lower GFAP levels in FPI vs. CCI and PBBI ($P < 0.001$ and $P < 0.01$, respectively). Studies with nicotinamide showed that high dose treatment (500mg/kg) produced significant reductions of serum GFAP levels in PBBI and a trend toward a reduction in CCI at 24hrs postinjury (but not FPI). Nicotinamide had no impact on serum UCH-L1 levels. Studies with EPO showed that high dose treatment (10,000IU/kg) produced significant increases at 4hrs and significant reductions at 24hrs post-injury of serum UCH-L1 levels in CCI (but not PBBI and FPI). EPO had no impact on serum GFAP levels. Studies with CsA showed an initial dose-dependent trend of increase in GFAP at 4hrs in CCI and PBBI while in FPI there was a trend toward a reduction in the treated group vs. TBI + Veh. CsA had no impact on serum UCH-L1 levels. Conclusions We have characterized experimental TBI models using serum brain injury biomarkers and have shown that different models produced distinct biomarker profiles replicable across experiments. These findings provided robust evidence that biomarkers may be a valuable means for characterization, standardization and refinement of TBI animal models. Importantly, this study demonstrates that drugs differently affect distinct types of lesions as reflected by distinct biomarker pathways. Taken together, these findings strongly support the potential applications of biomarkers in TBI theranostics thereby holding promise for personalized medicine.

3701. Mondello, S., et al. (2012). "Differential effect of nicotinamide on serum damage marker profiles following controlled cortical impact, parasagittal fluid percussion, and penetrating ballistic-like brain injury: Results from operation brain trauma therapy." Journal of neurotrauma **29**(10): A48.

Introduction Preclinical models can help define TBI pathobiology and test new therapies. The multi-center, pre-clinical Operation Brain Trauma Therapy (OBTT) is evaluating drugs and biomarkers in three TBI models to prioritize for clinical translation. We evaluated the effect of nicotinamide across models on post-injury biomarker profiles and their neuropathological correlations. Methods Adult male Sprague-Dawley rats were subjected to controlled cortical impact (CCI), fluid percussion (FPI), or penetrating ballistic-like brain injury (PBBI) and treated with nicotinamide or vehicle at 15

min and 24 h post-injury. Sham rats in each model underwent all manipulations with the exception that they did not receivetrauma. In each model, animals were classified into 4 groups: (1): Sham, (2): TBI + Vehicle, (3): TBI + nicotinamide (50mg/kg), (4): TBI + nicotinamide (500mg/kg). At 21 days, rats were sacrificed and brain sections were assessed for lesion volume and either hemispheric or cortical tissue volume loss. The glial marker glial fibrillary acidic protein (GFAP) and the neuronal marker ubiquitin C-terminal hydrolase (UCH-L1) were measured by ELISA in serum at 4, 24 hours and 21 days after injury. Results At 4h post-injury, serum concentrations of UCH-L1 and GFAP were significantly increased compared to shams across all 3 TBI models. Initial GFAP levels were higher in CCI and PBBI model than in FPI model, whereas initial UCH-L1 concentration was highest after FPI. No significant treatment effect was detected in initial biomarker concentrations. At 24h post-injury, nicotinamide dose-dependently reduced serum GFAP levels in CCI and PBBI (but not FPI) with the greatest effect detected with the high dosage (500mg/kg). These findings were correlated with histological measures of lesion size and brain tissue loss. GFAP concentrations at 24h post-injury in CCI and PBBI strongly correlated with lesion volume ($R = 0.84$, $P < 0.0001$ and $R = 0.53$, $P < 0.0001$, respectively) and hemispheric tissue loss ($R = 0.87$, $P < 0.0001$ and $R= 0.59$, $P < 0.0001$). In FPI UCH-L1 concentrations at 4h post-injury correlated with lesion volume and hemispheric tissue loss ($R = 0.63$, $P < 0.0001$ and $R = 0.50$, $P = 0.002$, respectively). However, nicotinamide had no impact on serum UCHL1 levels. Conclusions Our results indicate that nicotinamide reduces GFAP levels following CCI and PBBI but not FPI, and that biomarker concentrations are predictive of lesion size and brain tissue loss. Differential effects of nicotinamide may be a reflection of the different animal models used and their associated type of injury. Our findings suggest the potential use of serum GFAP as a surrogate for volumetric analyses in preclinical therapeutic screening and the possibility that serum biomarker profiles may be useful in matching experimental models with patient subgroups in human TBI.

3702. Mondello, S., et al. (2011). "Analyses of brain damage biomarkers in patients with penetrating brain injury: A case series study." Critical care medicine **39**: 80.

Introduction: Penetrating brain injury (PBI) is a devastating insult associated to significant morbidity and mortality. To date, there are no therapies. In order to develop new therapeutic strategies, biomarkers represent a novel approach which may assess injury severity, provide objective and unique temporal information and insight into the pathophysiologic mechanisms following PBI. Hypothesis: We hypothesized that the magnitude of the increase in biomarker concentrations would reflect the severity of brain damage differentiating between mechanisms of injury, and that the time course of the biomarkers would mirror Blood-BrainBar-rier (BBB) dysfunction. Methods: Therefore, we evaluated concentration of Ubiquitin Carboxyl-Terminal Hydrolase-L1 (UCHL1) and glial fibrillary acidic protein (GFAP) in CSF and serum and compared their time course after PBI, closed head trauma and in uninjured controls. Samples were taken from each TBI patient at admission and every 6hrs up to 24hrs. Brain injury biomarkers were measured using absorbance-based ELISAassays. Results: CSF and serum levels of UCH-L1 and GFAP were significantly higher after PBI compared to closed head trauma and in uninjured controls. Initial and peak UCH-L1 and GFAP concentrations in CSF and serum were higher after PBI. Different temporal release patterns of biomarkers were observed. The temporal profile of CSF GFAP and UCH-L1 was more sustained in patients with PBI compared to patients with closed head trauma. Correlation between CSF and serum levels of both GFAP andUCH-L1 indicated an increased permeability of BBB in the first 12 hrs post-injury. Conclusions: Our findings including magnitude of the increase in biomarker concentrations and prolonged and elevated biomarker release suggest that the injury that occurs after PBI is particularly deleterious to the brain, and may explain the poor outcome in these patients. In addition, these preliminary results support the potential of brain biomarkers as monitoring parameters of BBB disruption following penetrating brain injury.

3703. Mondello, S., et al. (2014). "Comparison of TBI models using brain damage markers, and histological and behavioral outcomes in operation brain trauma therapy." Journal of neurotrauma **31**(12): A120.

Successful preclinical testing of neuroprotective drugs depends on the selection and characterization of appropriate animal models. Operation Brain Trauma Therapy (OBTT) is a multi-center pre-clinical drug screening consortium testing promising therapies for traumatic brain injury (TBI) in 3 well-established animal models (parasagittal fluid percussion injury [FPI], controlled cortical impact [CCI] and penetrating ballistic-like brain injury [PBBI]). Here, we characterize/ compare these models using circulating glial (glial fibrillary acidic protein [GFAP]) and neuronal (ubiquitin C-terminal hydrolase [UCHL1]) markers, behavior, and histology. At 4 h post-injury UCH-L1 was higher in CCI vs. FPI and PBBI ($P < 0.001$) and GFAP lower in PBBI vs. CCI and FPI ($P < 0.001$). Differences were also found comparing shams across models, with higher UCH-L1 levels in CCI vs. FPI and PBBI ($P < 0.001$) and lower GFAP levels in FPI vs. CCI and PBBI ($P <$

0.001 and P < 0.01, respectively). Increased cognitive deficits were observed in PBBI and CCI in the hidden platform task vs. FPI (P < 0.001) and in sham-CCI vs. sham-PBBI and sham-FPI (P < 0.001). Lesion volume was larger in PBBI vs. FPI and CCI (P < 0.001), while hemispheric volume loss was smaller in FPI vs. CCI and PBBI (P < 0.001). Average latency to find the hidden platform correlated with GFAP concentrations across models, but not with UCH-L1. Also, GFAP but not UCH-L1 correlated with lesion volume and hemispheric volume loss across models (P < 0.001). Experimental TBI models display major differences in biomarker profiles and functional and pathological consequences. Circulating GFAP levels best reflected behavioral and histological outcomes. Our data provide a unique characterization of TBI models that enlighten our understanding of the relationship between biomarkers and traditional TBI outcomes and could advance translational research.

3704. Mondello, S., et al. (2016). "Insight into Pre-Clinical Models of Traumatic Brain Injury Using Circulating Brain Damage Biomarkers: Operation Brain Trauma Therapy." Journal of neurotrauma **33**(6): 595-605.

Operation Brain Trauma Therapy (OBTT) is a multicenter pre-clinical drug screening consortium testing promising therapies for traumatic brain injury (TBI) in three well-established models of TBI in rats--namely, parasagittal fluid percussion injury (FPI), controlled cortical impact (CCI), and penetrating ballistic-like brain injury (PBBI). This article presents unique characterization of these models using histological and behavioral outcomes and novel candidate biomarkers from the first three treatment trials of OBTT. Adult rats underwent CCI, FPI, or PBBI and were treated with vehicle (VEH). Shams underwent all manipulations except trauma. The glial marker glial fibrillary acidic protein (GFAP) and the neuronal marker ubiquitin C-terminal hydrolase (UCH-L1) were measured by enzyme-linked immunosorbent assay in blood at 4 and 24 h, and their delta 24-4 h was calculated for each marker. Comparing sham groups across experiments, no differences were found in the same model. Similarly, comparing TBI + VEH groups across experiments, no differences were found in the same model. GFAP was acutely increased in injured rats in each model, with significant differences in levels and temporal patterns mirrored by significant differences in delta 24-4 h GFAP levels and neuropathological and behavioral outcomes. Circulating GFAP levels at 4 and 24 h were powerful predictors of 21 day contusion volume and tissue loss. UCH-L1 showed similar tendencies, albeit with less robust differences between sham and injury groups. Significant differences were also found comparing shams across the models. Our findings (1) demonstrate that TBI models display specific biomarker profiles, functional deficits, and pathological consequence; (2) support the concept that there are different cellular, molecular, and pathophysiological responses to TBI in each model; and (3) advance our understanding of TBI, providing opportunities for a successful translation and holding promise for theranostic applications. Based on our findings, additional studies in pre-clinical models should pursue assessment of GFAP as a surrogate histological and/or theranostic end-point.

3705. Mondello, S., et al. (2014). "Characterization of TBI models and evaluation of efficacy of nicotinamide, erythropoietin, and cyclosporin a using serum biomarkers: Results from operation brain trauma therapy." Journal of neurotrauma **31**(5): A35.

OBTT is a multicenter preclinical drug screening consortium for TBI. We measured serum glial fibrillary acidic protein (GFAP) and Ubiquitin C-terminal hydrolase (UCH-L1) in 3 rat models (parasagittal fluid percussion injury [FPI]), controlled cortical impact [CCI] and penetrating ballistic-like brain injury [PBBI]) treated with vehicle, or low or high doses of nicotinamide, erythropoietin [EPO] or Cyclosporin A [CsA]. At 4h after TBI UCH-L1 was significantly higher in CCI vs. FPI and PBBI, and GFAP lower in PBBI vs. CCI and FPI. Sham and TBI + Veh groups did not differ across experiments in the same model confirming intra-model reproducibility. But shams differed across models with highest UCHL1 levels in CCI and lowest GFAP in FPI. High-dose nicotinamide reduced GFAP but not UCH-L1 in PBBI at 24 h. High-dose EPO increased UCH-L1 at 4 h and reduced it at 24 h in CCI, but did not affect GFAP. CsA showed a dose-dependent increase in GFAP at 4 h in CCI and PBBI but a reduction trend in FPI vs. Veh. CsA had no impact on UCH-L1. Different models produced distinct biomarker profiles replicable across experiments supporting use of biomarkers to characterize, standardize and refine TBI animal models. Importantly, this study demonstrates that drugs differently affect distinct types of lesions as reflected by distinct biomarker pathways. Taken together, these findings provide robust evidence for a potential application of biomarkers in TBI theranostics thereby holding promise for personalized medicine.

3706. Mondello, S., et al. (2019). "Effects of glyburide on blood biomarker in three rat TBI models: Findings from OBTT." Journal of neurotrauma **36**(13): A33.

Glyburide (Gly) has shown promise in several studies of experimental traumatic brain injury (TBI) and the second highest scoring therapy tested in Operation Brain Trauma Therapy (OBTT). Although histological and functional measures remain central to assess therapeutic efficacy, there is interest in blood-based biomarkers to provide complementary, objective and efficient information. Here, we assess the effects of Gly on blood levels of neuronal and glial markers and their relationships with histopathological and behavioral outcomes across the OBTT consortium. Adult male rats subjected to controlled cortical impact (CCI), fluid percussion (FPI), or penetrating ballistic-like brain injury (PBBI) received a bolus 15min after-injury, followed by a continuous infusion for 7d. Serum glial fibrillary acidic protein (GFAP) and ubiquitin C-terminal hydrolase (UCH-L1) were measured at 4h and 24h after-injury. At 24h post-injury, GFAP was increased across models vs sham. At 24h, in CCI and PBBI, GFAP was lower in Gly-treated vs vehicle-treated, whereas there were no differences in UCH-L1 concentrations. Conversely, in FPI, Gly increased GFAP levels in treated rats at 4h and 24h, but attenuated neuronal injury as assessed by reduced UCHL1 at 4h. Contusion volume and hemispheric/cortical tissue loss were correlated with GFAP at both timepoints and with UCH-L1 at 4h across models; cognitive disfunction correlated with GFAP at 4h and 24h in CCI and at 24h in PBBI; no other correlations with behavioral outcomes were found. Overall, Gly produced distinct biomarker patterns and correlations across models. Greater understanding of the mechanisms underlying biomarker findings in TBI models may enhance their preclinical and clinical utility in TBI.

3707. Mono, J., et al. (1986). "Occult transorbital intracranial penetrating injuries." Annals of emergency medicine **15**(5): 589-591.

Emergency physicians who are confronted with orbital injuries must recognize that the transorbital route offers little resistance to intracranial penetration. Neither direct inspection of an orbital wound nor plain radiographs are sufficient to evaluate the extent of penetration beyond the orbital confines. A high index of suspicion is critical to the proper assessment and subsequent management of such injuries. We present two cases of penetrating injury. In the first, an arrow caused a hematoma in the superior cerebellar peduncle after passing through the medial orbit and superior orbital fissure. In the second, a wire entered the upper lid, fractured the orbital roof, and caused a frontal hematoma.

3708. Monson, D. O., et al. (1969). "Carotid vertebral trauma." The Journal of trauma **9**(12): 987-999.

3709. Monson, M. and A. Nations (2011). "Elevated intracranial pressure diagnosed by optic ultrasound in the setting of normal intraventricular catheter pressure measurements." Critical care medicine **39**: 17.

Case Report: One of the largest obstacles for physicians treating wounded service members is measuring intracranial pressure (ICP). Intraventricular catheters have long served as the «gold standard» of measuring, but are extremely invasive and difficult to maintain. Recent studies by Hansen HC, Blaivas M, Tayal V, Moretti R have shown that ultrasound measurement of the optic nerve sheath diameter can be used as a noninvasive way to gauge the ICP. We present the case of a wounded Marine who was diagnosed by ultrasound to have elevated ICP, in the setting of a normal intraventricular catheter pressure measurement. The patient is a 20 year old previously healthy male who was injured in an explosion causing multiple penetrating cranial wounds. Prior to arrival, he had undergone multiple surgeries, including a bifrontal craniectomy with intraventricular catheter placement for direct ICP monitoring. One week after arrival, the patient became acutely hypertensive and bradycardic, concerning for increasing ICP. The reading from the intraventricular catheter was discordant, however, showing a normal pressure. To assess help solve this diagnostic dilemma, a bedside ultrasound was performed of the orbit, which showed a markedly dilated optic nerve sheath diameter (6.9 mm with normal being less than 5.2 mm). The patient underwent a stat CT of the head, which showed a significant increase in size of a previously stable intracranial hemorrhage. He underwent arterial embolization, which he tolerated without complication. The intraventricular catheter did eventually show an elevated ICP, but not for another 2 hours. This case highlights the profound usefulness of the bedside ultrasound as a diagnostic modality in patients who have suffered traumatic brain injury. In this patient, whose vital signs and physical exam findings were conflicting, beside ultrasound of the optic nerve sheath was able to provide information leading to a definitive diagnosis prior to the «gold standard» of direct ICP measurement. We submit this case to bring to the attention of physicians the usefulness of a bedside ultrasound of the optic nerve sheath in evaluating for increased intracranial pressure.

3710. Montague, A. and B. Orozco (2017). "Systemic lead poisoning in an infant after gunshot injury to the spine and brain." Clinical Toxicology **55**(7): 790.

Background: Lead is a well-known toxic metal and developmental toxin in children. Cases of systemic absorption and toxicity from lead ingestion are common. Far more unusual is lead absorption and toxicity from non-ingested lead foreign bodies (LFBs), such as bullets. When this occurs, it is most likely because the LFB is in contact with circulating fluid, such as synovial fluid and possibly cerebrospinal fluid. We describe a case of lead poisoning in an infant after gunshot injury to the head and neck with LFBs in the central nervous system (CNS). Case report: The guardian of a 5-month-old female was attempting to fix a rifle when it discharged. The bullet ricocheted and struck the girl in her neck and thorax. She was stabilized at an outside hospital and transferred to a level one pediatric trauma center. Imaging revealed extensive soft tissue shrapnel in left neck, thorax, and occipital head. There were LFBs in the spinal canal at C4 and T2. LFB also tracked into the left cerebellum, penetrating to the midline brain near the cerebral aquaduct. Initial examination showed no movement in upper extremities and withdrawal to touch in bilateral lower extremities in a stable, intubated and sedated patient. Soft tissue was tattooed with black substance; LFBs and shrapnel were present. Debridement removed visible fragments. She had a C4-5 and T2-3 laminectomy with intradural LFB removal. Post-operative imaging revealed residual LFBs in the left cerebellar hemisphere, fourth ventricle, and occipital soft tissue. Two days after injury, a capillary blood lead level (BLL) was 27 mcg/dL. Thereafter, she was able to wean from the ventilator, smile, make eye contact and regain some extremity function. Constipation occurred that was attributed to medications and critical illness. Serial BLLs went up to 50 mcg/dL at 3 weeks post-injury. Succimer was started at standard dosing. BLLs initially decreased during succimer therapy, but quickly rebounded. Using a threshold of 45 mcg/dL for chelation, she required three courses of succimer in the 6 months since her injury. Highest BLL was 59 mcg/dL. She has not developed signs of neurotoxicity, hypertension, anemia or constipation. She is meeting appropriate language and social developmental milestones with motor limited as expected from her spinal injuries. Case discussion: Any symptoms of lead toxicity in this child are complicated by her young age and her co-occurring injuries. Her BLL may have risen rapidly secondary to initial high surface area exposure. Her ongoing source of lead is likely LFBs in contact with CSF. This type of exposure may result in chronic lead toxicity and potentially greater neurotoxicity. Unfortunately, the location of these LFBs also makes removal too risky to attempt. The role that potentially higher CSF lead burden may play is unstudied. The few pediatric reports of CNS LFB include no infants and no long-term outcomes. Conclusions: Elevated blood lead levels in an infant are complicated by retained lead foreign bodies in the CNS. For this rare scenario, no precedence was found in published cases to guide chelation therapy or predict long-term outcomes (Figure presented).

3711. Monterey, M., et al. (2019). "Open Surgery for Extraction of an Embolized Pellet in the Middle Cerebral Artery From a Shotgun Injury." Operative neurosurgery (Hagerstown, Md.) **17**(3): E119-E123.

BACKGROUND AND IMPORTANCE: Embolization of shotgun pellet from the peripheral vasculature to the cerebral vessels has been a known phenomenon that has been reported previously in the literature. However, there is no consensus on clinical indications for intervention, best modality of intervention or management upon leaving the hospital. We describe a case of a shotgun pellet in the neck that embolized to the middle cerebral artery that was treated with open surgery. Discussed is the initial management on presentation, timing of intervention from surgery and detailed surgical technique., CLINICAL PRESENTATION: A 20-yr-old man presented after being shot at close range with a shotgun. He was neurologically intact on exam. Initial screening computed tomography (CT) of the brain noted a shotgun pellet in the region of the sylvian fissure without intracranial hemorrhage. Computed tomography angiography again displayed pellet in the vicinity of the left middle cerebral artery. He was emergently taken for an awake cerebral angiogram and subsequent surgical extraction of the shotgun pellet., CONCLUSION: Missile embolization of a bullet fragment to the intracranial vasculature is rare and requires difficult decisions regarding management. Critical factors that are to be considered prior to treatment include neurological clinical presentation, timing of the trauma, and anatomic location of injury. Patients who are without neurological deficit that display compromised blood flow require immediate cerebral angiogram followed by surgical intervention depending on location.

3712. Montero-Menei, C. N., et al. (1996). "Early events of the inflammatory reaction induced in rat brain by lipopolysaccharide intracerebral injection: relative contribution of peripheral monocytes and activated microglia." Brain research **724**(1): 55-66.

We have previously demonstrated that lipopolysaccharide (LPS) intracerebral injection induced only minimal inflammatory reaction in rat brain, apart from an increased number of 'brain macrophages' observed 24 h after LPS administration [Montero-Menei et al., Brain Res., 653 (1994) 101-111]. However, the nature of these 'brain macrophages' in the inflammatory response is still unclear. The present study focused on the early time-points (from 5 h to 24 h) after LPS injection or stab-lesion, and was aimed at the identification of the peripheral (monocytes) or parenchymal (microglia) origin of these 'brain macrophages'. OX42- and ED1-labeling did not clearly discriminate between monocytes/macrophages and reactive microglia, both cell types being immunoreactive. In other experiments, rats were made aplasic by irradiation prior to lesioning. These experiments clearly demonstrated that LPS induces an intense monocyte recruitment and, to a lesser extent, microglial activation since about 80% of the cells present 24 h after LPS injection consisted of recruited monocytes not observed in aplasic rats. Interestingly, our data show that LPS exerts a sequential dual action by first inhibiting the monocyte recruitment observed 5 h after stab lesion and then enhancing it at 15 h and 24 h after injection. A possible involvement of cytokines, chemokines and adhesion molecules in the mechanisms occurring in the early events of brain inflammatory reaction is discussed.

3713. Montero-Menei, C. N., et al. (1994). "Lipopolysaccharide intracerebral administration induces minimal inflammatory reaction in rat brain." Brain research **653**(1-2): 101-111.

An inflammatory reaction, essential for defence against infection and for wound repair, may also induce irreversible tissue damage. It appears that the central nervous system has developed its own immunosuppressive strategy in order to limit the destructive effects of inflammation. To clarify this point, we have characterized in one unique model of inflammation induced in the rat by intracerebral lipopolysaccharide injection the kinetics of the inflammatory reaction, the participation of immunitary and glial cells and of three growth factors. Among these molecules, brain-derived neurotrophic factor mRNA expression was found decreased following LPS injection. No striking differences were observed in the brain parenchyma after stab lesion or inflammatory lesion apart from an increase in the number of monocytes/macrophages recruited early to the lesion area. Macrophages were later accumulated around the lesion when astroglia and microglia reactions occurred. Some of the macrophages and microglia expressed major histocompatibility complex class II antigens on their surface whereas no T or B lymphocytes were observed in the brain parenchyma. However, a subpopulation of CD3- and CD4-negative CD8-positive cells, likely natural killer cells, was observed around the lesion site; this recruitment was inhibited by the highest dose of LPS. This study therefore supports the hypothesis of a suppression of some aspects of cell-mediated immunity in the brain, mechanisms which need to be further characterized.

3714. Montgomery, S. P., et al. (2005). "The evaluation of casualties from Operation Iraqi Freedom on return to the continental United States from March to June 2003." Journal of the American College of Surgeons **201**(1): 7-3.

BACKGROUND: Most seriously wounded US Army casualties from the Iraqi theater of operations come through Walter Reed Army Medical Center on their return to the United States. General surgery and orthopaedic surgery services have developed a multidisciplinary team approach to triage and treatment of incoming casualties., STUDY DESIGN: Prospective database of returning casualties to Walter Reed Army Medical Center from Operation Iraqi Freedom (OIF) from March 1 to July 1, 2003., RESULTS: Of 294 casualties seen, 119 were triaged to inpatient status and treated within 1 hour of arrival; mean age 26.6 +/- 6.2 years (range 23 to 37). Time from original battlefield injury was a mean of 8 days (range 3 to 28 days). Forty-six (39%) sustained gunshot wounds, 37 (31%) sustained blast and shrapnel injuries, and 41 (34%) had blunt/motor vehicle collision mechanisms. There were a total of 184 wounded locations in these 119 casualties; of these, there were 29 head and neck, 25 chest, 20 abdomen, 74 lower extremity, and 36 upper extremity. Twenty-eight casualties (23%) required emergent surgical procedures on the night of arrival. Another 30 (25%) required an urgent surgical procedure within 48 hours of arrival., CONCLUSIONS: Followup surgical procedures were urgently or emergently required in 43% of admitted battlefield casualties from OIF on transfer to Level V care in the continental United States. The injury pattern of wounds from this engagement is described. The Walter Reed Army Medical Center system of incoming battlefield casualty evaluation using multidisciplinary teams is successful in expediting care and ensuring evaluation of the full range of potential injuries.

3715. Monticelli, F., et al. (2002). "Air rifle injury with an entrance through the nose: a case report and review of the literature." International journal of legal medicine **116**(5): 292-294.

A case of attempted homicide is reported where a 31-year-old woman was shot in the left nostril with a pellet from an air rifle. The projectile channel reconstruction showed penetration of the nasal septum, the maxillary and sphenoid cavities and the dura mater, with the pellet finally lodging in the anterior cranial fossa between the sinus cavernosus and the internal carotid artery. The patient was finally discharged from hospital in a good physical condition without any neurological symptoms. Although the muzzle velocity of the air rifle was within the legal limits, the present case demonstrates the potential lethality of air weapons considering the site of entrance of the pellet.

3716. Montiel, M. B. E., et al. (2018). "Renal allografts from brain dead donors following cerebral gunshot wounds." Transplantation **102**(7): S797.

Introduction: Severe brain injury following cerebral gunshot wounds may expose large amounts of tissue factor to the circulation and develop disseminated intravascular coagulation (DIC). DIC can lead to renal dysfunction. Objectives: Analyse the validity for transplantation of kidneys harvested from brain dead donors (BDD) following cerebral gunshot wounds and the outcome of the transplanted renal grafts. Methods: Retrospective descriptive study of renal allografts harvested from BDD following cerebral gunshot wounds, at a single center, between June 1, 2007 and May 31, 2017. Data on donors (patients' characteristics, blood tests, associated injuries) and recipients (graft survival, rejection) were collected. Results:We analysed data from six BDD following cerebral gunshot wounds (age 40.3 ± 9.6 years) without any cardiovascular risk factors, except one patient who had hypertension. All patients presented brain death in the first 24 hours of hospital admission. None of them had any associated injuries. One patient suffered a cardiopulmonary arrest (during 20 minutes) prior to ICU admission.One of the patients had elevated creatinine levels in the blood tests when he was admitted to the hospital. But, during the ICU length of stay, up to 50%of the patients presented acute renal failure. Fifty percent of the patients presented compatible or suggestive criteria for DIC. Four kidney grafts were not valid for transplantation because: acute renal failure (two kidney grafts), poor graft perfusion (one case) and complex vascular anomalies (one case). Eight kidney grafts (66.67%) were transplanted. Seven kidney grafts were transplanted in our center. One of them was explanted, in the first 24 hours after transplantation, due to cortical necrosis (pathology report: glomerular and vascular thrombotic microangiopathy lesions). Figure 1. The donor's contralateral kidney was not implanted due to poor perfusion. The pathology report of this kidney was: multiple fibrin trombi in glomerular capillaries and small-vessels (Figure 2). The remaining 6 grafts presented adequate function one year after the transplantation, except in one case which suffered underlying disease recurrence. Conclusion: An accurate evaluation of kidney grafts from BDD following cerebral gunshot wounds is required, because those patients are at risk for DIC and acute renal failure. Almost all transplanted renal allografts from BDD, following cerebral gunshot wounds, had good results in our study. Pre-transplant biopsy and, perhaps, the reduction of ischemia time may be indicated. Further studies with larger simple sizes are needed.

3717. Montoure, A., et al. (2016). "Neuro-critical care services can manage mild traumatic brain injury effectively without neurosurgical consultation." Neurocritical care. Conference: 14th annual meeting of the neurocritical care society. United states **25**(1 Supplement 1): S73.

Introduction: Mild traumatic brain injury (TBI) is a commonly seen pathology at trauma centers. Neurosurgical consultation is a routine practice; however, the vast majority do not require surgical intervention or invasive monitoring during the entirety of their hospital stay. In certain trauma centers, neurology-centered neurocritical care solely evaluate and manage mild TBI. We provide a retrospective analysis of this practice at our level 1 trauma center. Methods: A retrospective chart review was completed on TBI patients evaluated at a level 1 trauma center between September 2009 and December 2015. Inclusion criteria included; initial GCS 13-15, blunt head injury, available repeat imaging, and management by neurology-centered neuro-intensivists. Exclusion criteria included GCS <13, penetrating trauma, those that needed immediate surgery, those with neurosurgical consultation, and those without available imaging. A total of 87 patients were included in the final analysis. Results: Age was 48.8 +/- 21 years. There were 50 males and 37 females. The most common mechanism was falls (51.7%), followed by motor-vehicle collision (16.1%), motor-cycle accident (12.6%), bike-related (8.0%), assault (6.9%), and pedestrian-struck by automobile (4.6%). Polytrauma occurred in 8%, anticoagulation / antiplatelet (A/A) use in 23.0%, and skull fractures in 41.4%. On repeat CT head, 14.9% were better, 60.9% were stable, 24.1% were worse. Only 10 patients (11.5%) exhibited neuro-exam

changes, where 7 patients received repeat imaging which ultimately demonstrated stable findings. No patients required a neurosurgical procedure. Average hospital stay was 2.8 +/- 3.7 days. Conclusions: Neurology-centered neuro-intensivists can manage mild TBI appropriately without official neurosurgical consultation. This practice can streamline TBI management and potentially reduce hospital costs.

3718. Montoure, A., et al. (2016). "Routine repeat CT head is not necessary without neurological change for mild traumatic brain injury." Neurocritical care. Conference: 14th annual meeting of the neurocritical care society. United states **25**(1 Supplement 1): S61.

Introduction: Mild traumatic brain injury (mTBI) is defined as an initial Glasgow Coma Scale (GCS) 13-15. Current recommendations include a follow-up computed tomography (CT) scan of the head prior to discharge. Often, imaging and neurological exam remains stable, questioning the role of routine repeat imaging. Methods: A retrospective chart review was completed on TBI patients evaluated at a level 1 trauma center between August 2009 and December 2015. Inclusion criteria included: initial GCS 13-15, blunt head injury, and available repeat imaging. Exclusion criteria included GCS <13, penetrating trauma, those that required immediate surgery, or those without repeat imaging. A total of 198 patients were included in the analysis. Statistics were done with Mann-U Whitney or Chi-Square testing. Results: Age was 49.3+/-21 years. There were 123 males and 75 females. The most common mechanism was falls (43.9%), followed by motor-vehicle collision (22.7%), motor-cycle accident (12.6%), assault (9.1%), pedestrian-struck by automobile (6.1%), and bike-related (5.6%). Polytrauma occurred in 42.6%, anticoagulation / antiplatelet (A/A) use in 22.2%, and skull fractures in 50.5%. On repeat CT, 16.2% were better, 59.1% were stable, 24.7% were worse. Only 19 patients (19.6%) exhibited neuro-exam changes, where 16 patients received repeat imaging which ultimately demonstrated stable findings. Ultimately, only one patient required a neurosurgical procedure, an external ventricular drain, due to significant decline. Age, gender, mechanism, polytrauma, A/A use, and skull fractures did not significantly correlate with neuro-exam changes. On the other hand, neuro-exam changes significantly correlated with CT changes ($p = 0.01$). Conclusions: Repeat imaging tend to show worse findings when associated with neurological changes. On the other hand, results for repeat imaging were variable without neurological changes and generally did not alter treatment plans / patient outcomes. As CT imaging inflicts radiation exposure and hospital costs, repeat imaging is only warranted for neurological changes that may necessitate a neurosurgical procedure.

3719. Moon, J. H., et al. (2013). "Evaluation of probability of survival using trauma and injury severity score method in severe neurotrauma patients." Journal of Korean Neurosurgical Society **54**(1): 42-46.

Objective: Despite several limitations, the Trauma Injury Severity Score (TRISS) is normally used to evaluate trauma systems. The aim of this study was to evaluate the preventable trauma death rate using the TRISS method in severe trauma patients with traumatic brain injury using our emergency department data. Methods: The use of the TRISS formula has been suggested to consider definitively preventable death (DP); the deaths occurred with a probability of survival (Ps) higher than 0.50 and possible preventable death (PP); the deaths occurred with a Ps between 0.50 and 0.25. Deaths in patients with a calculated Ps of less than 0.25 is considered as non-preventable death (NP). A retrospective case review of deaths attributed to mechanical trauma occurring between January 1, 2011 and December 31, 2011 was conducted. Results: A total of 565 consecutive severe trauma patients with ISS>15 or Revised Trauma Score<7 were admitted in our institute. We excluded a total of 24 patients from our analysis: 22 patients younger than 15 years, and 2 patients with burned injury. Of these, 221 patients with head injury were analyzed in the final study. One hundred eighty-two patients were in DP, 13 in PP and 24 in NP. The calculated predicted mortality rates were 11.13%, 59.04%, and 90.09%. The actual mortality rates were 12.64%, 61.547%, and 91.67%, respectively. Conclusion: Although it needs to make some improvements, the present study showed that TRISS performed well in predicting survival of traumatic brain injured patients. Also, TRISS is relatively exact and acceptable compared with actual data, as a simple and time-saving method.

3720. Moore, D. F., et al. (2008). "Blast physics and central nervous system injury." Future neurology **3**(3): 243-250.

The effect of blast on biological tissue is well documented for particular organ systems such as the lung. This is not the case for the CNS, where the mechanism of CNS injury following a detonation and blast wave is unclear. The effect of blast on traumatic brain injury (TBI) has come into particular focus with the Global War on Terror and Operation Iraqi Freedom, and Operation Enduring Freedom where TBI has become known as the signature injury of

these conflicts. The reason for the prominence of TBI in these particular conflicts as opposed to others is unclear, but may result from the increased survivability of blast due to improvements in body armor. In this review, we trace the historical context of blast injury and develop current concepts from this framework, in addition to highlighting many remaining unsolved questions.

3721. Moore, H. B., et al. (2016). "Pediatric emergency department thoracotomy: A 40-year review." Journal of pediatric surgery **51**(2): 315-318.

BACKGROUND/PURPOSE: Emergency department thoracotomy (EDT) has been proposed to be futile in the pediatric patient population. This extreme procedure has survival rates of 0 to 26% in the nonadult population. When taking into consideration that the mechanism of injury is one of the strongest predictors of survival, we hypothesize that the low survival rate in pediatric patients is attributable to a higher rate of blunt trauma compared to their adolescent counterparts., METHODS: Prospective data collected from our level 1 trauma center from 1974 to 2014 on all patients undergoing EDT at our institution were evaluated for age 18years or younger. Patient predictor variables included injury mechanism, injury pattern, and detected cardiac activity in the field. Outcomes included successful resuscitation (reestablish of blood pressure and taken to operating room) and overall survival. Patients were dichotomized by age into pediatric (age<=15years) and adolescent (16-18years) categories., RESULTS: 1691 patients who underwent EDT were evaluated for age of 18years or less, which included 179 patents (11%). Overall survival in the adult population was 6.1%, compared to 3.4% in the nonadult population (p=0.157). Pediatric patients were more likely to sustain blunt injury than adolescents (72% vs 32%, p<0.001). This also corresponded to differences in anatomic injury patterns and more multisystem trauma (52% vs 44%, p=0.001). Adolescents had significantly higher survival rates than pediatric patients (5% vs 0%, p=0.036)., CONCLUSION: In nonadult patients undergoing EDT, adolescents have a higher survival rate than pediatric patients. The pediatric population had a significantly lower incidence of penetrating trauma and higher incidence of head injury. The discrepancy in survival between adolescent and pediatric patients appears to be attributable to differences in mechanism. Therefore, those pediatric patients with penetrating thoracic injuries may still benefit from EDT.

3722. Moore, H. B., et al. (2016). "Establishing Benchmarks for Resuscitation of Traumatic Circulatory Arrest: Success-to-Rescue and Survival among 1,708 Patients." Journal of the American College of Surgeons **223**(1): 42-50.

BACKGROUND: Attempts are made with emergency department thoracotomy (EDT) to salvage trauma patients who present to the hospital in extremis. The EDT allows for relief of cardiac tamponade, internal cardiac massage, and proximal hemorrhage control. Minimally invasive techniques, such as endovascular hemorrhage control (EHC) are available, but their noninferiority to EDT remains unproven. Before adopting EHC, it is important to evaluate the current outcomes of EDT. We hypothesized that EDT survival has improved during the last 4 decades, and outcomes stratified by pre-hospital CPR and injury patterns will provide benchmarks for success-to-rescue and survival outcomes for patients in extremis., STUDY DESIGN: Consecutive trauma patients undergoing EDT from 1975 to 2014 were prospectively observed as part of quality improvement. Predicted probabilities of survival were adjusted for pre-hospital CPR, mechanism of injury, injury pattern, patient demographics, and time period of EDT using logistic regression. Success-to-rescue was defined as return of spontaneous circulation with blood pressure permissive for transfer to the operating room., RESULTS: There were 1,708 EDTs included, with an overall 419 (24%) success-to-rescue patients and 106 survivors (6%), and 1,394 (79%) of these patients had pre-hospital CPR and 900 (54%) had penetrating wounds. The most common injury patterns were chest (29%), multisystem with head (27%), and multisystem without head (21%). Penetrating injury was associated with higher survival than blunt trauma (9% vs 3% p < 0.001). Success-to-rescue increased from 22% in 1975 to 1979 to 35% over the final 5 years (p < 0.001); survival increased from 5% to 14% (p < 0.001)., CONCLUSIONS: Outcomes of EDT have improved over the past 40 years. In the last 5 years, STR was 35% and overall survival was 14%. These prospective observational data provide benchmarks to define the role of EHC as an alternative approach for patients arriving in extremis.

3723. Moore, J. P., et al. (2009). "The corrected QT interval before and after heart transplantation." The American journal of cardiology **104**(4): 596-601.

Heart donor candidates have severe neurologic injuries that have been associated with significant prolongation of the corrected QT (QTc) interval. Screening for an underlying abnormality of cardiac repolarization such as the long-QT syndrome thus becomes difficult. The aims of this study were to establish normal values and determine factors associated with prolongation of pre- and post-transplantation QTc intervals in a large cohort of heart transplantation donors and recipients. The medical records of 179 donors and 112 recipients were reviewed for historical, electrocardiographic, and neuroimaging data. After linear regression analysis, gunshot wounds were associated with the shortest mean pre-transplantation QTc interval of 447 +/- 51 ms (p = 0.016), whereas all other mechanisms of brain injury were associated with markedly prolonged QTc intervals. Overall, the mean QTc interval decreased from 467 +/- 58 to 446 +/- 47 ms (p <0.001), the mean QRS duration increased from 87 +/- 16 to 98 +/- 21 ms (p <0.001), and the mean QT dispersion did not change significantly after transplantation. The only factor associated with a prolonged QTc interval in the post-transplantation period was hypokalemia, with a mean QTc of 468 +/- 37 ms (p = 0.047). In conclusion, the mechanism of donor brain injury is associated with alterations in the pre-transplantation QTc interval, with the shortest intervals related to gunshot wounds. Fewer than 5% of the donor population was found to have QTc interval > or =580 ms. For those afflicted by gunshot wounds, <5% had QTc intervals > or =550 ms. This information can be used in pre-transplantation donor assessment, and post-transplantation management can be tailored to avoid the occurrence of ventricular arrhythmia.

3724. Moore, N., et al. (2017). "Prevalence of ocular injuries in the setting of trauma: A 6-year retrospective analysis from a level-one trauma center." Investigative Ophthalmology and Visual Science **58**(8).

Purpose: To characterize ocular injuries in trauma patients requiring ophthalmic consultation. Methods: The American College of Surgeons (ACS) trauma registry was utilized to identify patients presenting to a level-one trauma center in the Midwest region who received ophthalmic evaluation for associated ocular injuries from January 1, 2006 to December 31, 2012. Data recorded from the registry included patient demographics, mechanism of injury, and the specific ocular injuries encountered. Descriptive analysis of the data was utilized. Results: 212 patients were identified as having ocular injuries related to major trauma requiring an ophthalmic evaluation. 161 patients were male (75.9%, median age 37) and 51 were female (24.1%, median age 44). Mechanisms of injury included: motor vehicle/motorcycle accidents (36%), assault (33%), fall (16%), gunshot injury (3.8%), and accidental or other cause of injury (11.2%). Of the total number of females, 72.5% (n=37) suffered a motor vehicle crash or a fall as a cause of their ocular injury, whereas 70% (n=113) of men suffered a motor vehicle crash or assault. Significant injuries included: open globe injury (24%, n=51), hyphema (16%, n=34), retrobulbar hemorrhage (14%, n=30), traumatic optic neuropathy (7%, n=15), vitreous hemorrhage (7%, n=15), optic nerve transection (2.4%, n=5), and retinal detachment (1.4%, n=3). Other common injuries included: orbital fracture (49%, n=104), eyelid laceration (32%, n=68), subconjunctival hemorrhage (24%, n=51), and corneal abrasions (14%, n=30). Orbital fractures were associated with simultaneous open globe injuries in 18 of the 51 patients (35%), traumatic optic neuropathy in 9 of the 15 patients (60%), and optic nerve transection in 3 of the 5 patients (60%). Seventy (33%) of all these patients required an ophthalmic procedural intervention. Conclusions: Patients presenting to the trauma service can also have significant ocular injuries. Young men are vulnerable to ocular injuries in the setting of trauma, especially with motor vehicle accidents and assaults. Women are more likely to suffer ocular injuries through a motor vehicle crash or fall. Orbital fractures were associated with significant sight threatening ocular injuries. Early ocular evaluation is important in the setting of major trauma, as one third of the patients in this analysis required an ophthalmologic procedural intervention.

3725. Moore, P. L., et al. (2003). "Gunshot injuries to the temporal bone." The Journal of laryngology and otology **117**(1): 71-74.

The current incidence of missile injury to the temporal bone (MITB) is very low in the United Kingdom. However, the increasing frequency of firearm violence in Britain suggests a greater risk of occurrence. This, along with the devastating potential sequelae of MITB (facial palsy, dead ear, intracranial damage, major vascular injury and cosmetic disfigurement), requires otolaryngologists to be conversant with all aspects of their management. The risk of major complications is much higher with MITB than with temporal bone injury following blunt trauma, and surgical management is, therefore, much more common. We present one such case, and review the literature outlining the pathogenesis, clinical features, and recommended management.

3726. Moore, R. A., et al. (2020). "Clinical utility of WAIS-IV 'excessive decline from premorbid functioning' scores to detect invalid test performance following traumatic brain injury." The Clinical neuropsychologist **34**(3): 512-528.

Objective: Excessive Decline from Premorbid Functioning (EDPF), an atypical discrepancy between demographically predicted and obtained Wechsler Adult Intelligence Scale-4th Edition (WAIS-IV) scores, has been recently proposed as a potential embedded performance validity test (PVT). This study examined the clinical utility of EDPF scores to detect invalid test performance following traumatic brain injury (TBI). Methods: Participants were 194 U.S. military service members who completed neuropsychological testing on average 2.4 years (SD = 4.0) following uncomplicated mild, complicated mild, moderate, severe, or penetrating TBI (Age: M = 34.0, SD = 9.9). Using TBI severity and PVT performance (i.e., PVT Pass/Fail), participants were classified into three groups: Uncomplicated Mild TBI-PVT Fail (MTBI-Fail; n = 21), Uncomplicated Mild TBI-PVT Pass (MTBI-Pass; n = 94), and Complicated Mild to Severe/Penetrating TBI-PVT Pass (CM/STBI-Pass; n = 79). Seven EDPF measures were calculated by subtracting WAIS-IV obtained index scores from the demographically predicted scores from the Test of Premorbid Functioning (TOPF). Cutoff scores to detect invalid test performance were examined for each EDPF measure separately. Results: The MTBI-Fail group had higher scores than the MTBI-Pass and CM/STBI-Pass groups on five of the seven EDPF measures ($p<.05$). Overall, the EDPF measure using the Processing Speed Index (EDPF-PSI) was the most useful score to detect invalid test performance. However, sensitivity was only low to moderate depending on the cutoff score used. Conclusions: These findings provide support for the use of EDPF as an embedded PVT to be considered along with other performance validity data when administering the WAIS-IV.

3727. Mootha, V. V., et al. (1997). "Subperiosteal orbital hemorrhage from retrobulbar injection resulting in blindness." Archives of ophthalmology (Chicago, Ill. : 1960) **115**(1): 123-124.

3728. Mora Rubio, J. and J. Mendoza-Vega (1971). "[Craniocerebral injuries. Epidemiology]." Traumatismos encefalocraneanos. Epidemiologia. **17**(2 Suppl): 199-212.

3729. Morais, B. A., et al. (2018). "Post-traumatic carotid-cavernous fistula in a pediatric patient: a case-based literature review." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **34**(3): 577-580.

BACKGROUND: Carotid-cavernous fistula (CCF) is a shunt between the carotid artery and the cavernous sinus. Traumatic CCFs are diagnosed in 0.2% of head traumas being only 4.6% of the pediatric population. Classified by Barrow in 1985, type A CCF is the most frequent, occurring in 75% of cases. Type A is characterized by direct and high-flow CCF that generally can occur as a result of traumatic injury or rupture of an intracavernous aneurysm., CASE PRESENTATION: The subject was an 8-year-old boy with penetrating trauma to his left eye. During the initial evaluation, a computed tomography (CT) scan was unremarkable, and after relief of symptoms, the patient was discharged. Seven days later, he developed grade I proptosis, conjunctival chemosis, ophthalmoplegia (III, IV, and VI cranial nerve palsies), and left-sided ptosis and mydriasis. Arteriography confirmed a post-traumatic CCF, and the patient was treated with an endovascular detachable balloon., CONCLUSION: CCF should be suspected in craniofacial traumas with ocular symptoms. The presence of a skull base fracture on CT is a poor predictor of CCF associated with head trauma. Early diagnosis and treatment can prevent permanent neurological deficits and unfavorable outcomes.

3730. Morales, C. H., et al. (2014). "Negative pleural suction in thoracic trauma patients: a randomized controlled trial." The journal of trauma and acute care surgery **77**(2): 251.

BACKGROUND: The study aimed to establish the benefits of using chest tubes with negative pleural suction against trapped water in patients with penetrating or blunt chest trauma who underwent tube thoracostomy, in terms of the incidence of complications, such as persistent air leak, clotted hemothorax, empyema, and duration of stay., METHODS: Patients who underwent tube thoracostomy because of traumatic pneumothorax, hemothorax, or hemopneumothorax were randomly assigned into one of two groups: in Group 1, the three-bottle drainage system was connected to a negative suction; in Group 2, no suction was given. Patients who required mechanical ventilation or emergency surgery (thoracotomy or thoracoscopy) either at the time of admission to the institution or immediately after the tube thoracostomy, patients who had histories of thoracic procedures or chronic pulmonary diseases (chronic

obstructive pulmonary disease, diffuse interstitial lung disease), and patients with multiple injuries with severe traumatic brain injury and a Glasgow Coma Scale (GCS) score less than 8 of 15 were excluded from the study. Hospital stay, duration of tube thoracostomy, prolonged fistula, and other clinical variables were compared., RESULTS: One hundred ten patients were included, 56 in the group with suction and 54 in the group without suction. There were no differences in the demographic characteristics of each group. There were no differences between the groups in terms of hospital stay (p = 0.22), duration of tube thoracostomy (p = 0.35) (3 days in each group), or complications. However, the probability of air leak presence in time was greater for the Group 1 patients with negative suction versus the Group 2 patients (p = 0.023)., CONCLUSION: The use of negative pleural suction did not demonstrate advantages over the three-bottle chest drainage system without suction in patients with uncomplicated traumatic pneumothorax, hemothorax, or hemopneumothorax., LEVEL OF EVIDENCE: Therapeutic study, level II.

3731. Morales, C. H., et al. (2014). "Negative pleural suction in thoracic trauma patients: A randomized controlled trial." The journal of trauma and acute care surgery **77**(2): 251-255.

BACKGROUND: The study aimed to establish the benefits of using chest tubes with negative pleural suction against trapped water in patients with penetrating or blunt chest trauma who underwent tube thoracostomy, in terms of the incidence of complications, such as persistent air leak, clotted hemothorax, empyema, and duration of stay., METHODS: Patients who underwent tube thoracostomy because of traumatic pneumothorax, hemothorax, or hemopneumothorax were randomly assigned into one of two groups: in Group 1, the three-bottle drainage system was connected to a negative suction; in Group 2, no suction was given. Patients who required mechanical ventilation or emergency surgery (thoracotomy or thoracoscopy) either at the time of admission to the institution or immediately after the tube thoracostomy, patients who had histories of thoracic procedures or chronic pulmonary diseases (chronic obstructive pulmonary disease, diffuse interstitial lung disease), and patients with multiple injuries with severe traumatic brain injury and a Glasgow Coma Scale (GCS) score less than 8 of 15 were excluded from the study. Hospital stay, duration of tube thoracostomy, prolonged fistula, and other clinical variables were compared., RESULTS: One hundred ten patients were included, 56 in the group with suction and 54 in the group without suction. There were no differences in the demographic characteristics of each group. There were no differences between the groups in terms of hospital stay (p = 0.22), duration of tube thoracostomy (p = 0.35) (3 days in each group), or complications. However, the probability of air leak presence in time was greater for the Group 1 patients with negative suction versus the Group 2 patients (p = 0.023)., CONCLUSION: The use of negative pleural suction did not demonstrate advantages over the three-bottle chest drainage system without suction in patients with uncomplicated traumatic pneumothorax, hemothorax, or hemopneumothorax., LEVEL OF EVIDENCE: Therapeutic study, level II.

3732. Morales, N. G., et al. (2021). "Eye injuries associated with nerf gun use in a pediatric population: a case series." Journal of AAPOS **25**(4): e41-e42.

Introduction: Nerf guns can cause vision-threatening injuries. We conducted a retrospective case series of patients evaluated during the acute management of Nerf gun-associated eye injuries to assess clinical outcomes and follow-up burden. Methods: An electronic medical record search was conducted for pediatric (age 1-19) patients seen at an academic pediatric ophthalmology clinic between 12/1/2017 and 3/31/2020. 445 patients were identified using ocular injury-related ICD codes. Thirteen patients met our inclusion criteria of injury with a Nerf gun, evaluation within 48 hours, and completion of follow-up appointments. Results: Mean patient age was 9.7 years old and most were male (69.2%). At presentation, only ∼1/3 had 20/20 near visual acuity and two had pressures >21 mm Hg. Hyphema, the most common injury, was documented in 11 patients (84.6%), and commotio retinae, the most severe injury, in one. Four patients (30.8%) required pressure lowering drops over an average of 15 days. Cumulative follow-up for all 13 cases amounted to 61 outpatient visits, with an average of 4.7 visits and 26-day follow-up windows per patient. Activity restriction averaged 15 days per patient, with ∼176 cumulative days of restriction for all patients. Although no severe complications were noted at discharge, both blunt trauma and hyphema confer an increased lifetime risk for angle-recession glaucoma, necessitating lifelong follow-up. Conclusion/Relevance: This case series highlights the ocular dangers and emphasizes the potential loss of productivity for children and their families resulting from Nerf gun injuries. The authors support formal recommendations for eye protection during the use of Nerf guns.

3733. Moran, J. (2014). "Ninety minutes to die." Journal of palliative medicine **17**(1): 112-113.

3734. Morariu, A. M., et al. (2008). "Early events in kidney donation: progression of endothelial activation, oxidative stress and tubular injury after brain death." American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons **8**(5): 933-941.

Cerebral injury leading to brain death (BD) causes major physiologic derangements in potential organ donors, which may result in vascular-endothelial activation and affect posttransplant graft function. We investigated the kinetic of pro-coagulatory and pro-inflammatory endothelial activation and the subsequent oxidative stress and renal tubular injury, early after BD declaration. BD was induced by slowly inflating a balloon-catheter inserted in the extradural space over a period of 30 min. Rats (n = 30) were sacrificed 0.5, 1, 2 or 4 h after BD-induction and compared with sham-controls. This study demonstrates immediate pro-coagulatory and pro-inflammatory activation of vascular endothelium after BD in kidney donor rats, proportional with the duration of BD. E- and P-Selectins, Aalpha/Bbeta-fibrinogen mRNA were abruptly and progressively up-regulated from 0.5 h BD onwards; P-Selectin membrane protein expression was increased; fibrinogen was primarily visualized in the peritubular capillaries. Plasma von Willebrand factor was significantly higher after 2 h and 4 h BD. Urine heart-fatty-acid-binding-protein and N-acetyl-glucosaminidase, used as new specific and sensitive markers of proximal and distal tubular damage, were found significantly increased after 0.5 h, with a maximum at 4 h. Unexpectedly, oxidative stress was detectable only late, after the installation of tubular injury, suggesting only a secondary role for hypoxia in triggering these injuries.

3735. Morax, S., et al. (1980). "[Oculo-orbito-palpebral injuries by projectile]." Traumatismes oculo-orbito-palpebraux par projectile. **25**(4): 341-346.

3736. Moreira Filho, P. F. and M. R. Freitas (1986). "[Post-anoxic hemi-myoclonic encephalopathy: report of a case]." Encefalopatia hemi-mioclonica pos anoxica: registro de um caso. **44**(1): 67-72.

A case of a young man with myoclonus in his right side after cerebral hypoxia is reported. This patient had cerebral hypoxia caused by injury in his left common carotid artery. After a few hours he had generalized convulsive seizures of tonic-clonic type and also a septic shock. As consciousness was regained, he developed action and intention myoclonus in his right-side. The EEG showed diffuse typical myoclonus potentials. Clonazepan 8 mg daily was used with good results. This is the first reference in the medical literature of the unilateral localization in the Lance-Adams syndrome. The authors think that in this case two abnormalities contributed to the cerebral anoxia: the common carotid artery injury and the septic shock.

3737. Moreno, A., et al. (2009). "[Current treatment of pediatric penetrating traumas]." Tratamiento actual de los traumatismos penetrantes pediatricos. **22**(4): 193-196.

INTRODUCTION: The traditional management of pediatric penetrating trauma has been wide surgical examination. However, the selective nonoperative management is increasing thanks to the precise diagnosis obtained from radiologic studies as CT scan. The purpose of this study is reviewing our experience in the last eight years with a less invasive management., PATIENTS AND METHODS: We retrospectively reviewed (2000-2007) the patients with penetrating injuries of different parts of the body (excluding cranioencephalic traumatism) treated in our center and registered by the Clinical Documentation Unit. The variables collected and evaluated included age, mechanism of injury, kind of injury, diagnostic and therapeutic modalities and outcome., RESULTS: There were 17 patients (median 9.5 years, range 4-17) with penetrating trauma. According the localization of injury the patients were divided into 4 groups: abdominal (17.6%), thoracic (23.5%), cervical (17.6%) and extremities (41.2%). The most frequent kind of injuries were: skin and muscle (with or without penetrating peritoneal or chest cavity, 52.9%) vascular or neurological structures (29.4%). We would like to highlight one case of cardiac perforation and taponade, one traqueal lesion and one case of external iliac vein injury. The injuries caused by glass (35.3%) and sharp arms (29,4%) were the most frequent mechanism. Simple suture and observation was treatment enough in 47.1%. Three patients required neural and vascular micro suture. One patient followed a thoracotomy procedure and other one, a sternotomy. It wasn't necessary any laparotomy. No patient died and 88% of the patients have no sequelae., CONCLUSIONS: Most of the penetrating child traumas have good prognosis and are associated with few sequelae. Low energy thoracic and abdominal penetrating

traumas can be managed conservatively when the patient is hemodiynamically stable and CT scan shows no organ injury, avoiding unnecessary surgical examinations.

3738. Moreno, L., et al. (2013). "Ocular trauma from land mines among soldiers treated at a University Hospital in Medellin, Colombia." Colombia medica (Cali, Colombia) **44**(4): 218-223.

INTRODUCTION: Currently ocular combat injuries are complex and associated with poor visual outcomes. Our objective is to characterize the military population that suffer land mine combat ocular trauma in Colombia and identify the type of wound, treatment and visual outcomes., METHODS: Retrospectively review of medical history of soldiers evaluated in Pablo Tobon Uribe Hospital, whom had land mine trauma during January of 2004 and December 2012., RESULTS: 635 soldiers had land mine trauma, 153 of them had ocular trauma (226 eyes). Open ocular trauma was observed in 29.6%. The Ocular Trauma Score was calculated in 183 eyes, the initial visual acuity was not possible to be reported in the rest of them; the 45% of the eyes were classified in category 3. Three patients had no light perception in both eyes. 97.3% of the eyes received medical treatment and 49.1% had surgery also. Primary evisceration was made in 5.8% and enucleation in 1.8%. Intraocular foreign body was observed by ultrasonography in 11.1% and in 5.8% by orbital tomography. Eleven patients were legally blind at discharge., CONCLUSIONS: The ocular trauma related to a land mine is highly destructive at an ocular level. The treatments associated with better visual outcomes are primary closure of globe and systemic antibiotics; although the characteristics of the wound itself are the main prognostic factor. The Ocular trauma score is a useful tool for determining visual outcome in combat ocular trauma.

3739. Moreno, P., et al. (2013). "Early lung retrieval from traumatic brain-dead donors does not compromise outcomes following lung transplantation." European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery **43**(6): e190-197.

OBJECTIVES: To determine whether lung retrieval from traumatic donors performed within 24 h of brain death has a negative impact on early graft function and survival after lung transplantation (LT), when compared with those retrieved after 24 h., METHODS: Review of lung transplants performed from traumatic donors over a 17-year period. Recipients were distributed into two groups: transplants from traumatic donor lungs retrieved within 24 h of brain death (Group A), and transplants from traumatic donor lungs retrieved after 24 h of brain death (Group B). Demographic data of donors and recipients, early graft function, perioperative complications and mortality were compared between both groups., RESULTS: Among 356 lung transplants performed at our institution, 132 were from traumatic donors (70% male, 30% female). Group A: 73 (55%); Group B: 59 (45%). There were 53 single, 77 double, and 2 combined LT. Indications were emphysema in 41 (31%), pulmonary fibrosis in 31 (23%), cystic fibrosis in 38 (29%), bronchiectasis in 9 (7%) and other indications in 13 patients (10%). Donor and recipient demographic data, need or cardiopulmonary bypass, postoperative complications and Intensive Care Unit and hospital stay did not differ between groups. Primary graft dysfunction (A vs B): 9 (16%) vs 13 (26%) P = 0.17. PaO2/FiO2 24 h post-transplant (A vs B): 303 mmHg vs 288 mmHg (P = 0.57). Number of acute rejection episodes (A vs B): 0.93 vs 1.49 (P = 0.01). Postoperative intubation time (A vs B): 99 vs 100 h (P = 0.99). 30-day mortality (A vs B): 7 (10%) vs 2 (3.5%) (P = 0.13). Freedom from bronchiolitis obliterans syndrome (A vs B): 82, 72, 37, 22 vs 78, 68, 42, 15%, at 3, 5, 10 and 15 years, respectively (P = 0.889). Survival (A vs B): 65, 54, 46, 42 and 27 vs 60, 50, 45, 43 and 29% at 3, 5, 7, 10 and 15 years, respectively (P = 0.937)., CONCLUSIONS: In our experience, early lung retrieval after brain death from traumatic donors does not adversely affect early and long-term outcomes after LT.

3740. Morentin, B. and B. Biritxinaga (2006). "Massive pulmonary embolization by cerebral tissue after head trauma in an adult male." The American journal of forensic medicine and pathology **27**(3): 268-270.

We report a case of an adult man who was run over by a car, suffering severe head trauma. After 3 hours in the hospital, he experienced sudden and severe hemodynamic deterioration, dying immediately. The autopsy showed massive cerebral tissue pulmonary embolization (CTPE), confirmed by immunohistochemistry. Multiple fractures of the skull, tear of the transverse sinus, and brain laceration of the occipital lobe were present. CTPE is very infrequent. In children and adults, it occurs as a complication of severe closed or penetrating head trauma. Although laceration of a large cerebral venous sinus is not always essential, in some cases (like in the present one) this laceration is the mechanism of entry of the cerebral tissue to the blood circulation. The clinical repercussion of CTPE is variable. In some cases, it could be an incidental finding of autopsy. In other cases, coagulation abnormalities and disseminated

intravascular coagulation have been reported. Finally, such as in the present case, the immediate cause of death is the sudden hemodynamic failure due to the massive CTPE.

3741. Moreschi, C., et al. (2019). "Medicolegal Investigations in Cases of Double Suicidal Gunshots to the Head Using 2 Different Handguns: A Report of an Unusual Case." The American journal of forensic medicine and pathology **40**(3): 266-268.

Suicides committed by firing 2 gunshots to the head are rare events and pose a significant challenge for coroners and forensic pathologists. The evaluation of the victim's ability to fire 2 shots simultaneously, or to act after a first gunshot, is crucial for the reconstruction of the death scene and to differentiate between homicide and suicide. We report an unusual case of suicide involving 2 gunshot wounds to the head. The medicolegal investigations hypothesized that the victim had either fired 2 shots near simultaneously or he suffered from rapid incapacitation after the first gunshot but was still able to fire a second consecutive and fatal shot to the head. This article focuses on the diagnostic difficulties involved, together with analysis of the death scene and autopsy findings, in cases where the courts demand confirmation that a double gunshot to the head is in fact a case of suicide.

3742. Morgan, K. S., et al. (1984). "Epikeratophakia in children." Ophthalmology **91**(7): 780-784.

Epikeratophakia was performed in 61 children for the correction of aphakia after the removal of unilateral congenital or traumatic cataracts; 51 patients (54 grafts) have more than 6 months follow-up. In the first 27 grafts, 8 (30%) failed, but in the last 27 grafts, only 2 (7%) failed, largely due to improved surgical and tissue handling techniques. The average increase in corneal refractive power for the early patients was 12.68 +/- 4.63 D with an average overrefraction of +0.45 +/- 5.60 D. The last half of the patients showed an average increase of 14.83 +/- 4.83 D, with an average overrefraction of -0.00 +/- 5.20 D. Visual acuity results in patients with traumatic cataracts have been the most satisfactory, with the majority of patients obtaining useful vision. It also appears that in patients with congenital cataracts, the younger the patient at the time of surgery, the greater the chance for a good visual result. Some improvement in vision has been seen in all of the children with successful grafts, even those beyond the age when amblyopia therapy would be considered to have some potential for therapeutic effect. By attaching the correction permanently on the eye, epikeratophakia facilitates the vigorous occlusion therapy required after cataract extraction in these children.

3743. Morita, T., et al. (2017). "External Ventricular Drainage Preceding the Removal of a Nail from the Intracranial Space as a Safe Management Strategy for Predicted Secondary Intraventricular Hemorrhage." World neurosurgery **106**: 1056.e1059-1056.e1013.

BACKGROUND: Intracranial nail gun injury is a rare traumatic event and can result from a suicide attempt. Cerebral angiography is essential in the evaluation of damage to the intracranial vessels, and surgical removal of nails is generally the optimal treatment. Intraventricular hemorrhage can happen after removal of intracranial nails. Endovascular surgery or intraoperative computed tomography has been reported to be useful for detection and treatment of intraventricular hemorrhage. After the surgical removal of nails, attention should be paid for complications such as pseudoaneurysm and infection., CASE DESCRIPTION: A 63-year-old man with a history of depression was transferred to our hospital in an unconscious state. Physical examination showed 2 nails puncturing his left thorax, and computed tomography revealed a nail puncturing the intracranial space. No damage to these intracranial vessels was observed on computed tomography angiography and venography. After drainage for potential intraventricular hemorrhage, the nails were removed. Postoperatively, prophylactic antibiotic therapy was administrated for secondary infection. Computed tomography angiography did not detect any postoperative pseudoaneurysms. The patient also underwent therapy from a psychiatrist and was transferred to another hospital., CONCLUSIONS: As for treatment of a case of intracranial nail gun injury, our case shows that preoperative cerebral angiography is not always needed in intracranial nail gun injury when there is no apparent damage to the intracranial vessels and emergent removal of nails is required. External ventricular drainage preceding the removal of a puncture object can be an effective management strategy for secondary intraventricular hemorrhage.

3744. Morris, C., et al. (2012). "Cervical spine injuries associated with mandibular trauma." Journal of oral and maxillofacial surgery **70**(9): e106-e107.

Introduction: Cervical spine fractures are a severe injury associated with high morbidity and mortality. Due to the tragic consequences of a missed cervical spine injury, maxillofacial surgeons must be acutely aware of the mechanisms most likely to result in cervical injury when evaluating patients with mandibular trauma.1 Past studies have investigated this association and reported a prevalence of 0.0 to 8.2%.2 This study examines the relationship between mandibular fractures and concomitant cervical spine injury at an urban trauma center. The importance of this study is to further isolate mechanismbased risk factors for cervical spine injuries presenting with mandibular fractures to provide data for when additional evaluation is necessary. Materials and Methods: The UT Southwestern Medical Center Institutional Review Board approved the study protocol and patient information was de-identified prior to analysis. Mandibular Fracture Data was collected from the Parkland Memorial Hospital trauma registry using ICD-9 codes (802.21-802.39). Additional information included fracture type, age, gender, mechanism of injury, and associated injuries. Methods of Data Analysis: Data was analyzed using a Microsoft excel spreadsheet. Results of Investigation: The Parkland Trauma Registry yielded 2288 patients presenting with mandible fractures to Parkland Memorial Hospital between 1993- 2007. These fractures were all managed by a single surgical service allowing a degree of consistency in coding and treatment. Of the 2288 patients presenting with mandibular fractures, 72 patients (3.1%) had associated cervical spine injuries. High velocity mechanisms resulted in 68 of the 72 c-spine injuries associated with mandibular fractures (94.4%). 12 (6.7%) of the cervical spine injuries associated with mandibular fractures were due to a high velocity penetrating mechanism (gunshot wounds). 56 of the 72 c-spine injuries (78% of the cervical spine injuries associated with mandibular fractures were due to high velocity blunt injury (motor vehicle, motor cycle, motor pedestrian collisions, or unspecified high velocity mechanisms). 5 patients had multiple c-spine injures; these were all the result of high velocity blunt mechanisms. In patients presenting with mandibular fractures and high velocity mechanisms (blunt and penetrating) the overall incidence of cervical spine injury was 12.1% (68/560). In high velocity blunt mechanisms the combined incidence was 11.9% (52/456). In patients presenting with mandibular fractures and low velocity mechanisms the overall incidence of cervical spine injury was 0.4% (4/986). Conclusion: Clinical examination should include an evaluation for recognized concomitant injuries including cervical spine involvement. The results of this investigation underscore the importance of association of high velocity mechanism with patients presenting with a mandibular fracture and cervical spine injury. Further investigation is needed to determine a cost-effective protocol to screen patients presenting with mandibular frac- tures caused by high velocity injuries for cervical spine injuries.

3745. Morris, C. D., et al. (2011). "Mandibular fractures: Epidemiology and patterns of injury in 4100 fractures." International journal of oral and maxillofacial surgery **40**(10): 1024.

Introduction: This study provides a large statistical sample to investigate patterns of mandibular injury in a major urban trauma center. The purpose of this study is to allow identification of population and mechanism-based risk factors and to isolate concomitant, potentially life-threatening injuries, presenting with fractures of the mandible. Methods: Data was collected from the Parkland Memorial Hospital Trauma Registry using ICD-9 codes. Information included fracture type, age, gender, mechanism of injury, and associated injuries. Results: 4143 mandibular fractures in 2828 patients were managed at Parkland Memorial Hospital between 1993 and 2010. The 3rd decade was the most prevalent age group; there was a male predominance of 83%. The injury distribution by site was: Condyle 9.2%, Subcondyle 10.6%, Coronoid 1.1%, Ramus 5.6%, Angle 29.18%, Symphysis 22.92%, Alveolar Border 3.2%, and Body 18.09%. Mechanism was generally subdivided for comparison of associated injuries. Subdivisions include high velocity penetrating (gunshot - 5%), low velocity penetrating (knife - 0.4%), high velocity blunt (MVC, MCC - 19.9%), Low velocity blunt (MPC, IPC, Falls, Sports - 46.85%) and other (NOS - 27.8%). Multiple fractures within the mandible were the predominant pattern representing 1426 of the 4143 fractures. 1402 fractures were limited to a single site. Fractures were more common in the summer months. Conclusion: This study provides a large statistical sample of mandible fracture patterns at a single institution. Future investigation of will provide greater insight into the patterns of injury and degree of severity of associated injuries based on mechanism of injury.

3746. Morrison, C. S., et al. (2013). "Utilization of intraoperative 3D navigation for delayed reconstruction of orbitozygomatic complex fractures." The Journal of craniofacial surgery **24**(3): e284-286.

Reconstructive goals for orbitozygomaticomaxillary complex fractures include restoration of orbital volume, facial projection, and facial width. Delayed reconstruction is made more difficult by malunion, nonunion, bony

absorption, loss of the soft tissue envelope, and scar. Three-dimensional intraoperative navigation, widely used in neurosurgery and sinus surgery, can improve the accuracy with which bony reduction is performed. This is particularly useful in the setting of bony absorption and comminution. We report a case of delayed reconstruction of an orbitozygomaticomaxillary complex fracture using intraoperative navigation and review this technology's utility in this setting.

3747. Morrow, J. D. (1994). "Prosthetic cranioplasty infection due to Sporobolomyces." Journal of the Tennessee Medical Association **87**(11): 466-467.

I have presented an unusual case of an infected prosthetic cranioplasty due to Sporobolomyces species found to be sensitive to amphotericin B in vitro. The infection was successfully treated with a combination of surgery and antifungal therapy.

3748. Morrow, K. D., et al. (2020). "Safety of MRI with Retained Civilian Bullets." Clinical neurosurgery **67**(SUPPL 1): 154.

INTRODUCTION: There is a concern for ballistic movement and radiofrequency induced heating causing damage to surrounding structures for patients who undergo MRIs with retained civilian bullets. METHODS: The prospectively maintained trauma database was queried for gun-shot wounds from 2016-2019. Charts from patients with retained bullets who subsequently underwent MRI were reviewed. RESULTS: 1,977 patients were evaluated for gun-shot wounds. 63 had retained bullets who subsequently underwent an MRI. A total of 67 MRIs were completed. 35 of the MRIs were performed within one month of the injury. 36 of the MRI images involved the same body part of the retained bullet. The majority of retained bullets were either near-complete projectile, fragmentation, or a combination of the two. 2 patients had retained intracranial bullets that underwent MRI Brain. 5 patients had retained intraspinal bullets/fragments that underwent an MRI spine. Following completion of MRIs, 17 patients had follow-up CTs that included imaging of the retained bullets. 11 of these 17 were performed within 1 month of the MRI. 3 bullets showed rotational movement; 1 bullet showed translational movement of .9 cm inferior. 13 patients did not have CT following the MRI but did have post-MRIs X-rays involving the retained bullet. There was no obvious bullet migration on these radiographs. There were no reported immediate complications as the result of an MRI. CONCLUSION: MRIs with retained civilian non-ferromagnetic ballistics produced in the United States are generally safe but each MRI should be completed on a case to case basis. Due to evidence of both rotational and translational movement, one should avoid MRIs for retained bullets near nerves or major blood vessels. There were no reported complications from undergoing MRI with retained projectiles.

3749. Morselli, C., et al. (2019). "Comparison between the different types of heterologous materials used in cranioplasty: a systematic review of the literature." Journal of neurosurgical sciences **63**(6): 723-736.

INTRODUCTION: The choice of heterologous materials for cranioplasty after decompressive craniectomy is still difficult. The aim of this study is to examine the association between material of choice and related complications to suggest the best treatment option., EVIDENCE ACQUISITION: A systematic review was performed for articles reporting cranioplasty comparing the following heterologous implants: titanium, poli-methyl-methacrylate (PMMA), polyetheretherketone (PEEK) and hydroxyapatite (HA). Extracted data included implant materials and incidence of the most frequent complications., EVIDENCE SYNTHESIS: The final selection resulted in 106 papers but according to our rules only 27 studies were included in the final analysis. Among a total of 1688 custom-made prosthesis implanted, 649 were titanium (38.49%), 298 PMMA (17.56%), 233 PEEK (13.82%), and 508 were HA (30.13%). A total of 348 complications were recorded out of 1688 reported patients (20.64%). In the titanium group, 139 complications were recorded (21.42%); in the PMMA group 57 (19.26%), in the PEEK group 49 (21.03%) and in the HA group 103 (20.3%). If we examine a summary of the reported complications clearly related to cranioplasty (postoperative infections, fractures and prosthesis displacement) versus type of material in multicentric and prospective studies we can see how HA group patients have less reported infections and cranioplasty explantation after infections than PMMA, PEEK and titanium. On the contrary HA patients seem to have a higher number of prosthesis displacement again if compared with the other materials. Since these data are not derived from a statistically correct analysis they should be used only to help to differentiate the properties of the various heterologous cranioplasties., CONCLUSIONS: The ideal material for all heterologous cranioplasty has not yet been identified. The choice of material should be based on the clinical data of

patients, such as the craniectomy size, presence of seizures, possibility of recovery, good long-term outcome associated with a cost analysis.

3750. Mortier, P., et al. (2013). "Is electroconvulsive therapy safe in the presence of an intracranial metallic object?: case report and review of the literature." The journal of ECT **29**(3): 231-238.

BACKGROUND: Little is known about the use of electroconvulsive therapy (ECT) in patients with intracranial metallic objects. Theoretically, electric current might cause heating of the metal and damage of the surrounding brain tissue. Moreover, intracranial foreign objects increase the risk for epileptic phenomena and could thus complicate the treatment course., METHODS: The case of a man with intracranial bullet fragments as a result of a headshot, treated with ECT for mania, is presented. We conducted a PubMed literature search for other relevant cases., RESULTS: In our patient, ECT was completed without complication. Electroconvulsive therapy was safely administered in 22 published cases of patients with intracranial metallic objects., CONCLUSION: After carefully weighing benefits and risks in each individual case, psychiatrists should not be reluctant to use ECT in patients with intracranial metallic objects. Apart from avoiding empirical dosage titration to minimize the exposure to current, positioning the electrodes to avoid the electric current of heating the metal, and continuing antiepileptic agents in high-risk patients, no precautions need to be considered.

3751. Moscote Salazar, L. R., et al. (2012). "[Transvaginal penetrating fetal head injury]." Traumatismo encefalocraneano fetal por via penetrante transvaginal. **110**(5): e99-e102.

In utero head traumas are extremely rare and are usually caused by penetrating injuries in the thoracic or abdominal wall that affect the uterine cavity. Transvaginal fetal head injuries have been reported in exceptional cases. This is a case-report of a fetus affected by penetrating head trauma with skull fracture and intra-ventricular hemorrhage after his mother's self-insertion of a blunt object, violently through the vagina. Trauma disrupted the integrity of intrauterine membranes and precipitated preterm labor. After birth, there was a debridement of the scalp and surgical management of the fracture was performed; nevertheless, the patient died four weeks later, due to neonatal sepsis. Management of these wounds must not only be focused on repairing the primary wound, but on preventing the infectious complications.

3752. Mosdal, C. (1985). "Cranio-cerebral injuries from Slaughterer's gun." Acta neurochirurgica **74**(1-2): 31-34.

3 patients attempted suicide by a powder-activated cattle skull impacting tool (Slauthterer's gun). While captive bolt pre-slaughter stunning in pigs and ruminants is safe, two of the patients remainded conscious after the shot and survived. Despite much lower impact velocity (less than 50 m/sec) these self-inflicted brain lesions are as serious as "low velocity" (less than 300 m/sec) penetrating gunshot wounds, mainly because of impaction of bone fragments and the dynamic energy possessed by the bolt.

3753. Mota, F., et al. (2021). "Noninvasive Assessment of Intralesional Antimicrobial Concentration-Time Profiles in Pulmonary and Central Nervous System Tuberculosis using Dynamic 18F-Pretomanid Positron Emission Tomography." Open forum infectious diseases **8**(SUPPL 1): S789-S790.

Background. Pretomanid is used in combination with bedaquiline and linezolid (BPaL regimen) in the treatment of multidrug-resistant tuberculosis (MDR-TB). However, the penetration of pretomanid in privileged sites remain unknown. Antimicrobial pharmacokinetic (PK) parameters are traditionally derived from clinical samples (blood and cerebrospinal fluid), which may not accurately represent the intralesional tissue PK, affected by drug properties, vascular supply, barrier permeability, and the microenvironment. Methods. We developed 18F-pretomanid (chemically identical to pretomanid) for in vivo multi-compartment PK by positron emission tomography (PET). Dynamic 18F-pretomanid PET was used to obtain cross species pretomanid concentration-time profiles in animal models of TB (mice and rabbits) to quantify penetration into pulmonary and brain lesions. A subset of animals underwent PET/CT imaging with 18F-py-albumin and 18F-FDG to assess vascular supply and inflammation. Postmortem 18F-pretomanid autoradiography (high-resolution) and mass spectrometry were performed in infected tissues. A mouse model of TB meningitis was used to evaluate the bactericidal activity of the BPaL regimen (Figure 1). Figure 1. Experimental schematics. (A) A new synthetic approach was developed to obtain radiofluorinated pretomanid (18F-pretomanid), which is chemically identical to

pretomanid and therefore undergoes identical PK and metabolism in vivo. Dynamic 18F-pretomanid PET/CT imaging was performed in validated preclinical models of tuberculosis following intravenous administration of 18F-pretomanid. (B) PET signal was quantified in multiple compartments to generate time activity curves (TACs) used to calculate area under the curve (AUC) over 0-60 minutes. A subset of animals also underwent PET/CT imaging of 18F-py-albumin to assess vascular supply to lung and brain lesions, and with 18FFDG to confirm the presence of neuroinflammation in the mouse and rabbit models of TB meningitis. Tissue resection post-mortem was used to visualize the intralesional retention of 18F-pretomanid using high-resolution (10 µm) autoradiography. The efficacy of the BPaL regimen in TB meningitis was compared to that of standard treatment with rifampin, isoniazid, and pyrazinamide in the mouse model. Mass spectrometry was performed following oral administration of BPaL to determine brain drug levels. (C) These data provide multicompartment PK analysis, intralesional levels of pretomanid, and insights into the mechanism that govern pretomanid tissue distribution. Results. 18F-Pretomanid PET provided detailed concentration-time profiles in infected tissues demonstrating excellent lung and brain tissue penetration (AUC ratio to plasma > 1) in both animal species, which was spatially compartmentalized, likely due to differential vascular supply (18F-py-albumin PET) (Figure 2). Brain lesions (identified by 18F-FDG PET) demonstrated localized leakiness on 18F-py-albumin PET. Autoradiography and mass spectrometry corroborated the imaging findings. The efficacy of the BPaL regimen in TB meningitis was substantially lower than standard TB treatment (Figure 3), likely due to restricted penetration of bedaquiline and linezolid into the brain parenchyma. Figure 2. Spatial heterogeneity of 18F-Pretomanid penetration and vascular supply to pulmonary TB lesions. (A) A novel synthetic was devised to obtain 18F-pretomanid, which is chemically identical to pretomanid. (B) Maximum intensity projection (MIP) of 18F-Pretomanid PET/CT in M.tb.-infected mice over 3 hrs shows hepatobiliary and renal excretion, high uptake into brown fat, brain, and lungs. (C) Resection of infected lungs 30 minutes post intravenous administration of 18F-pretomanid shows heterogenous distribution of 18F-pretomanid into the lungs visible by high resolution autoradiography. Areas of pneumonia are identifiable by hematoxylin and eosin (H&E) staining of the same tissue section used for autoradiography. (D) Time-activity curves of 18F-Pretomanid in infected mouse lung (0-3 hours) and derived area under the c rve (AUC) ratios to plasma (E) in infected mouse lung. Representative MIP of 18F-pretomanid (F) and 18F-py-albumin (H) PET/ CT in a rabbit with cavitary TB and quantification of the AUC ratios to plasma show reduced penetration into lung lesions and cavitary wall compared to areas of unaffected lung (G and I). Data are represented as median ± interquartile range, n=3-4 group. Figure 3. Exposure levels of 18/19F-pretomanid in models of TB meningitis. (A) Experimental timeline used to assess the penetration of pretomanid into infected mouse brain before and during treatment with antimicrobials bedaquiline (B), pretomanid (Pa), and linezolid (L), and corticosteroid dexamethasone (D). (B) Representative three-dimensional MIP of 18F-pretomanid PET/CT in the CNS-TB model, 10 min post-injection, and transverse section showing high and heterogeneous brain uptake. (C) High-resolution autoradiography was performed to confirm heterogeneous penetration of 18F-pretomanid into infected brain lesions in the mouse. (D). 8F-pretomanid AUC ratios of tissue to plasma in mouse brain before (day 0) and two weeks into treatment show a reduction in penetration at week 2. (E). Pretomanid concentrations (µg/mL) in mouse plasma and brain, at day 0 and two weeks into treatment, measured by mass spectrometry and derived concentration ratios of brain to plasma (F) suggest drug accumulation due to the long half-life. (G) While 18F-pyalbumin and 18F-FDG PET/CT show vascular leakage and neuroinflammation in the rabbit model of TB meningitis, the penetration of 18F-pretomanid is heterogeneous and reduced at the lesion site (indicated by white arrow). (H) Quantification of the PET signal shows variability within the same animal. Data are represented as median ± interquartile range, n=3-5 group. Figure 4. Evaluation of a pretomanid-containing regimen in TB meningitis. (A) Mice with experimentally induced TB meningitis were treated with Bedaquiline (25 mg/day), Pretomanid (100 mg/day), Linezolid (100 mg/day), and Dexamethasone (2 mg/day) or Rifampin (10 mg/day), Isoniazid (10 mg/day), Pyrazinamide (150 mg/ day) and Dexamethasone (2mg/day) for 8 weeks. Treatment efficacy was determined based on the brain bacterial burden after 2, 4, 6, and 8 weeks of treatment. (B) The penetration of 76Br-bedaquiline, 18F-linezolid, and 18F-pretomanid into the brain parenchyma was measured non-invasively by PET and revealed low penetration of 76Br-bedaquiline (AUC radio to plasma 0.15) and 18F-linezolid (AUC radio to plasma 0.3). (C) Mass spectrometry analysis was performed to confirm the brain penetration of bedaquiline, linezolid, and pretomanid following oral administration. Conclusion. Dynamic 18F-pretomanid PET provided holistic data on pretomanid exposures showing excellent penetration into infected lung and brain tissues. The BPaL regimen was inferior to standard TB treatment for TB meningitis. Thus, new pretomanid-containing regimens need to be developed for the treatment of MDR-TB meningitis.

3754. Motamedi, M. H. and H. Behnia (1999). "Experience with regional flaps in the comprehensive treatment of maxillofacial soft-tissue injuries in war victims." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **27**(4): 256-265.

This article presents our experience with regional flaps in the treatment of facial soft-tissue defects and deformities in 33 patients with various facial injuries from warfare during the period from 1986 to 1999. Thirty-two males and 1 female aged between 8 and 53 years (mean 24.18 years) were treated with facial soft-tissue injuries from high velocity projectiles and varying degrees of associated hard-tissue injuries. Bullets were the most common cause (70%), followed by injuries from shrapnel (21%), land mines (6%), and breech blocks (3%). The perioral region was involved in 15 cases (45%), the midface and cheeks were involved in 13 cases (39%), and the periorbital area was involved in 5 cases (15%). All soft-tissue injuries were treated primarily by debridement and primary closure and by combining, modifying, and tailoring standard regional flap techniques to fit the location of the injury and compensate for the extent of tissue loss. These procedures consisted basically of local-advancement or rotation-advancement flaps, used in conjunction with pedicled fat or subcutaneous supporting flaps, nasolabial, cheek, cervical, Dieffenbach, and Abbe-type flaps. Scar revision, tissue repositioning, and lengthening procedures, such as W, V-Y, Z, or multiple Z-plasty techniques were also used both primarily and secondarily. Revisions and secondary operations were done in 48% of the patients. Initial healing of the flaps was favourable in 76% of the patients. Postoperative discharge from the suture sites was seen in 24% of the patients, but this usually resolved within several weeks using daily irrigation, and these cases underwent scar revision subsequently. None of the soft-tissue flaps sloughed or developed necrosis. Form and function of the soft-tissue reconstructed regions usually recovered within one year postoperatively. The aesthetic results obtained were favourable. None required facial nerve grafting as only the terminal branches were injured in our cases and functional recovery was acceptable. Application of local tissue transfer procedures in our series of facial warfare injuries yielded acceptable tissue form, texture, and colour match, especially when these procedures were used in combination, and tailored to surgically fit the individual case. Moreover, application of these procedures is relatively easy and postoperative morbidity is limited, provided the general condition of the patient is stable, and the surgical techniques used have good indications and flap principles.

3755. Motamedi, M. H. K. (2003). "Primary management of maxillofacial hard and soft tissue gunshot and shrapnel injuries." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **61**(12): 1390-1398.

PURPOSE: A 10-year retrospective study was undertaken of all patients treated for facial gunshot and shrapnel wounds at our medical center to evaluate the outcomes and assess the results of simultaneous management to treat the hard and soft tissue injuries primarily., PATIENTS AND METHODS: A total of 44 patients were treated. Medical documentation of the patients was compiled. All maxillofacial gunshot, shrapnel, and warfare injuries were treated by the oral and maxillofacial surgeon. Other concomitant bodily injuries were treated by pertinent consultant specialists. Patients ranged in age from 8 to 53 years, with a mean age of 24.7 years. Maxillofacial hard and soft tissue injuries were treated definitively in the first operation except when gross contamination, infection, extensive comminution, or general condition precluded this., RESULTS: There were 2 shotgun, 28 bullet, 10 shrapnel, 3 land mine, and 1 breech block injuries. Overall postadmission mortality in this series was 2.2%. Of the 97.7% of the patients who had an injury to the underlying craniofacial skeleton, all required surgical intervention. The soft tissue and underlying bony injuries were addressed concomitantly (in a single stage at the time of primary surgical debridement) in 86.3% of the patients. Nine percent of the patients had a tracheostomy emergently for management of the airway, 6.8% had an intracranial injury, and 2.2% of them required neurosurgery. In the series, 4.5% of the patients had neck wounds that required exploration. Comprehensive treatment was rendered in 1 to 3 major operations (average, 1.5)., CONCLUSION: All patients in this series required surgical intervention for treatment of their facial gunshot wounds. Primary treatment of hard and soft tissue injuries of the face at the time of surgical debridement was possible in the majority of our patients. This minimized the number of admissions and did not bear a higher complication rate than other reported series that advocate multiple staged operations to treat such injuries despite the fact that, in our series, flaps were also mobilized for wound closure in the primary phase.

3756. Motamedi, M. H. K. (2007). "Primary treatment of penetrating injuries to the face." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **65**(6): 1215-1218.

3757. Motwani, M., et al. (2011). "Photorefractive keratectomy after late traumatic LASIK flap loss." Journal of refractive surgery (Thorofare, N.J. : 1995) **27**(7): 542-544.

PURPOSE: To present a case of photorefractive keratectomy (PRK) after late traumatic LASIK flap loss., METHODS: The initial LASIK procedure was performed in 2003 with a Moria M2 microkeratome and NIDEK EC-5000 excimer laser using a 5.0/9.0-mm aspheric ablation pattern, resulting in 20/20(+) uncorrected distance visual acuity (UDVA) and plano refraction. Traumatic flap loss of the right eye occurred in 2007. The patient was treated for the trauma, and PRK for -5.00 -1.25 x 090degree was performed 2 months later., RESULTS: Posttraumatic flap loss UDVA was 20/200 in the right eye, with corrected distance visual acuity (CDVA) of 20/25(+2). After PRK with mitomycin C (MMC), UDVA was 20/15 2 months postoperatively and was maintained through the last postoperative follow-up in 2010 (approximately 3 years after PRK)., CONCLUSIONS: Treating a patient with traumatic LASIK flap loss can be done by careful, conservative treatment of the abrasion followed by correction of the refractive error using PRK with MMC. Copyright 2011, SLACK Incorporated.

3758. Mouawad, N. J., et al. (2020). "Blunt thoracic aortic injury - concepts and management." Journal of cardiothoracic surgery **15**(1): 62.

BACKGROUND: Blunt thoracic aortic injury, a life-threatening concern, remains the second most common cause of mortality among all non-penetrating traumatic injuries, second only to intracranial hemorrhage. Kinetic forces from the rapid deceleration are the impetus for the injury mechanism and are graded accordingly. Given the prevalence of trauma as a public health problem, contemporary management considerations are important., MAIN BODY: Blunt thoracic aortic injury may be fatal if not diagnosed and treated expeditiously. Endovascular options allow safe and effective management of these dangerous injuries. This paper describes the overview of blunt thoracic aortic trauma, the epidemiology, presentation, diagnosis, and treatment options with a focus on endovascular management., CONCLUSION: Blunt thoracic aortic injury requires a high index of suspicion based on mechanism of injury in the trauma population. Endovascular options have become the mainstay of blunt thoracic aortic injury treatment whenever feasible with satisfactory results and long-term outcomes.

3759. Moulton, C., et al. (1994). "Cutaneous leakage of cerebrospinal fluid following a stab wound to the back." Injury **25**(2): 118-119.

3760. Mountney, A., et al. (2016). "Intravenous Administration of Simvastatin Improves Cognitive Outcome following Severe Traumatic Brain Injury in Rats." Journal of neurotrauma **33**(16): 1492-1500.

Simvastatin is a 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor commonly used to reduce serum cholesterol. The beneficial effects of oral simvastatin have been reported in pre-clinical models of traumatic brain injury (TBI). The current study was designed to evaluate the potential beneficial effects of simvastatin in a model of severe penetrating TBI using an intravenous (IV) route of administration. Rats were subjected to unilateral frontal penetrating ballistic-like brain injury (PBBI), and simvastatin was delivered intravenously at 30 min and 6 h post-injury and continued once daily for either 4 or 10 days post-PBBI. Motor function was assessed on the rotarod and cognitive performance was evaluated using the Morris water maze (MWM) task. Serum levels of inflammatory cytokines and the astrocytic biomarker, glial fibrillary acidic protein (GFAP), were quantified at 1 h, 4 h, and 24 h post-injury. Histopathological damage was assessed at the terminal end-point. Rotarod testing revealed significant motor deficits in all injury groups but no significant simvastatin-induced therapeutic benefits. All PBBI-injured animals showed cognitive impairment on the MWM test; however, 10-day simvastatin treatment mitigated these effects. Animals showed significantly improved latency to platform and retention scores, whereas the 4-day treatment regimen failed to produce any significant improvements. Biomarker and cytokine analysis showed that IV simvastatin significantly reduced GFAP, interleukin (IL)-1alpha, and IL-17 serum levels by 4.0-, 2.6-, and 7.0-fold, respectively, at 4 h post-injury. Collectively, our results demonstrate that IV simvastatin provides significant protection against injury-induced cognitive dysfunction and reduces TBI-specific biomarker levels. Further research is warranted to identify the optimal dose and therapeutic window for IV delivery of simvastatin in models of severe TBI.

3761. Mountney, A., et al. (2016). "Simvastatin Treatment in Traumatic Brain Injury: Operation Brain Trauma Therapy." Journal of neurotrauma **33**(6): 567-580.

Simvastatin, the fourth drug selected for testing by Operation Brain Trauma Therapy (OBTT), is a 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor used clinically to reduce serum cholesterol. In addition, simvastatin has demonstrated potent antineuroinflammatory and brain edema reducing effects and has shown promise in promoting functional recovery in pre-clinical models of traumatic brain injury (TBI). The purpose of this study was to assess the potential neuroprotective effects of oral administration of simvastatin on neurobehavioral, biomarker, and histopathological outcome measures compared across three pre-clinical TBI animal models. Adult male Sprague-Dawley rats were exposed to either moderate fluid percussion injury (FPI), controlled cortical impact injury (CCI), or penetrating ballistic-like brain injury (PBBI). Simvastatin (1 or 5 mg/kg) was delivered via oral gavage at 3 h post-injury and continued once daily out to 14 days post-injury. Results indicated an intermediate beneficial effect of simvastatin on motor performance on the gridwalk (FPI), balance beam (CCI), and rotarod tasks (PBBI). No significant therapeutic benefit was detected, however, on cognitive outcome across the OBTT TBI models. In fact, Morris water maze (MWM) performance was actually worsened by treatment in the FPI model and scored full negative points for low dose in the MWM latency and swim distance to locate the hidden platform. A detrimental effect on cortical tissue loss was also seen in the FPI model, and there were no benefits on histology across the other models. Simvastatin also produced negative effects on circulating glial fibrillary acidic protein biomarker outcomes that were evident in the FPI and PBBI models. Overall, the current findings do not support the beneficial effects of simvastatin administration over 2 weeks post-TBI using the oral route of administration and, as such, it will not be further pursued by OBTT.

3762. Mountney, A., et al. (2016). "Penetrating brain injury alters sleep-wake architecture in rodents." Journal of neurotrauma **33**: A41-A42.

Sleep disturbances are common following traumatic brain injury (TBI) and often exacerbate symptoms, impeding rehabilitation. This study provides a comprehensive profile of sleep architecture changes following severe penetrating ballistic-like brain injury (PBBI). Animals were randomly assigned to cohorts, implanted with bilateral electrodes and subjected to PBBI or sham. Electroencephalographic (EEG) recordings were scored into vigilance states and spectral analysis quantified relative power and frequency shifts during periods of wakefulness, slow-wave-activity (SWA), and rapid eye movement (REM) sleep. PBBI induced significant changes in bilateral sleep architecture. Sham animals displayed light-dependent rhythmic changes which oscillated between sleep-wake states, whereas, brain-injured rats showed irregular sleep patterns which deviated from baseline recordings. Following PBBI, rats showed rapid reductions in wakefulness (63%) and rapid eye movement (REM) sleep (67%) with concomitant increases in SWA (25%). Rats showed delayed REM onset, fewer sleep-stage transitions, and increased sleep disruptions. PBBI induced bioelectrical discordance-changes in REM and SWA were more prominent and persistent in the ipsilateral hemisphere. To discriminate SWA periods from TBI-induced delta slowing, SWA was further resolved into SWA-1 and SWA-2 according to the percentage of delta activity. PBBI-injured rats showed significant reductions in ipsilateral SWA-1 with increases in high-delta SWA-2. These rats showed rapid increases in delta activity (200% compared to baseline) and decreases in theta, alpha, beta, and gamma frequencies. Compared to baseline, post-injury sleep tracings showed acute peak frequency shifts and attenuation in EEG amplitude during SWS and REM. Overall, our results indicate that TBI produces significant effects on sleep architecture: altering wake, SWA, and REM periods compared to respective controls and indicate a decrease in restorative and quality sleep. Reduced REM sleep has been linked to decreases in memory consolidation, reduced reaction reflexes, increased risk of cardiovascular disease, and increased occurrence of mental health comorbidities. Furthermore, we report that slow-wave activity can be classified power into periods of slow-wave sleep and slow-wave delta activity which accompanies TBI.

3763. Mountney, A., et al. (2013). "Longitudinal assessment of gait abnormalities following penetrating ballistic-like brain injury in rats." Journal of neuroscience methods **212**(1): 1-16.

Traumatic brain injury (TBI) results in enduring motor and cognitive dysfunction. Although gait disturbances have been documented among TBI patients, few studies have profiled gait abnormalities in animal models of TBI. We sought to obtain a comprehensive longitudinal analysis of gait function following severe penetrating ballistic-like brain injury (PBBI) in rats. Rats were subjected to either unilateral frontal PBBI, probe insertion alone, or sham surgery. Sensorimotor performance was assessed using the CatWalk automated gait analysis system. Baseline measurements were taken 3 days prior to injury and detailed analysis of gait was performed at 1, 3, 7, 14, and 28 days post-injury. Both

PBBI and probe-inserted rats displayed altered static and dynamic gait parameters that were primarily evident during the early (<7 days) post-injury phase and were resolved by 1 month post-injury. PBBI produced more severe deficits compared to probe-alone which were reflected in the number, magnitude, and resolution time of abnormal gait parameters. While altered parameters were detected in all four paws, they were more apparent on the contralateral side. Gait parameters including paw pressure, print area, swing speed, and stride length were significantly decreased whereas stance, swing, and step cycle duration were increased compared to sham. Overall, altered gait patterns detected using the CatWalk system in the PBBI model were injury-severity dependent, resolved at later time points, and appeared similar to those reported in severe TBI patients. These results indicate that the CatWalk may be most useful for neuroprotection studies that focus on the acute/subacute recovery period after TBI. Copyright Published by Elsevier B.V.

3764. Mountney, A., et al. (2012). "Longitudinal profile of gait disturbances following penetrating ballistic-like brain injury using the CatWalk gait analysis system." Journal of neurotrauma **29**(10): A219.

Introduction Traumatic brain injury results in enduring motor and cognitive dysfunction. Although gait disturbances have been documented among TBI patients, few studies have profiled gait abnormalities in animal models of TBI. We sought to obtain a comprehensive longitudinal analysis of gait function following severe penetrating ballistic-like brain injury in rats. Methods Unilateral frontal PBBI (n = 10) was induced in the isoflurane anesthetized rat by stereotactically inserting a perforated steel probe through the right frontal cortex and rapidly inflating the elastic tubing of the probe tip into an elliptical shaped balloon with a volume equal to 10% of total rat brain volume. Control groups included insertion of the probe alone (probe control) or sham surgery (n = 10/group). Sensorimotor performance of sham, probe, and PBBI rats was assessed using the CatWalk automated gait analysis system. Baseline measurements were taken 3 days prior to injury and detailed analysis of gait was performed at 1, 3, 7, 14, and 28 days post-injury. Individual footprints were identified and processed using the CatWalk software, which generates comprehensive static and dynamic gait parameters. Mean changes of statistically significant gait abnormalities were analyzed between all groups. Results Our primary objective was to identify a longitudinal profile of gait abnormalities following PBBI using the CatWalk. Both PBBI and probe-inserted rats displayed altered static and dynamic gait parameters that were primarily evident during the acute (< 7 days) postinjury phase and were resolved by 1 month post-injury. As expected, PBBI produced more severe deficits compared to probe-alone which were reflected in the number, magnitude, and resolution time of abnormal gait parameters. In both PBBI and probe-inserted rats, altered parameters were detected in all four paws but were more apparent on the contralateral side. Gait parameters including paw pressure, print area, swing speed, and stride length were significantly decreased whereas stance, swing, and step cycle duration were increased compared to sham. Injured rats showed an altered distribution of limb support that appeared immediately following injury and resolved by two weeks. Conclusions Altered gait patterns detected using the CatWalk system in the PBBI model appear similar to those reported in severe TBI patients. However, significant motor recovery occurred by 1 week post-PBBI on the CatWalk task, whereas severe TBI patients show more enduring motor deficits. Collectively, these results indicate that the CatWalk may be useful for short-term neuroprotection studies focused on the acute post-injury recovery period after PBBI but not for chronic studies that require repeated testing at later time points.

3765. Mountney, A., et al. (2012). "Ethosuximide dose-dependently attenuated nonconvulsive seizures induced by penetrating ballistic-like brain injury in rats." Journal of neurotrauma **29**(10): A11-A12.

Introduction Traumatic brain injury can trigger non-convulsive seizures (NCS) that are detrimental to patients' prognosis. Identification of effective antiepileptic drugs against NCS remains crucial to improve neurological outcome. We evaluated the dose-response effects of ethosuximide (ETX) against NCS in a rat model of penetrating ballistic-like brain injury. Methods Unilateral frontal PBBI was produced in the right hemisphere of isoflurane anesthetized rats (10% injury severity level). Spontaneously occurring NCS were detected by continuous electroencephalograph (cEEG) monitoring and video-recording for 72 h post-injury. ETX (25, 125, 250, and 375 mg/kg, i.v., n ≥ 15/group) or vehicle was administered via a bolus injection 30 min post-injury followed by a maintenance dose (1/2 bolus dose) given twice daily thereafter. Animals were sacrificed 72 h post-injury and brain tissue was processed for histopathological assessment. The NCS were identified from offline review of the cEEG recordings and confirmed by investigators blind to treatment groups. ETX efficacy was evaluated on NCS parameters of incidence, frequency, episode duration, total seizure duration, and latency. Results ETX attenuated NCS seizures in a dose-dependent manner. In vehicletreated animals, 65% experienced NCS (averaging 9 NCS/rat) whereas ETX treatment at high doses (250 or 375 mg/kg) significantly reduced

NCS incidence to 27% and 13% ($p < 0.05$), and seizure frequency to 2.1 and 1.8 NCS/rat ($p < 0.05$), respectively. By comparison, effects of two low ETX doses (25 and 125 mg/kg) were relatively moderate (47% and 53% incidence, and 5.0 and 3.0 NCS/rat, respectively) and failed to achieve statistical significance. Except for the lowest doses tested, ETX treatment significantly shortened NCS total duration by 50-80% compared to the vehicle (261 sec), and delayed NCS onset from 29 h (vehicle group) to 57-68h (ETX groups) postinjury. Overall, the two highest doses exerted equivalent therapeutic efficacy, yet severe sedative effects were observed at only the highest dose tested.All ETX doses did not significantly alter lesion volumes compared to vehicle-treated animals. Conclusions Ethosuximide is an FDA-approved anti-epileptic drug commonly used to treat absence (petit mal) seizures. It has previously been shown to prevent post-ischemic NCS in a rat model of middle cerebral artery occlusion at the comparable doses tested in this study. For the first time we demonstrate here that ETX is effective against spontaneously occurring NCS following penetrating ballistic-like brain injury. These data taking together indicate that ETX may be considered as a drug option for treating post-traumatic/ischemic NCS and improve patient outcome. It is widely accepted that the effects of ETX on absence seizure is mediated by its modulation of calcium channels functions. In this regard, the mechanisms of ETX on post-traumatic/ischemic NCS remain to be elucidated.

3766. Mountney, A., et al. (2013). "Ethosuximide and phenytoin dose-dependently attenuate acute nonconvulsive seizures after traumatic brain injury in rats." Journal of neurotrauma **30**(23): 1973-1982.

Acute seizures frequently occur following severe traumatic brain injury (TBI) and have been associated with poor patient prognosis. Silent or nonconvulsive seizures (NCS) manifest in the absence of motor convulsion, can only be detected via continuous electroencephalographic (EEG) recordings, and are often unidentified and untreated. Identification of effective anti-epileptic drugs (AED) against post-traumatic NCS remains crucial to improve neurological outcome. Here, we assessed the anti-seizure profile of ethosuximide (ETX, 12.5-187.5 mg/kg) and phenytoin (PHT, 5-30 mg/kg) in a spontaneously occurring NCS model associated with penetrating ballistic-like brain injury (PBBI). Rats were divided between two drug cohorts, PHT or ETX, and randomly assigned to one of four doses or vehicle within each cohort. Following PBBI, NCS were detected by continuous EEG monitoring for 72 h post-injury. Drug efficacy was evaluated on NCS parameters of incidence, frequency, episode duration, total duration, and onset latency. Both PHT and ETX attenuated NCS in a dose-dependent manner. In vehicle-treated animals, 69-73% experienced NCS (averaging 9-10 episodes/rat) with average onset of NCS occurring at 30 h post-injury. Compared with control treatment, the two highest PHT and ETX doses significantly reduced NCS incidence to 13-40%, reduced NCS frequency (1.8-6.2 episodes/rat), and delayed seizure onset: <20% of treated animals exhibited NCS within the first 48 h. NCS durations were also dose-dependently mitigated. For the first time, we demonstrate that ETX and PHT are effective against spontaneously occurring NCS following PBBI, and suggest that these AEDs may be effective at treating post-traumatic NCS.

3767. Moussa, W. M. M. and M. Abbas (2016). "Management and outcome of low velocity penetrating head injury caused by impacted foreign bodies." Acta neurochirurgica **158**(5): 895-904.

BACKGROUND: Penetrating head injuries with impacted foreign bodies are rare, associated with a high incidence of morbidity and potentially life-threatening. In this study, we aimed at investigating the outcome of these cases as well as analyzing the factors affecting the prognosis., METHODS: A retrospective study in which the records of 16 patients who had penetrating head injuries caused by low-velocity impacted foreign bodies were revised. All patients were males with a mean age of 28.9 years (range, 18 to 50 years). The follow-up period ranged from 4 to 13 months with a mean of 8.1 months. Causes of injury were construction accidents in 6 (37.5 %) patients, assault in 6 (37.5 %) and road traffic accidents in 4 (25 %). The impacted objects included a bar of iron, a piece of wood, a nail, a sickle and a piece of glass. Diagnostic computerized tomography (CT) of the brain was carried out on admission in all patients. Thirteen (81.3 %) patients were submitted to surgery, and all had the appropriate management in the form of antibiotics and dehydrating measures as required. The primary outcome measure was the Glasgow Outcome Scale (GOS) at the end of follow-up., RESULTS: At the end of follow-up, ten (62.5 %) patients had a GOS score of 5, two (12.5 %) patients had a score of 4, and four (25 %) patients had a score of 1., CONCLUSIONS: Low-velocity penetrating head injuries are most common in young adult males. With the appropriate management, a majority of even the most severe cases can have a favorable outcome.

3768. Moxness, M. H. and B. Nedregaard (2001). "[Pneumocephalus as a complication to sinus surgery]." Pneumocephalus som komplikasjon til bihulekirurgi. **121**(2): 168-170.

BACKGROUND: Pneumocephalus is a rare complication of sinus surgery. The complications of sinus surgery are often classified as minor or major. Minor complications are seen as adhesions, scarring, bleeding, development of subcutaneous emphysema, penetration of the orbit without herniation and eyelid ecchymosis. The incidence of major complications is 0 to 3% and include haemorrhage, retrobulbar haematoma, injury to the optic nerve, CSF leaks, meningitis, intracranial penetration with development of tension pneumocephalus, and death., MATERIAL AND METHODS: We present a case of pneumocephalus after endonasal ethmoidectomy. The literature is reviewed., RESULTS: The patient had clinical findings consistent with non-tension pneumocephalus. Development of tension pneumocephalus is a distinct possibility and it is necessary to monitor these patients closely., INTERPRETATION: In order to reduce the risk of injury to the anterior skull base it is important to eliminate certain normal anatomic variations and to assess the individual anatomy thoroughly. This can be done with preoperative nasal endoscopy and CT imaging. This applies even more to patients who have previously undergone sinus surgery.

3769. Mrowka, R., et al. (1978). "Grave cranio-cerebral trauma 30 years ago as cause of the brain glioma at the locus of the trauma particulars of the case." Zentralblatt fur Neurochirurgie **39**(1): 57-64.

A glioblastoma multiforma developed 30 years after a penetrating craniocerebral injury in the left parietal region caused by fragments of an artillery projectile. The 3 cm large bone defect was located directly above the tumour. There were close scarry connections between dura, brain and tumour. Partial removal could not prevent the lethal exitus. Causal connection with the accident is assumed to exist.

3770. Muballe, K. D., et al. (2016). "Neurological findings in pediatric penetrating head injury at a university teaching hospital in Durban, South Africa: a 23-year retrospective study." Journal of neurosurgery. Pediatrics **18**(5): 550-557.

OBJECTIVES Penetrating traumatic brain injuries (TBIs) can be divided into gunshot wounds or stab wounds based on the mechanisms of injury. Pediatric penetrating TBIs are of major concern as many parental and social factors may be involved in the causation. The authors describe the penetrating cranial injuries in pediatric patient subgroups at risk and presenting to the Department of Neurosurgery at the University of KwaZulu-Natal, by assessment of the Glasgow Coma Scale (GCS) score and review of the common neurological manifestations including cranial nerve abnormalities. METHODS The authors performed a retrospective chart review of children who presented with penetrating TBIs between 1985 and 2007 at a university teaching hospital. Descriptive statistical analysis with univariate and multivariate logistic regression was used to assess the variables. RESULTS Out of 223 children aged 16 years and younger with penetrating TBIs seen during the study period, stab wounds were causal in 127 (57%) of the patients, while gunshot injuries were causal in 96 (43%). Eighty-four percent of the patients were male. Apart from abnormal GCS scores, other neurological abnormalities were noted in 109 (48.9%) of the patients, the most common being cranial nerve deficits (22.4%) and hemiparesis. There was a strong correlation between left-sided stab wounds and development of seizures. The mean age of patients with neurological abnormalities was 11.72 years whereas that of patients with no neurological abnormalities was 8.96 years. CONCLUSIONS Penetrating head injuries in children are not as uncommon as previously thought. There was no correlation between the age group of the patients and the mechanism of injury, which implies that stab or gunshot injuries could occur in any of our pediatric population with the same frequency. While gunshot injuries accounted for 56% of the patient population, stab injuries still accounted for 44%. Following penetrating head injuries, neurological abnormalities tend to occur in the older subgroup of the pediatric patients. The most common neurological abnormalities were hemiparesis followed by cranial nerve deficits. Facial nerve deficits were the most commonly seen cranial nerve abnormality. Immediate convulsions were a significant feature in patients with stab injuries to the head compared to those with gunshot injuries.

3771. Mucciarone, J. J., et al. (2006). "Tactical combat casualty care in the assault on Punta Paitilla Airfield." Military medicine **171**(8): 687-690.

Casualties incurred during the assault on Punta Paitilla Airfield during Operation Just Cause were evaluated through reviews of records and interviews with the participants. There were eight initial casualties. One-half of all subsequent casualties were wounded trying to move to these men while still under effective hostile fire. Consistent with other studies, the most common cause of death was internal hemorrhage; the second most common was catastrophic

brain injury. Rapid control of external exsanguination was the technique most likely to prevent death. Tourniquets were applied to three lower extremities for two casualties, without sequelae.

3772. Muckart, D. J. and S. Bhagwanjee (1997). "American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference definitions of the systemic inflammatory response syndrome and allied disorders in relation to critically injured patients." Critical care medicine **25**(11): 1789-1795.

OBJECTIVES: To determine the frequency of the proposed definitions for the systemic inflammatory response syndrome (SIRS), sepsis and septic shock, and to further define severe SIRS and sterile shock as determined at 24 hrs of admission to an intensive care unit (ICU) in critically ill trauma patients without head injury, and their relationships to mechanism of injury, Acute Physiology and Chronic Health Evaluation (APACHE) II score, risk of death, Injury Severity Score (ISS), number of organ failures, and mortality rate., DESIGN: Prospective, inception cohort analysis., SETTING: Sixteen-bed surgical ICU in a teaching hospital., PATIENTS: Four hundred fifty critically injured patients without associated head trauma. Penetrating trauma accounted for 70% (gunshot 202; stab 113) and nonpenetrating trauma for 30% (motor vehicle collision 103; blunt 32) of admissions. Three hundred ninety-four (88%) patients underwent surgical procedures., INTERVENTIONS: None., MEASUREMENTS AND MAIN RESULTS: Infective and noninfective insults were distinguished by the need for therapeutic or prophylactic antibiotics, respectively, based on an established antibiotic policy. Three hundred ninety-five (87.8%) patients fulfilled a definition of the SIRS criteria. The frequency of the definitive categories was SIRS 21.8%, sepsis 14.4%, severe SIRS 8.4%, severe sepsis 13.6%, sterile shock 9.3%, and septic shock 20.2%. Patients with penetrating trauma had a significantly higher frequency of sepsis, severe sepsis, and septic shock ($p < .01$). The APACHE II score, risk of death, and number of organ failures increased significantly in both infective and noninfective groups with increasing severity of the inflammatory response. Sterile shock was associated with a significantly higher APACHE II score ($p < .02$), risk of death ($p < .01$), and number of organ failures ($p = .03$) compared with septic shock. Only sterile shock was associated with a significantly higher ISS ($p < .01$). Organ system failure was significantly ($p < .001$) higher in nonsurvivors compared with survivors in all categories. The only significant ($p < .001$) difference in mortality rate was found between patients in shock and all other categories., CONCLUSIONS: The current definitions of SIRS, sepsis, and related disorders in critically injured patients without head trauma show a significant association with physiologic deterioration and increasing organ dysfunction. The only significant association with mortality, however, is the presence of shock. The definitions require refinement, with the possible inclusion of more objective gradations of organ system failure, if they are to be used for stratifying severity of illness in seriously injured patients.

3773. Mucke, T., et al. (2011). "Maxillary reconstruction using microvascular free flaps." Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics **111**(1): 51-57.

OBJECTIVE: Loss of all or part of the maxilla as a result of tumor ablation has both functional and aesthetic consequences. Reconstruction of the maxilla remains a challenge despite the availability of several flaps and the skills of the prosthodontist. We have analyzed a series of maxillary resections that underwent flap reconstruction to guide planning of the rehabilitation of patients with such defects., STUDY DESIGN: The authors present 83 patients with various types of maxillary defects that were reconstructed with different microvascular free flaps. All clinical data, including data on the functional and aesthetic outcome, are analyzed., RESULTS: Flap transfer was successful in 80 of 83 patients who underwent maxillary reconstruction. Separation of the oral and nasal cavities was achieved in all cases. Flap compromise occurred in 6 cases, which made revision necessary. Three of these flaps were salvaged and 3 flaps failed. In 10 of 28 patients with transferred bone, osseointegrated implants were inserted and dentally rehabilitated with excellent functional and aesthetic results., CONCLUSION: Various types of maxillary defects can be reconstructed successfully using different microvascular free flaps. This procedure is challenging because of the anatomical site of reconstruction creating a steep learning curve. If the reconstruction is successful, both facial appearance and oral function can be improved. Microvascular flaps containing bone of the fibula, scapula, or iliac crest facilitate complete dental rehabilitation.

3774. Mudekereza, P. S., et al. (2021). "Factors associated with hospital outcomes of patients with penetrating craniocerebral injuries in armed conflict areas of the Democratic Republic of the Congo: a retrospective series." BMC emergency medicine **21**(1): 109.

INTRODUCTION: Penetrating craniocerebral injuries (PCCI) are types of open head injuries caused by sharp objects or missiles, resulting in communication between the cranial cavity and the external environment. This condition is deemed to be more prevalent in armed conflict regions where both civilians and military are frequently assaulted on the head, but paradoxically their hospital outcomes are under-reported. We aimed to identify factors associated with poor hospital outcomes of patients with PCCI., METHODS: This was a retrospective series of patients admitted at the Regional Hospital of Bukavu, DRC, from 2010 to 2020. We retrieved medical records of patients with PCCI operated in the surgical departments. A multivariate logistic regression model was performed to find associations between patients' admission clinico-radiological parameters and hospital outcomes. Poor outcome was defined as a Glasgow Outcomes Score below 4., RESULTS: The prevalence of PCCI was 9.1% (91/858 cases) among admitted TBI patients. More than one-third (36.2%) of patients were admitted with GCS < 13, and 40.6% of them were unstable hemodynamic. Hemiplegia was found in 23.1% on admission. Eight patients had an intracerebral hemorrhage. Among the 69 operated patients, complications, mainly infectious, occurred in half (50.7%) of patients. Poor hospital outcomes were observed in 30.4% and associated with an admission GCS < 13, hemodynamic instability, intracerebral hemorrhage, and hemiplegia ($p < 0.05$)., CONCLUSION: The hospital poor outcomes are observed when patients present with hemodynamic instability, an admission GCS < 13, intracerebral hemorrhage, and hemiplegia. There is a need for optimizing the initial care of patients with PCCI in armed conflict regions.

3775. Muehlschlegel, S., et al. (2016). "Predicting survival after acute civilian penetrating brain injuries: The SPIN score." Neurology **87**(21): 2244-2253.

OBJECTIVE: To identify predictors associated with survival in civilian penetrating traumatic brain injury (pTBI) utilizing a contemporary, large, diverse 2-center cohort, and to develop a parsimonious survival prediction score for pTBI., METHODS: Our cohort comprised 413 pTBI patients retrospectively identified from the local trauma registries at 2 US level 1 trauma centers, of which one was predominantly urban and the other predominantly rural. Predictors of in-hospital and 6-month survival identified in univariate and multivariable logistic regression were used to develop the simple Surviving Penetrating Injury to the Brain (SPIN) score., RESULTS: The mean age was 33 +/- 16 years and patients were predominantly male (87%). Survival at hospital discharge as well as 6 months post pTBI was 42.4%. Higher motor Glasgow Coma Scale subscore, pupillary reactivity, lack of self-inflicted injury, transfer from other hospital, female sex, lower Injury Severity Score, and lower international normalized ratio were independently associated with survival (all $p < 0.001$; model area under the curve 0.962). Important radiologic factors associated with survival were also identified but their addition to the full multivariable would have resulted in model overfitting without much gain in the area under the curve., CONCLUSIONS: The SPIN score, a logistic regression-based clinical risk stratification scale estimating survival after pTBI, was developed in this large, diverse 2-center cohort. While this preliminary clinical survival prediction tool does not include radiologic factors, it may support clinical decision-making after civilian pTBI if external validation confirms the probability estimates.

3776. Muehlschlegel, S., et al. (2016). "Predicting survival after acute civilian penetrating brain injuries: The spin score." Annals of neurology **80**: S54.

Objective: The aim of this study was to identify predictors associated with survival in a contemporary, large, diverse two-center penetrating traumatic brain injury (pTBI) cohort, and to develop a parsimonious survival prediction score for civilian pTBI. Methods: Our cohort comprised 415 pTBI patients retrospectively identified from the local trauma registries at two U.S. level-1 trauma centers, of which one was predominantly urban and the other predominantly rural. Predictors of inhospital and 6-month survival identified in univariate and multivariable logistic regression were used to develop the simple Surviving Penetrating Injury to the BraiN (SPIN) Score. Results: The mean age was 33±16 years and patients were predominantly male (87%) and black (58%). Survival at hospital discharge as well as 6-months post pTBI was 42.4%. Motor Glasgow Coma sub-score, pupillary reactivity, self-inflicted injury, transfer from other hospital, female sex, Injury Severity Score and INR were independently associated with survival (all $p<0.001$; model area-under-thecurve 0.962). Important radiological factors associated with survival were also identified but their addition to the full multivariable would have resulted in model overfitting without much gain in the area-under-the-curve. Interpretation: We developed the SPIN Score, a logistic regression-based risk stratification scale estimating survival after pTBI. While external validation is warranted, this clinical survival prediction tool may provide important information to guide families and physicians during intervention and goals-of-care decision-making after civilian pTBI.

3777. Muehlschlegel, S., et al. (2017). "Predicting survival after acute civilian penetrating brain injuries: the spin score." Journal of neurotrauma. Conference: 35th annual national neurotrauma symposium. United states **34**(13): A21.

Introduction: The predominant experience of penetrating traumatic brain injury (pTBI) derives from battlefield settings, but the civilian experience inWestern settings in patients treated after 2005 is limited to only small and single-center studies. As a result, outcome predictors of civilian pTBI in modern trauma and neurocritical care settings are poorly defined. The aim of this study was to identify predictors associated with survival in a contemporary, large, diverse two-center pTBI cohort, and to develop a parsimonious survival prediction score for civilian pTBI. Methods: Our cohort comprised 415 pTBI patients retrospectively identified from the local trauma registries at two U.S. level-1 trauma centers, of which one was predominantly urban and the other predominantly rural. Predictors of in-hospital and 6-month survival identified in univariate and multivariable logistic regression were used to develop the simple Surviving Penetrating Injury to the BraiN (SPIN) Score. Results: The mean age was 33- 16 years, and patients were predominantly male (87%) and black (58%). Survival at hospital discharge and 6-months post pTBI was 42.4%. Motor Glasgow Coma sub-score, pupillary reactivity, self-inflicted injury, transfer from other hospital, female sex, Injury Severity Score and INR were independently associated with survival (all $p < 0.001$; area-under-the-curve 0.962). Important radiological factors associated with survival were also identified but their addition to the full multivariable would have resulted in model overfitting without much gain in the area-under-the-curve. Conclusions: We developed the SPIN Score, a logistic regressionbased risk stratification scale estimating survival after pTBI. While external validation is warranted, this clinical survival prediction tool may provide important information to guide families and physicians during intervention-and goals-of-care decision-making after civilian pTBI.

3778. Muehlschlegel, S., et al. (2016). "Predicting survival after acute civilian penetrating brain injuries: the spin score." Neurocritical care. Conference: 14th annual meeting of the neurocritical care society. United states **25**(1 Supplement 1): S67.

Introduction: The predominant experience of penetrating traumatic brain injury (pTBI) derives from battlefield settings, but the civilian experience in Western settings in patients treated after 2005 is limited to only small and single-center studies. As a result, outcome predictors of civilian pTBI in modern trauma and neurocritical care settings are poorly defined. The aim of this study was to identify predictors associated with survival in a contemporary, large, diverse two-center pTBI cohort, and to develop a parsimonious survival prediction score for civilian pTBI. Methods: Our cohort comprised 415 pTBI patients retrospectively identified from the local trauma registries at two U.S. level-1 trauma centers, of which one was predominantly urban and the other predominantly rural. Predictors of in-hospital and 6-month survival identified in univariate and multivariable logistic regression were used to develop the simple Surviving Penetrating Injury to the BraiN (SPIN) Score. Results: The mean age was 33+/-16 years, and patients were predominantly male (87%) and black (58%). Survival at hospital discharge and 6-months post pTBI was 42.4%. Motor Glasgow Coma sub-score, pupillary reactivity, self-inflicted injury, transfer from other hospital, female sex, Injury Severity Score and INR were independently associated with survival (all $p<0.001$; area-under-the-curve 0.962). Important radiological factors associated with survival were also identified but their addition to the full multivariable would have resulted in model overfitting without much gain in the area-under-the-curve. Conclusions: We developed the SPIN Score, a logistic regression-based risk stratification scale estimating survival after pTBI. While external validation is warranted, this clinical survival prediction tool may provide important information to guide families and physicians during intervention-and goals-of-care decision-making after civilian pTBI.

3779. Muhammad Khyani, I. A., et al. (2008). "Endoscopic removal of bullet from orbital apex." Journal of the College of Physicians and Surgeons--Pakistan : JCPSP **18**(10): 646-648.

Penetrating injuries of face are not uncommon. Bullets or pallets may be lodged anywhere in the cavities of skull as a result of firearm injury. Lodgment of a bullet within the orbit through nose is uncommon. An eighteen 18 years old married woman sustained a bullet injury, which entered through lateral wall of the nose and lodged at left orbital apex area. The bullet was removed endoscopically via left nostril without any damage to the eye or disturbance in vision.

3780. Mukerji, S., et al. (2022). "Persistent coagulopathy after gunshot traumatic brain injury: the importance of INR and the SPIN score." European journal of trauma and emergency surgery : official publication of the European Trauma Society.

INTRODUCTION: Penetrating ballistic brain injury (gunshot traumatic brain injury or GTBI) is associated with a high mortality. Admission Glascow Coma Scale (GCS), injury severity score and neurological findings, cardiopulmonary instability, coagulopathy and radiological finding such as bullet trajectory and mass effect are shown to predict survival after GTBI. We aimed to examine the dynamics of the observed coagulopathy and its association with outcome., METHODS: In this single-centered retrospective cohort study, we examined 88 patients with GTBI between 2015 and 2021. Variables analyzed include patient age; temperature, hemodynamic and respiratory variables, admission Glasgow Coma Scale (GCS); injury severity score (ISS); head abbreviated injury scale (AIS); Marshall, Rotterdam, SPIN and Baylor scores, and laboratory data including PTT, INR and platelet count. Receiver operating characteristic analysis was conducted to evaluate the performance of the predictive models., RESULTS: The average age of our sample was 28.5 years and a majority were male subjects (92%). Fifty-four (62%) of the patients survived to discharge. The GCS score, as well as the motor, verbal, and eye-opening sub-scores were higher in survivors ($P < 0.001$). As was expected, radiologic findings including the Marshall and Rotterdam Scores were also associated with survival ($P < 0.001$). Although the ISS and Head AIS scores were higher ($P < 0.001$), extracranial injuries were not more prevalent in non-survivors ($P= 0.567$). Non-survivors had lower platelet counts and elevated PTT and INR ($P < 0.001$) on admission. PTT normalized within 24 h but INR continued to increase in non-survivors. SPIN score, which includes INR, was a better predictor for mortality than Rotterdam, Marshall, and Baylor etc. CONCLUSION : Progressively increasing INR after GTBI is associated with poor outcome and may indicate consumption coagulopathy from activation of the extrinsic pathway of coagulation and metabolic derangements that are triggered and sustained by the brain injury. The SPIN score, which incorporates INR as a major survival score component, outperforms other available prediction models for predicting outcome after GTBI.

3781. Mukherjee, S., et al. (2020). "Withanolide a penetrates brain via intra-nasal administration and exerts neuroprotection in cerebral ischemia reperfusion injury in mice." Xenobiotica; the fate of foreign compounds in biological systems **50**(8): 957-966.

1. Withanolide A (WA), a major constituent phytochemical of the Ayurvedic herb Withania somnifera reportedly combats neurodegeneration in Alzheimer's disease and Parkinson's disease. But no study has yet reported the ability of WA in crossing the blood-brain barrier (BBB). The present study analyses the brain penetration ability of WA after intra-nasal administration and assesses its neuroprotective ability in cerebral ischemia-reperfusion injury in adult mice model.2. Brain penetration of WA after intranasal administration in cortex and cerebellum was assessed using HPLC-UV. Three different doses (1 mg/kg, 5 mg/kg and 10 mg/kg) of the phytochemical were used to study the neuroprotective ability of WA by evaluating the brain damage, changes in cerebral neurotransmitter levels and brain tissue morphology.3. Intranasal administration of the phytochemical facilitates its penetration in the cortex and cerebellum. Post-treatment with WA significantly reduced cerebral infarction, restored BBB disruption and cerebral oedema. The WA post-treatment also lowered the ischemia-induced elevated neurotransmitter and biochemical levels in brain compartments. The highest dose (10 mg/kg) of WA also markedly reduced the morphological damages, apoptotic and necrotic cell death in brain tissue occurring due to cerebral ischemia pathophysiology.4. Intra-nasal administration enables brain penetration of WA and allows the phytochemical to exert neuroprotective ability in the global cerebral ischemia model.

3782. Mulazzani, M., et al. (2013). "Abdominal muscle contractions in brain death triggering the respirator: A case report." Journal of neurology **260**: S94.

Introduction: Brain death (BD) is the irreversible end of neuronal activity of the brain including the brainstem. Spontaneous as well as reflex-movements are present in 40-50 % of BDs. Preserved spinal reflex movements are not only challenging the diagnosing physician, but also leading to disconcertment among relatives and health personnel. In recent literature plantar withdrawal responses, muscle stretch reflexes, abdominal contractions and respiratory-like movements have been described before. Case presentation: A 23-year old man was admitted to a Viennese hospital after a self-induced penetration of the skull using a crossbow in the attempt of suicide. The initial cranial computer tomography (CCT) showed a massive cerebral trauma at the entry point (left frontal lobe) with cerebral edema and cerebral prolapse through the right temporal bone. After transfer to the Medical University Hospital of Vienna, the

clinical assessment by two neurologists fulfilled the criteria for brain death (coma, hypotonic quadriplegia, absent brainstem reflexes, negative atropine-test and apnoea-test, and no exclusion criterion found). An electroencephalography (EEG) showed complete cessation of cortical electrical activity. Thereafter, while repositioning the patient, abdominal muscle contractions activated the respirator (see enclosed video). Passive flexion of the cervical spine led to reflex movements and persistent spontaneous contractions of the abdominal muscles. Nevertheless, repeated EEGs confirmed the isoelectric finding. Because of the open skull trauma and concomitant decompression, magnetic resonance imaging (MRI) and CCT-Angiography failed to show a complete loss of perfusion. Transcranial Doppler indicated minimal residual perfusion. Seven days after the suicide, electromyographic studies of abdominal muscles and the lower extremities documented spinal reflex activity as the cause for the triggered respirator. A positron emission tomography scan demonstrated no cerebral glucose uptake, and brain death was therefore confirmed. Conclusion: Mechanically induced movements through passive neck flexion are often present in BD during the first 24 h. Sometimes, as seen in this case, prolonged presence of spinal reflexes as well as spontaneous abdominal contractions can persist. Physicians and health personnel caring for BDs should be aware of these phenomena and of the fact that spinal reflex movements do not preclude the diagnosis of brain death or organ transplantation.

3783. Mulholland, D. A., et al. (1995). "Traumatic intraorbital aerocele with pneumocephalus." The British journal of ophthalmology **79**(5): 504-505.

3784. Mulholland, N. and S. Connor (2004). "A summer trip." The British journal of radiology **77**(913): 77-78.

3785. Mulla, M., et al. (2017). "Civilian Occult Orbitocranial Penetrating Injury Presenting with Cerebral Abscess in Elderly Patient." Indian Journal of Neurotrauma **14**(2-3): 145-148.

Orbital penetrating injuries are uncommon and occur following accidental entry of objects through orbit. The authors report an interesting case of right frontal abscess resulting from orbitocranial penetrating injury due to accidental penetration of wooden stick into the right eye, which remained undiagnosed. A 70-year-man presented with complaints of headache and vomiting for few days. His computed tomographic (CT) scan of the brain revealed peripheral rim-enhancing cystic lesion in the right frontal lobe with perilesional edema, mass effect, and midline shift. Orbital CT scan revealed hyperdense lesion just lateral to medial orbital wall. Magnetic resonance imaging of the brain showed cystic peripheral rim-enhancing lesion that was homogenous hypointense on T1-weighted images and homogenous hyperintense on T2-weighted images. The patient underwent right frontal craniotomy. Pus was drained out, and abscess wall was excised. Foreign bodies protruding through fractured orbital roof were found and removed. He made good clinical recovery. He has received intravenous antibiotics for 2 weeks followed by 4 weeks of oral antibiotics. He had no visual symptoms. The authors report the case, review the literature, and highlight need for imaging in every case of orbital penetrating injury to prevent the life-threatening cerebral parenchymal complications.

3786. Müller-Vahl, H. (2015). "Traumatic nerve damage: Causes, approaches and prognosis." Nervenarzt **86**(2): 142-150.

Whereas minor injuries to peripheral nerves merely lead to a circumscribed damage of the myelin sheath which is completely healed within 3 months, penetrating injuries lead to degeneration of the distal axonal fragment (Waller degeneration) and simultaneously to time-dependent alterations in the effector organs, in the perikarya in the medulla and spinal ganglia as well as in the brain. Animal experimental studies and also findings in humans confirm that the conditions for regeneration of nerve fibers are most favorable in the first days and weeks following injury. Therefore, for optimal therapy it should be clarified as early as possible whether there is a chance for reinnervation using exclusively conservative therapy or whether an operative reconstruction is necessary due to the severity of structural damage. Imaging investigation procedures, such as neurosonography and magnetic resonance (MR) neurography can provide decisive information on this aspect. As a rule, the decision on the indications for a nerve operation should be made within the first 3 months. Even with optimal therapy the healing process of severe neural injuries is often unsatisfactory. For some years novel procedures for improvement of nerve regeneration have been tested in animal experiments which involve totally different points in the healing process. It is hoped that with these approaches procedures for improvement in the treatment of nerve injuries in humans can be developed in the near future.

3787. Mullins, R. J., et al. (2002). "Survival of seriously injured patients first treated in rural hospitals." The Journal of trauma **52**(6): 1019-1029.

BACKGROUND: Patients injured in rural counties are hypothesized to have improved survival if local hospitals are categorized as Level III, Level IV, and Level V trauma centers., METHODS: Data were abstracted on patients with brain, liver, or spleen injuries who were first treated in 16 rural hospitals in Oregon (with categorized trauma centers) and 16 hospitals in Washington (without categorized trauma centers). Logistic regression models evaluated survival up to 30 days after hospital discharge., RESULTS: Among Oregon's 642 study patients, 63% were transferred to another hospital. Among Washington's 624 patients, a higher proportion, 70%, were transferred. Risk-adjusted odds of death for Washington patients (reference odds, 1) were the same as for Oregon patients (odds ratio, 0.82; 95% confidence interval, 0.53-1.28). Most patients died after transfer to another hospital., CONCLUSION: In states with a prevailing practice of promptly transferring brain-injured patients, survival of these patients may not be enhanced by categorization of hospitals as rural trauma centers. To further improve the outcome of these patients, policy makers should adjust statewide trauma system guidelines to enhance integration and to perfect coordination among sequential decision makers.

3788. Mulvey, J. M., et al. (2008). "Profile of injuries arising from the 2005 Kashmir earthquake: the first 72 h." Injury **39**(5): 554-560.

BACKGROUND: The Kashmir Earthquake of October 8, 2005 had widespread destructive effects with in excess of 86,000 people killed and over 80,000 severely injured. Most hospitals were destroyed and limited facilities were available for medical service in the immediate aftermath. A small military hospital in Forward Kahuta, Pakistan, remained functional and was inundated with severely injured patients over 72h., METHODS: A retrospective review of medical records to document the injury patterns, subsequent treatment, infections and logistical requirements that occurred following this earthquake., RESULTS: One thousand five hundred and two patients were triaged over 72h. Four hundred and sixty eight (31.1%) patients required admission. Three hundred and nineteen (68.2%) patients were managed non-operatively and 149 (31.8%) required a procedure under general anaesthesia. The most common type of injuries were: superficial lacerations (64.9%); fractures (22.2%); and soft tissue contusions/sprains (5.9%). There were 266 major injuries to the extremities (40.1% upper limb; 59.9% lower limb). Six patients had significant abdominal injuries, 66.6% of these required urgent laparotomy. 14.8% had clinically relevant infections at follow-up requiring surgical debridement or antibiotic therapy., CONCLUSIONS: Disaster response in the early phase of earthquake relief is complex, with local facilities often overwhelmed and damaged. Limb injuries are most likely; however facilities should have clear plans to deal with severe trauma including head injuries and penetrating abdominal trauma. Coordinated effort is required for success, with lessons learnt to improve future disaster management.

3789. Mundinger, F. (1974). "[Treatment of deep angiomas and aneurysms, removal of foreign bodies and abscess punctures]." Behandlung tiefliegender arteriovenoser Angiome und aneurysmen, Entfernung von Fremdkorpern und Abszesspunktionen **50**(19): 877-884.

3790. Muneza, S., et al. (2015). "Incidentally detected intracranial sewing needle in a child - A case report." Interdisciplinary Neurosurgery: Advanced Techniques and Case Management **2**(2): 95-97.

A 4-year-old boy with normal physical and mental development presented to the emergency room with minor head injury and skin laceration on the right frontal region following an accidental fall in a ditch while playing with other kids. At presentation, he had normal neurologic examination. The skull X-ray showed a 4.5 cm long sewing needle-like foreign body, which was later confirmed by cranial computed tomography scanning. There was no suspected entry at the corresponding location to suggest an acute penetrating injury. This object may have penetrated during early infanthood before closure of anterior fontanelle. A nonsurgical management was opted because there were no neurological complaints, even after a three-year follow-up.

3791. Munoz Pareja, J. C., et al. (2022). "Biomarkers in Moderate to Severe Pediatric Traumatic Brain Injury: A Review of the Literature." Pediatric neurology **130**: 60-68.

BACKGROUND: Despite decades of research, outcomes in pediatric traumatic brain injury (pTBI) remain highly variable. Brain biofluid-specific biomarkers from pTBI patients may allow us to diagnose and prognosticate earlier and with a greater degree of accuracy than conventional methods. This manuscript reviews the evidence surrounding current brain-specific biomarkers in pTBI and assesses the temporal relationship between the natural history of the traumatic brain injury (TBI) and measured biomarker levels., METHODS: A literature search was conducted in the Ovid, PubMed, MEDLINE, and Cochrane databases seeking relevant publications. The study selection and screening process were documented in a Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram. Extraction forms included developmental stages of patients, type and biofluid source of biomarkers, brain injury type, and other relevant data., RESULTS: The search strategy identified 443 articles, of which 150 examining the biomarkers of our interest were included. The references retrieved were examined thoroughly and discussed at length with a pediatric neurocritical care intensivist specializing in pTBI and a Ph.D. scientist with a high degree of involvement in TBI biomarker research, authoring a vast amount of literature in this field., CONCLUSIONS: TBI biomarkers might serve as valuable tools in the diagnosis and prognosis of pTBI. However, while each biomarker has its advantages, they are not without limitations, and therefore, further research is critical in pTBI biomarkers.

3792. Murabito, M. and H. Seitz (2002). "Craniocerebral gunshot wound: Report of an attempted murder." Chirurgia **15**(3): 125-129.

An interesting and unusual case of gunshot wound to the head with severe brain injury that survived the bullet wound, as well as the delicate operation and a not wished cerebrospinal fluid leak complication are reported. Certainly an early and aggressive surgical and perioperative management seem to improve the outcome of such patients, even if many factors should be evaluated before surgery. Our patient showed only minor neurological deficits on discharge thus confirming that the outcome, according to the Glasgow outcome Scale, strongly correlated with the conditions upon admission, as determined by the Glasgow Coma Scale. Intracranial gunshot wounds can result in a wide variety of immediate severe, life threatening injuries. These patients need to be rapidly and thoroughly evaluated in a rational and systematic manner to minimize mortality and long-term morbidity.

3793. Murabito, M. and H. Seitz (2004). "Gunshot to the head with brain injury: Report of an attempted murder." European Surgery - Acta Chirurgica Austriaca **36**(4): 257-261.

Background: We present an interesting and unusual case of a gunshot wound to the head with severe brain injury. The patient survived and presented only minor neurological deficits upon discharge. Methods: An early and aggressive surgical and perioperative management. Results: Our patient confirms that the outcome as measured by the Glasgow Outcome Scale strongly correlates with the condition upon admission, as determined by the Glasgow Coma Scale. Conclusions: Intracranial gunshot wounds need to be rapidly and thoroughly evaluated in a rational and systematic manner to minimize mortality and long-term morbidity.

3794. Murakami, Y., et al. (2009). "Reduction of brain oxygen tension following penetrating ballistic-like brain injury in rats." Journal of neurotrauma **26**(8): A22.

Clinically, brain tissue oxygen tension (PbtO2) is one of the most important parameters for evaluating severity of injury and the outcome of therapeutic intervention in patients having sustained a traumatic brain injury. To determine the status of cerebral oxygen level following a penetrating injury, we measured PbtO2 levels in an experimental model of penetrating ballistic-like brain injury (PBBI). Rats were anesthetized with isoflurane (2%) mixed in oxygen and air. The inhalational oxygen was maintained at 25-26% to minimize its interference on PbtO2. An oxygen probe was implanted along with a temperature probe into the brain near the core region of the injury (~ 2 mm lateral; 2.5 mm posterior to bregma and ~6 mm in depth) to record PbtO2 and brain temperature. The mean arterial blood pressure (MABP) was monitored by a femoral artery catheter and the body temperature was maintained at 37°C. Rats were subjected to a right frontal PBBI or sham surgery. All parameters were monitored continuously beginning at 15 min (baseline) prior to PBBI and ending at 150-min post PBBI. Within 5 min post injury, PbtO2was significantly reduced by ~40% in PBBI rats (16.9 mmHg±4.0) as compared to sham rats (28.6 mmHg ± 6.2; mean±SD, $p<0.05$). This reduced PbtO2 was sustained for at least 150 min post PBBI. No significant differences in other physiological parameters, i.e. MABP, body or brain temperatures, were observed between PBBI and sham rats. In summary, our observations provide direct evidence of

acute decreases in PbtO2 immediately after PBBI, indicating a metabolic disturbance in the peri-lesion regions of the injury. Further studies are underway to evaluate the time course of PbtO2 reduction and its effect on the surrounding brain areas. Collectively, these data will provide important information on the development of secondary injury associated with PBBI and help to further define a rationale therapeutic strategy to prevent PBBI induced reductions in PbtO2 and improve brain metabolic dysfunction.

3795. Murano, T., et al. (2005). "Civilian craniocerebral gunshot wounds: an update in predicting outcomes." The American surgeon **71**(12): 1009-1014.

Given the high mortality in patients sustaining intracranial injury secondary to gunshot wounds (GSWs), predictors to identify patients at increased risk of death are needed to assist clinicians early in determining optimal treatment. There have been few recent studies involving penetrating craniocerebral injuries, and most studies have been restricted to small numbers of patients, which do not allow for adequate prediction of mortality. A retrospective chart review of 298 patients who sustained GSWs to the head between 1992 and 2003 was conducted at a level 1 trauma center. Demographics, bullet trajectory, admitting Glasgow Coma Scale (GCS), head Abbreviated Injury Score (AIS), as well as admission blood pressure and respiratory rate were evaluated. Univariate testing followed by multivariate logistic regression was performed to identify independent predictors of death. In-hospital mortality for patients with intracranial injury secondary to GSW was 51 per cent. A GCS <5 on admission and a high Injury Severity Score (ISS >25) was associated with mortality as compared with survivors ($P < 0.05$). Of those patients presenting with a GCS of 3, there were seven survivors to discharge. Logistic regression identified the following variables as predictors of death: respiratory arrest on admission, hypotension on admission, transhemispheric and transventricular GSW. Identification of those patients at the highest risk of death secondary to a craniocerebral GSW allows clinicians to better predict outcome and prognosis. This is not only important in determining treatment algorithms for physicians but also for appropriate counseling of family members to educate them with regard to patients' outcomes.

3796. Murashkin, S. V., et al. (1996). "[The intra-aortic antibacterial therapy of wounded patients with gunshot meningoencephalitis]." Vnutriaortal'naia antibakterial'naia terapiia ranenykh s ognestrel'nym meningoentsefalitom. **317**(12): 21-80.

The original decision of permanent introduction of antibacterial means to tissues of brain at gunshot meningoencephalitis is offered. For antibacterial therapy the intra-aortal catheter with diameter of 2,5 mm (through a.femoralis) was introduced. After washing the catheter by solution of crystalloid with heparin the various combinations of preparations in 5% solution of glucose were introduced: cephalosporin--8 g/day; hentamicin and brumacilin--240 mg/day accordingly, amicacin--1500 mg/day. Speed of introduction--20-50 mg/h, total volume--500 ml. The catheter was in aorta not more than 10 days, maximum--14 days. A described technique was applied in Burdenko Main Military Clinical Hospital on 34 wounded in head. At computer tomography of brain of all wounded intracranially the splinters and bullets were revealed, clinically--meningoencephalitis. Foreign bodies have been extracted after cupping of clinical and laboratory signs of meningoencephalitis. The authors consider, that the technique is effective not only at wounds of brain, but also at suppurative meningoencephalitis of other etiology.

3797. Muresanu, D., et al. (2017). "Traumatic brain injury in diabetic and hypertensive rats exacerbates brain pathology and functional outcome-role of neurotrophic factors and nanomedicine." Brain injury **31**(6-7): 842.

Piercing traumatic brain injury (pTBI) cuts neuronal connections by direct physical tissue damage, microhaemorrhages and lacerations. Damage to the brain centres controlling movements; speech, cognitive functions as well as sensory motor disturbances lead to irreparable functional disturbances. However, if pTBI occurs in victims having hypertension, diabetes or a combination, the magnitude and intensity of brain damage intensify. In such cases, axonal regenerations, bridging tissue loss and making new connections by enhancing neuroplasticity is the need of the hour. There are reasons to believe that select combination of neurotrophins could help in pTBI cases complicated with additional comorbidity factors. In addition, use of nanotechnology to deliver neurotrophic drugs in these pTBI cases may further enhance their therapeutic efficacy in neurorepair. Our laboratory has initiated a series of investigations on TBI associated with comorbidity factors and showed that TBI inflicted in either hypertensive or diabetes rats caused greater damages on functional and pathological outcome as compared to TBI alone in healthy animals. However, the effects of TBI in hypertensive and diabetic animals are not well evaluated. In this investigation, we examined the effects of pTBI in

diabetic and hypertensive (DBHY) rats on brain pathology and functional outcome after 24 and 38 hours of the basic insult. We also evaluated a combination of neurotrophic drugs with active peptide fragments e.g., cerebrolysin treatment with or without nanodelivery to achieve better neuroprotection and functional recovery. pTBI was inflicted in rats under anaesthesia by opening of the right parietal cortex (4 mmb) and a longitudinal cortical incision was made (3 mm deep and 5 mm long) using stereotaxic guidance with a sterile scalpel blade. pTBI was also inflicted in separate group of rats made hypertensive by 2-kidneys-1-clip (2K1C) method. 2K1C was also applied in a group of rats that were made diabetic by streptozotocin (60 mg/kg, i. p. for 3 days). These DBHY rats were subjected to identical pTBI and allowed to survive for 24 hours after the insult. Our observations showed that pTBI in DBHY rats resulted in breakdown of the blood-brain barrier (BBB) to proteins, oedema formation and cell injuries that were 4-6 times higher than the identical pTBI in healthy rats. In these rats, cerebrolysin (2.5 or 5 ml/kg, i.v.) was able to reduce some of the pathological changes without having a significant effect on functional parameters such as Rotarod performance and grid waking. However, when TiO2 nanodelivery of cerebrolysin was done (5 ml/kg, i.v.), significant improvement on function parameters and pathological outcome was seen in pTBI in DBHY animals. These observations suggest that pTBI associated with comorbidity factors require nanodelivery of cerebrolysin to achieve good neuroprotection, not reported earlier.

3798. Murgas, I. (1985). "[Injury from a slaughter-house pistol]." Zranenia jatocnou pistol'ou. **64**(8-9): 589-596.

3799. Murillo-Ponce, C., et al. (2018). "Orbital aerocele: Case report." Journal of Neurological Surgery, Part B: Skull Base **79**.

Objective: We present a 26-year-old man with an orbital aerocele following roof and medial orbital wall fracture due to facial trauma for gunshot wound, managed with open surgery with orbital reconstruction. (Figure Presented) Methods: A case report and a review of the world literature concerning the etiology, clinical features, and management of orbital fractures are presented. Results: Our patient presented with a delayed posttraumatic orbital aerocele related to facial trauma by gunshot wound 4 years ago, and exacerbated by air travel and nose blowing. CT scan revealed a fracture of the ethmoid bone, deformed orbital roof, and orbital aerocele causing proptosis and stretching of the ophthalmic nerve and extraocular muscles. Management with a fronto-orbital approach, with reconstruction of the roof and medial orbital wall produced excellent results, with decompression achieved and immediate and sustained improvement in visual acuity and ocular movements. (Figure Presented) Conclusion: A search of the world literature revealed no documented cases of orbital aerocele as a delayed complication of roof and medial orbital wall fractures due to gunshot wound. Also, we take in consideration the open surgery with orbital reconstruction and its advantages over other procedures.

3800. Murphy, J. B. and M. A. Blanchi (1989). "Ghost foreign body." Oral surgery, oral medicine, and oral pathology **67**(2): 228.

3801. Murphy, P. A. (1986). "When a non-death death occurs." Nursing **16**(7): 34-39.

3802. Murray, J. A., et al. (1996). "Carotid injury: postrevascularization hemorrhagic infarction." The Journal of trauma **41**(4): 760-762.

3803. Murray, L. (2021). "Craniocerebral nail gun injuries: a definitive review of the literature." Brain injury **35**(2): 164-172.

AIM: Nail guns are important time saving devices but are associated with morbidity and mortality. Specifically, craniocerebral injuries have been reported in the literature since 1963 and have increased in frequency as the use of these tools has become commonplace. There remains a paucity of literature comprehensively assessing nail gun injuries, as compared with other penetrating craniocerebral injuries like those from firearms., METHOD: A literature review of PubMed, Medline (Ovid), Cochrane library, and Google Scholar for articles published between 1960 and 2018 reporting

craniocerebral nail gun injuries., RESULTS: In total, 96 individual cases were identified, with 80 meeting inclusion criteria. These were categorized as accidental and intentional injuries. The demographic was overwhelmingly young males (97.5%), and intentional self-inflicted injuries (54%) was the most frequent mechanism of injury. Overall mortality was 10%. Mortality was more common in patients with intentional injuries, but morbidity rates were similar between the accidental and intentional injury cohorts. Post-operative complications rate was 23.8%., CONCLUSION: Craniocerebral nail gun injuries are associated with lower rates of both mortality and residual neurological deficits than craniocerebral firearms injuries. There is limited data to inform clinical prognostication about long-term neurological impairments and the time to recovery which should be addressed in future studies.

3804. Muruve, N. A., et al. (2001). "Effect of donor brain-death duration on graft outcome." Transplantation proceedings **33**(6): 2980-2981.

3805. Musat, O., et al. (2012). "[Penetrating ocular trauma with intraocular foreign body]." Traumatism ocular penetrant cu retentie de corp strain. **56**(1): 64-68.

We present the case of a 65 years old pacient which was admitted for the sudden decrease of visual acuity in the left eye, accompanied by ocular pain and conjunctival hiperemia, simptoms appeared after an ocular trauma. After the clinical and paraclinical examination we determined the diagnosis of OS: Penetrating ocular trauma with retention of a foreign body; posttraumatic cataract. Surgical treatement was warrented and we performed OS : Facoemulsification + PFK implant in sulcus + 23 Ga posterior vitrectomy + peeling of the posterior hyaloid membrane + extraction of the foreign body + LASER endofotocoagulation + transscleral cryotherapy + SF6 gas injection. The post-operatory evolution was favorable.

3806. Musker, P. and G. Musker (2011). "Pneumocephalus and Brown-Sequard syndrome caused by a stab wound to the back." Emergency medicine Australasia : EMA **23**(2): 217-219.

This report describes a case of Brown-Sequard syndrome in a man who presented to the ED after a stabbing to the left scapula region. The incidental finding of pneumocephalus found on CT scan during workup lead to cervical MRI that revealed the spinal cord pathology associated with Brown-Sequard syndrome.

3807. Musyaju, S., et al. (2022). "POST-INJURY TIME-COURSE OF MITOCHONDRIAL OXIDATIVE STRESS AND ANTIOXIDANTS MARKERS FOLLOWING SEVERE PENETRATING TBI." Journal of neurotrauma **39**(11-12): A55.

Oxidative stress is a pathological state when free radicals generation outbalances elimination of these radicals through innate antioxidants system. The injured brain is susceptible to oxidative stress due to its high metabolic demand, and contains high polyunsaturated fatty acids and redox transition metals making it an ideal target for free radicals attack. In the interest of future evaluation ofmitochondria targeted neuroprotection drugs, we conducted a time-course evaluation of oxidative stress and antioxidantmarkers following penetrating traumatic brain injury (PTBI). Anesthetized adult male Sprague-Dawley rats (280-350 g) were subjected to either 10% unilateral PTBI or Sham craniectomy, followed by excitotoxic responses evaluated at 30min, 3h, 6h, 24h, 3d, 7d and 14d (n = 6-10 animals/group X 7 time-points). At each-time point, animals were euthanized and mitochondria isolated fromipsilateral frontal cortex and striatum areas. Both 3-nitrotyrosine (3-NT) and protein carbonyl (PC), the hallmarks of free radicals mediated protein modification during oxidative stress resulted in significantly increased expression (14-53%, vs. Sham) during first 3d time-points following PTBI. In general, all antioxidants such as glutathione (GSH), peroxiredoxins (PRX-3), thioredoxins (TRX), nicotinamide adenine dinucleotide phosphate (NADPH) and superoxide dismutase (SOD) expression/level were significantly decreased (20-80%, vs. Sham), whereas the catalase (CAT) exhibited increased (45-75%, vs. Sham) expression during first 7d post-injury period. Overall, we observed a maximum imbalance of oxidative stress and antioxidant markers during the first week following PTBI. The mitochondria-targeted acute pathophysiological secondary injury responses should be mitigated by targeted mitochondrial antioxidant therapeutics following PTBI.

3808. Mutafchiyski, V. M., et al. (2015). "A single gunshot wound of the face with simultaneous aspiration and ingestion of two bullets." Journal of the Royal Army Medical Corps **161**(1): 67-68.

3809. Muthe, M. M., et al. (2021). "Imaging findings in transorbital intracranial penetrating injury with an ice pick." BMJ case reports **14**(8).

3810. Mutlukan, E., et al. (1991). "Case of penetrating orbitocranial injury caused by wood." The British journal of ophthalmology **75**(6): 374-376.

A case of retained intraorbital and intracerebral wooden foreign body following an orbitocranial penetrating injury through the lower lid of an adult is described. Initial failure to recognise the true nature of the injury led to intracerebral abscess formation and monocular blindness. Diagnosis and management of such cases are discussed.

3811. Mutyala, A., et al. (2012). "Anton syndrome after gun shot wound to head: A case report." PM and R **4**(10): S194-S195.

Results or Clinical Course: 23-year-old man sustained a gun shot wound to the left occipital lobe. His initial GCS was 7T, and was found to have a left occipital entry point with ricochet off left temporal inner table, with fragments projecting into the right anterior cranial fossa. He sustained hemorrhages to the right occipital and temporal regions, right subdural hematoma, bilateral subarachnoid hemorrhages, midline shift with subfalcine herniation, and cerebellar tonsillar herniation. He underwent emergent craniectomy and right anterior temporoparietal lobectomy. On POD 5, he was found to have intact EOMs and pupillary reflex, intact light perception, but he was unable to visually track or identify objects. At this time he denied vision loss, and was found to be confabulating parts of the visual examination, and was diagnosed with Anton Syndrome. The remainder of his examination was intact for strength, sensation, and cranial nerves, and he was classified as a Ranchos los Amigos level IV. He was transferred to an acute inpatient rehabilitation setting with Ranchos level VI on POD 17. At this time he was only able to identify shadows. On POD 18 he was able to distinguish outline of shapes; by POD 21 he was able to identify colors and track objects. At this time it was apparent that the patient was recovering some vision but was demonstrating visual object agnosia and prosopagnosia in that he was unable to recognize details of objects or his own face. He also demonstrated alexia without agraphia. Therapies focused on tactile kinesthetic input to facilitate object recognition and initiation of eye movements. By discharge on POD 31 he was able to identify objects and characteristics of faces, read large letters and numbers, with MME of 28/30 on discharge. Conclusions: Cortical blindness (Anton Syndrome) is a rare symptom of brain damage occurring in the bilateral occipital lobes, with preservation of pupillary reaction, optic nerve function, with denial of visual loss and confabulation. This patient had Anton syndrome secondary to TBI resulting from GSW. Resolving cortical edema resolved the Anton Sydrome, but revealed agnosia, prosopagnosia, and alexia without agraphia. Patient participated in Speech therapy, PT, and OT with improvement in ambulation, cognition and ADLs.

3812. Muzafar, N., et al. (2014). "Hand-grenade splinter-induced hypopituitarism." Journal of postgraduate medicine **60**(4): 422-424.

3813. Muzumdar, D., et al. (2006). "Intrauterine penetrating direct fetal head trauma following gunshot injury: a case report and review of the literature." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **22**(4): 398-402.

CASE REPORT: An unusual case of an intrauterine penetrating head injury due to a pellet from an airgun is described. A 28-year-old pregnant woman, at term, shot herself intravaginally with a toy BB gun. Following a spontaneous precipitous vaginal delivery, the neonate presented with persistent seizure disorder, meningitis, cerebritis, and a right parietal region scalp swelling. Imaging studies revealed intracranial hemorrhage, and the metallic pellet was adjacent to the right lateral ventricle, which was removed through a parietal craniotomy. Computed tomography of the brain after 1 week demonstrated early abscess formation in the left frontal operculum and a subdural empyema in the posterior fossa. The abscesses were evacuated, and the meningitis was treated vigorously with broad-spectrum antibiotics. Although well for the past 6 years, the child demonstrates significant mental handicap and developmental

delay., DISCUSSION: The pathogenesis, management, and medicolegal issues pertaining to the above case are discussed, and the relevant literature is briefly reviewed.

3814. Mwipatayi, B. P., et al. (2004). "Management of extra-cranial vertebral artery injuries." European journal of vascular and endovascular surgery : the official journal of the European Society for Vascular Surgery **27**(2): 157-162.

OBJECTIVES: To review the management of vertebral artery injuries, and the impact of pre-operative angiography., MATERIALS AND METHODS: A retrospective review was conducted of all patients with vertebral artery (VA) injuries admitted to Groote Schuur Hospital, Cape Town between January 1987 and December 2002. Patients presenting with uncontrolled active bleeding or haemodynamic instability with a poor response to resuscitation were taken immediately to surgery. Stable patients, including those who stabilised after simple resuscitation, with evidence of a vascular injury (a bruit or a large haematoma) or trans-cervical gunshot wounds, underwent routine aortic arch and selective angiography., RESULTS: One hundred and one patients with vertebral artery injuries were included in the study. Ninety-two patients sustained penetrating injuries (41 gunshot, 51 stab), three were iatrogenic and six due to blunt trauma. Angiography was performed as the primary investigation in 88 patients, while seven patients had angiography following surgery. Thirty-nine vertebral artery occlusions, 11 arteriovenous fistulae, two intimal injuries and 36 false aneurysms were identified. Thirty-three radiological interventions were performed. There were 22 associated vascular injuries in 16 patients, 27 nerve injuries in 25 patients, 11 osseous injuries in nine patients and eight aerodigestive injuries. Seven patients died., CONCLUSIONS: Angiography and intervention is of great benefit in the diagnosis and management of traumatic vertebral artery injuries. Angiography often avoids unnecessary exploration and permits endovascular treatment.

3815. Myers, J. C., et al. (1999). "Three-dimensional (3-D) imaging in post-mortem examinations: elucidation and identification of cranial and facial fractures in victims of homicide utilizing 3-D computerized imaging reconstruction techniques." International journal of legal medicine **113**(1): 33-37.

The analysis of cranial and facial fractures in skeletal remains of homicidal victims can prove challenging for forensic anthropologists and forensic pathologists in postmortem examination. In such cases, the use of 3-D computerized imaging to elucidate the fractures and patterns of injuries can provide strong medical evidence that is very useful during litigation and at trial. The authors describe 3-D reconstructions of the skull performed as part of forensic postmortem examination in a recent victim of homicide.

3816. Myers, K., et al. (2017). "Adherence to the pediatric emergency care applied research network head CT rule: 2013 to 2015." Annals of emergency medicine **70**(4): S88.

Study Objectives: Pediatric head injury is common and accounts for approximately 600,000 emergency department visits and over 7,600 deaths in the United States annually. Although the vast majority of children have minor injuries, a small number, even among well-appearing children, have serious injuries with the potential for deterioration and significant sequelae. The Pediatric Emergency Care Applied Research Network (PECARN) performed a large multicenter prospective cohort study and identified seven criteria that correlate with increased risk of clinically important traumatic brain injury (ciTBI). This study was conducted to determine whether the emergency department at the author's institution (17k annual pediatric visits in 2015) is following the PECARN guidelines for head CT scans in children with minor head injury. Methods: A retrospective review was performed of all pediatric head injury presenting to the emergency department in July-December 2013 and January-December 2015.The EMR database was accessed to obtain all emergency department visits for patients < 18 years old with documentation of “head injury.” Patient were excluded if they did not have blunt head trauma or if their GCS was <14. Adherence to the PECARN rule was determined based on documentation of the history and physical exam, and whether the patient obtained a head CT. Secondary analysis was conducted to see if there was any improvement in adherence between 2013 and 2015 after implementation of department-wide education regarding the utilization of the PECARN rule. Results: Of the 627 charts reviewed (2013: 228, 2015: 399), 47 encounters were excluded for not meeting inclusion criteria (9 penetrating injuries, 17 without head trauma, and 21 with GCS<14). Among the remaining 580 encounters (2013: 207, 2015: 373) and based on the PECARN criteria, 108 (18%) were considered “high risk” for ciTBI (2013: 40, 2015: 68), 220 (38%) were “low risk” (2013: 74, 2015: 146), and 252 (43%) were “very low risk” (2013: 93, 2015: 159). Head CT is recommended in the “high risk” category, and among these patients, 93 (86%) were scanned (2013: 31/40-77.5%, 2015: 62/68-91.2%). Among the

“low risk” patients, 162 (73.6%) were scanned (2013: 64/74-86.5%, 2015: 98/146-67.1%). Among the “very low risk” patients, 30 (11.9%) received a head CT (2013: 17/93-18.3%, 2015: 13/159-8.2%). The overall adherence to the PECARN rule in 2013 was 87.4%, and the overall adherence in 2015 was 94.9%. This indicates a relative improvement in PECARN adherence by 60% between 2013 and 2015. Conclusions: Overall adherence to the PECARN rule for head CT in patients with mild TBI improved by 60% between 2013 and 2015 to an absolute adherence rate of nearly 95% in 2015. Notably, there was also a decline in number of head CTs performed among the patients who met “low risk” criteria, in which cases clinical judgement is recommended (87% in 2013 to 67% in 2015). Over the course of 1 year and after implementation of department-wide education regarding head CT in children with head injury, we have made significant improvement in adherence to the PECARN rule, leading to fewer unnecessary scans and better clinical decisionmaking.

3817. Mzimbiri, J. M., et al. (2016). "Orbitocranial Low-Velocity Penetrating Injury: A Personal Experience, Case Series, Review of the literature, and Proposed Management Plan." World neurosurgery **87**: 26-34.

BACKGROUND: Orbitocranial penetrating injuries (OPI) are an unfamiliar subset of head injury and are particularly rare in clinical practice. They are usually the result of falls or motor vehicle collisions and occur more commonly in children, who are prone to trauma while playing games improperly., METHODS: We present a retrospective review of 5 cases of OPI treated in the Neurotrauma Department at Xiangya Hospital of Central South University in the last 5 years. Also, we performed comprehensive literature searches using Web of Science and the terms "orbitocranial injury," "penetrating ocular trauma," "penetrating orbital trauma," and "transorbital chopstick penetrating injury" to search for presentation, mechanism of injury, and management of transorbital penetrating injury., RESULTS: In 2 patients, there was right internal carotid artery occlusion while in other 2 patients, the penetrating objects reached the brainstem through the cavernous sinus, resulting in orbital apex syndrome. All patients underwent a thorough physical examination followed by diagnostic imaging. The cases were successfully managed surgically by removing the foreign bodies through their trajectories., CONCLUSIONS: Computed tomography, magnetic resonance imaging, and computed tomography angiography are key imaging modalities that are frequently used to determine the course of the foreign object and the extent of brain tissue injury as well as to rule out vascular injury in these types of cases. Early surgical exploration by a multidisciplinary team approach is essential to attain good recovery and a favorable outcome.

3818. Mzimbiri, J. M., et al. (2016). "Surviving Penetrating Brainstem Injury by Bamboo Sticks: Rare Case Reports and a Brief Review of Literature." Neurosurgery **78**(5): E753-760.

BACKGROUND AND IMPORTANCE: Chopsticks are common utensils used in many Asian cultures. However, they sometimes can be used as weapons or can cause accidents, particularly in children. Penetrating transorbital/transpharyngeal intracranial injuries with bamboo sticks are peculiar accidents and are relatively rare. Because of their rarity, the management of such injuries is often complex. We discuss 3 cases of penetration of the brainstem by bamboo sticks, 1 case through the foramen magnum, which, to the best of our knowledge, is the first reported case of such an injury., CLINICAL PRESENTATION: The case of a 50-year-old man who was stabbed with a pair of chopsticks in his left eye is presented. The chopsticks passed through the cavernous sinus, and the patient sustained superior orbital fissure syndrome. The other 2 cases were those of a 4-year-old girl having a similar pattern but different mechanism of injury and a 2-year-old boy who sustained transpharyngeal intracranial injury via the foramen magnum. Computed tomography, magnetic resonance imaging, and computed tomographic angiography (CTA) are the key imaging modalities frequently used to determine the course and extent of brain injury., CONCLUSION: Early surgical exploration by a multidisciplinary team approach is essential for attaining a favorable outcome. All cases demonstrated good postoperative recovery and were successfully managed by removing the foreign body through its trajectory. We discuss and briefly review the literature on patterns, complications, and management issues of these less common injuries.

3819. Nadalo, L. A., et al. (1991). "The neuroradiology of visual disturbances." Neurologic clinics **9**(1): 1-33.

The neuroradiology of visual deficits has advanced dramatically in recent years. Plain film evaluation of the orbit and face remains useful in the emergency room for the evaluation of trauma. High-resolution coronal CT remains the method of choice in the assessment of serious injury to the orbit and in cases of penetrating metallic foreign body. The contrast-enhanced orbital CT provides useful information in cases of tumor and infection and when the bones of the

face or skull are involved. MRI has largely replaced CT in the search for brain infarct, brain tumor, and cerebral inflammatory and demyelinating processes. MRI is the study of choice in all cases of sellar and parasellar disease. It offers high-resolution images in any plane. GTPA enhancement has provided additional information from MRI without significant risk. The final selection of an imaging modality should be based upon the clinical presentation and any physical limitations of the patient.

3820. Nader, M. A., et al. (2000). "Neglected craniocerebral gunshot wound resulting in an encephalocele: case report." Surgical neurology **54**(5): 397-400.

3821. Nadezhdina, M. V. (1990). "[Comparative dynamics of the epileptic syndrome in patients with open and closed war-time head injuries in the late period]." Sravnitel'naia dinamika epilepticheskogo sindroma u bol'nykh s otkrytoi i zakrytoi voennoi travmoi cherepa v otdalennom periode. **90**(6): 72-77.

The dynamics of the epileptic syndrome was studied in 55 patients with penetrating cranial wound and in 65 patients with closed cranial injury. Account was taken of the anamnesis, all-round clinical examination data, EEG and computer-aided tomography readings. The patients had been followed up over 40 years. Among the patients with fighting cranial injury, the incidence of the epileptic syndrome amounted to 14.01%. The epileptic syndrome was established to occur most frequently during the first year after injury, with that time (in patients with penetrating cranial wound) being the less the graver injury and longer consciousness loss. At the same time the later was the onset of epileptic attacks in patients with closed cranial injury the rarer was their incidence and more pronounced were mental disorders. In patients with penetrating cranial wound, focal and secondary-generalized attacks dominated in the structure of the epileptic syndrome, whereas in patients with closed cranial injury, convulsions and psychomotor fits ranked the first. With age the rate of epileptic attacks declined along with reduction and disappearance of epileptic activity on the EEG, augmentation of mental disorders and atrophy of substantia medullaris.

3822. Nagahiro, S., et al. (1981). "[Penetrating craniocerebral injuries - report of two unusual cases and review of literature (author's transl)]." No shinkei geka. Neurological surgery **9**(11): 1313-1318.

3823. Nagata, I. (2002). "How to avoid perforator injury when operating on anterior communicating aneurysms: A technical note." Japanese Journal of Neurosurgery **11**(11): 714-718.

A wide operative field and an approach which permits direct visualization of the whole ACOM complex may help avoid perforator injuries in operation for ACOM aneurysms. Sewering of the bridging veins while preserving the collateral channels allows good operative field. How to use retractors and clips are also indicated.

3824. Nagel, M., et al. (1991). "[Injuries of the small and large intestine in the traumatized abdomen]." Verletzungen von Dunn- und Dickdarm beim traumatisierten Abdomen. **94**(3): 105-109.

Between 1973 and 1989 a total of 388 patients underwent laparotomy because of abdominal trauma. In 98 cases, injuries of the small bowel, the colon or the mesentery were found. The injuries were caused by motor vehicle accidents in 55 patients; 12 had gunshot or stab wounds and 12 committed suicide. There were 78 patients who had sustained a blunt abdominal trauma and 20 patients with a penetrating trauma. Only 21 patients had suffered a solitary injury of the gastrointestinal tract. In 41 patients there were also lesions to other intraabdominal organs, in 11 patients, thoracic injuries and in 24 patients, a craniocerebral trauma. Combined injuries of skull, thorax and abdomen were present in 24 patients. Neither ultrasound nor peritoneal lavage allows reliable prediction of injuries of the gastrointestinal tract. In 51 cases a defect of the mesentery or serosa was repaired. In 54 patients there was a rupture of the small or large intestine: in 20 of these cases primary repair without resection was performed and in 34, resection and anastomosis. Ileostomy or colostomy was done in only 8 patients. An anastomotic leak developed in 2 patients. Lethality is correlated to the extent of concomitant injuries. Solitary injury of the small bowel or colon was followed by lethality of only 4.1%, increasing to 50% in patients with combined injuries of skull, thorax and abdomen.

3825. Nagele, D. (2018). "Screening for brain injury: Can we decrease disability by getting more people to brain injury services and supports?" Journal of Head Trauma Rehabilitation **33**(3): E78.

The literature is beginning to abound with examples of people who have brain injury, but who do not know that they have a brain injury. How does this occur, one might ask? Certainly, public awareness about brain injury has increased, due to publicity about brain injury in athletes as a result of sports injuries (collisions with other players/goal-post/ground, and now Chronic Traumatic Encephalopathy), as well as brain injury in soldiers involved in war-related injuries (gunshot wounds/blast-related injuries/motor vehicle crashes). What is being found is that multiple, mild brain injuries have a cumulative effect, and yet each one, on its own, may not result in a diagnosis of brain injury. Without a diagnosis of brain injury, it is unlikely that one will be treated for brain injury. If there are residual cognitive or physical sequelae of mild brain injury, but no brain injury diagnosis, then the root cause of these problems is either overlooked or attributed to psychological problems, and consequently people do not get the benefit of brain injury treatment and supports that are available and validated as efficacious. A growing list of 'at-risk' populations are coming to the attention of brain injury professionals. In addition to athletes and military personnel, people who are homeless, victims of domestic violence, and people in juvenile justice or adult corrections may in fact have a lifetime history of brain injury, but not be aware of it, and may never have received treatment for it. In addition, there may be an over-representation of a lifetime history of brain injury among people presenting for vocational rehabilitation services, mental health services, drug and alcohol services, and psychiatric hospitalizations. The issue for these populations is that brain injury, left untreated, can result in any number of mood, behavior, substance use disorders, that then become the focus of treatment. Without an understanding of the root cause of the person's difficulties, and how they developed into mood, behavior, or substance use disorders, the traditional treatments for those disorders are likely to be less effective. The reason has to do with cognitive impairments that can undermine new learning and applying that learning, which is essential for change when dealing with mood, behavior, and substance-use disorders. This presentation will highlight recent research done in several 'at-risk' populations, including corrections and juvenile justice, to get at the prevalence of previously undiagnosed brain injury. In a backward chaining fashion, we will make the public policy argument for annual screening for brain injury in children, much as is currently done for developmental disorders, or visual/auditory impairments, so that we can more easily identify who could benefit from brain injury interventions and supports, and break the cycle of mild brain injury masquerading as other disorders.

3826. Nagib, M. G., et al. (1986). "Civilian gunshot wounds to the brain: prognosis and management." Neurosurgery **18**(5): 533-537.

The extent of treatment for the victims of gunshot wounds to the brain remains quite controversial, particularly when these patients present with extensive neurological dysfunction. We propose guidelines regarding the degree and aggressiveness of therapy. The factors that seem to have a significant impact on the patient's final outcome are the neurological examination at the time of admission, the radiological findings, and the motivation for the shooting. Thus, the authors propose a nonsurgical line of therapy for comatose patients with unilateral or bilateral cerebral gunshot wounds where bone or metal fragments are visualized away from the bullet path on computed tomography scan, particularly when these individuals are suicide victims.

3827. Nagoria, R., et al. (2013). "A rare case of fusarium meningitis." Indian Journal of Critical Care Medicine **17**: 39.

Introduction: Fungal meningitis is very uncommon in immunecompetent patients. Here we are reporting case of fusarium meningitis, in an agriculture worker after she had a penetrating injury. 53 yrs old female was apparently well till 2 months back when she had giddiness and fall while watering the plants following she was unconscious for a brief period. After regaining consciousness she noticed weakness of left side of body. she was diagnosed to have cervical fractures which was managed conservatively. For last 1 week patient attenders noticed that she was sleeping a lot although she was oriented and talking sense. Patient drowsy but arousable, Oriented to place, person and time. Power was left upper and lower limb: 3/5. Findings of CT Brain was asymmetrically dilated lateral ventricles and MRI Brain was showing asymmetrical ventricles with no other space occupying lesion. CT C Spine was showing C5/C6 cervical cord contusion.patient underwent endoscopic septostomy. Findings was multiple clumsy tissue strands present in right lateral ventricle blocking Foramen of Monro. Septostomy was done. Tissue was sent for biopsy, staining and culture. Immediately after surgery patient sensorium improved. Tuberculosis was suspected and she was started emperically on ATT. Culture showed a growth of filamentous fungus initially, so amphoterecin was started with proper monitoring of potassium and creatinine. After 3-4 days, patient was again drowsy. CT scan of brain was done which showed bilaterally

asymmetrically enlarged ventricles. In view of her clinical condition and ventriculomegaly right V-P shunt was performed. Patient sensorium improved after the surgery. Her final culture growth was suggestive of fusarium species. Conclusion: CNS fungal infection are commonly seen in immunecompromised patients. But rarely we can seen the infection immune-competent patient after CNS trauma or device placement.

3828. Nagpal, M., et al. (2017). "Case of intraocular foreign body partly lodged in the ethmoid sinus." Indian journal of ophthalmology **65**(11): 1262-1263.

3829. Nagy, E. (1990). "[A projectile embolism of the arteria cerebri media following a gunshot injury to the neck]." Projektilembolie der Arteria cerebri media nach Schussverletzung des Halses. **152**(6): 742.

3830. Nagy, L. and I. Sipos (1983). "[An indirect brain stem injury caused by a bone splinter of the petrous portion of the temporal bone]." Eine indirekte Stammhirnverletzung durch einen Knochensplitter der Felsenbeinpyramide. **89**(4): 279-282.

3831. Nahum, Y., et al. (2016). "Visual Outcomes of Repeat Versus Primary Descemet Stripping Automated Endothelial Keratoplasty-A Paired Comparison." Cornea **35**(5): 592-595.

PURPOSE: To compare the results of repeat Descemet stripping automated endothelial keratoplasty (DSAEK) with those of primary DSAEK., MATERIALS AND METHODS: This retrospective study consisted of all consecutive eyes that underwent one or more repeat DSAEK surgeries after primary DSAEK performed at Villa Serena-Villa Igea Private Hospitals (Forli, Italy) between January 2005 and June 2015. A paired comparison between the outcomes of primary and the second DSAEK was performed. Main outcome measures included best recorded best spectacle-corrected visual acuity (BSCVA), postoperative endothelial cell loss (ECL), and refractive error., RESULTS: Of 1413 procedures, 51 eyes were included in the final analysis. Indications for primary DSAEK included pseudophakic bullous keratopathy (n = 21), Fuchs endothelial dystrophy (n = 20), failed penetrating keratoplasty (n = 9), and trauma (n = 1). Indications for repeat DSAEK were slowly progressive ECL (n = 35), endothelial rejection (n = 15), and host-graft interface abnormalities (n = 1). Preoperative BSCVA (logarithm of the minimum angle of resolution 1.23 +/- 0.8 vs. 1.38 +/- 0.6, P = 0.29) and best postoperative BSCVA (logarithm of the minimum angle of resolution 0.32 +/- 0.44 vs. 0.34 +/- 0.49, P = 0.70) did not differ significantly between the 2 groups. ECLs for primary and repeat DSAEK at 1 (46% +/- 16% vs. 40% +/- 18%, P = 0.22) and 2 years (50% +/- 18% vs. 44% +/- 2%, P = 0.33) were also similar. The mean postoperative spherical equivalent did not differ significantly between the 2 groups (-0.01 +/- 1.9 vs. -0.5 +/- 1.6, P = 0.08) nor did the absolute astigmatic error (1.6 +/- 1 vs. 1.8 +/- 1.2, respectively, P = 0.17)., CONCLUSIONS: After the failure of a primary DSAEK graft, a subsequent DSAEK can yield visual outcomes and ECL rates that are comparable with those of primary DSAEK.

3832. Naidoo, S. and A. B. Van As (2011). "Vulnerability of children to gunshot trauma in violence-prone environment: the case of South Africa." African journal of paediatric surgery : AJPS **8**(1): 101-104.

South Africa has a high level of violence, as more people are killed by gunfire each year than in motor vehicle accidents, and the numbers are increasing. Regrettably, children are affected most by this epidemic. During 1997, a total of 142 children aged less than 14 years died from gunshot injuries while many more were injured. Here we present the case of an 11-year-old male street child who sustained a gunshot to the face, and illustrate the magnitude of the problem. The escalating epidemic of firearm-related injuries and deaths among children and adolescents in Cape Town, like in many other parts of the world, calls for concern. Further research is needed to understand firearm-related injuries among children and adolescents in South Africa, and to develop policies and programmes for effective prevention of situations such as this.

3833. Naidu, K. (2006). "The injured eye - Practical management guidelines and referral criteria for the rural doctor." South African Family Practice **48**(7): 39-45.

Ocular trauma encompasses a wide spectrum of mechanisms and presentations, affecting the orbit, globe of the eye, optic nerve and adnexae. The causative injuries range from the relatively superficial to those that threaten sight. The rural doctor plays a vital role in the initial management of patients with ocular trauma and his/her decisions and treatment can influence the patient's final visual outcome. This article serves to classify ocular trauma and to provide management guidelines for treating minor trauma and initiating proper care for injuries that require referral to specialist ophthalmologists.

3834. Naik, M. N., et al. (2011). "An extraordinary orbital foreign body." Ophthalmic plastic and reconstructive surgery **27**(6): e149-152.

The authors report a unique case of a broken motorbike handle that presented as a bilateral orbital foreign body. A 30-year-old male sustained an injury to the right side of his face when he skidded from his motorbike while riding. He had bilateral sudden loss of vision and presented to emergency services with bilateral proptosis, motility restriction, and a right lower eyelid laceration. CT scan revealed a 7-cm-long motorbike handle lodged in the retrobulbar space of both orbits, close to the cribriform plate. Left lateral orbitotomy was performed to remove the foreign body; the right eye regained normal vision and function. The unique features of this case include the nature of the foreign body, its bilateral location, its proximity to the optic nerve and cribriform plate, and the challenges in its removal. The clinical presentation and management is presented, along with the surgical video.

3835. Naik, P. M. and L. F. Angel (2011). "Special issues in the management and selection of the donor for lung transplantation." Seminars in immunopathology **33**(2): 201-210.

Lung transplantation is a viable treatment option for select patients with end-stage lung disease. Two issues hamper progress in transplantation: first, donor shortage is a major limitation to increasing the number of transplants performed. Secondly, recipient outcomes remain disappointing when compared with other solid organ transplant results. Outcomes are limited by primary graft dysfunction (PGD), the posttransplant acute lung injury that increases both short-and long-term mortality. Attempts to overcome donor shortage have included aggressively managing solid organ donors to increase the number of donor lungs suitable for transplantation. Yet, the quality of the lung donor is likely to be related to the probability of the recipient experiencing PGD. PGD is the culmination of a series of insults, hemodynamic, metabolic, and inflammatory, that begin with the brain dead donor and result in poor recipient outcomes. Understanding the mechanism of donor lung injury resulting from brain death and the possible treatment strategies for its inhibition could help to increase the number of usable lungs and decrease the rate of PGD in the recipient. Here we present a review of the key pathways which result in donor lung injury, and follow this with a brief review of recent biomarkers that are proving to be instrumental to our ability to predict truly unsuitable lungs, and our ability to predict and hopefully prevent or treat recipients with subsequent lung injury.

3836. Naik, S. K., et al. (2014). "Infantry rifle contact wound mimicking multiple gun shot entrywounds." Journal of Forensic Medicine and Toxicology **31**(1): 18-21.

When a contact or near contact shot is fired from a rifled firearm, apart from the muzzle imprint other constructional parts like front sight and/or the recoil spring guide of semiautomatic pistols may surround the bullet entry wound. But when a rifle fitted with a flash suppressor is fired, the emerging soot-laden gas in the barrel escapes from the slits of the flash suppressor. If the shot is contact or near contact, the flash suppressor will produce a characteristic “flower-like” pattern of blackened zones around the entrance, or rarely may produce deep burns mimicking “grouping of gun-shot entry wounds”. We present a case where due to deep dermal burns resulting from escaping hot soot-laden gases through the slits/ openings of a flash suppressor of an infantry rifle in a contact shot mimicked multiple entry wounds.

3837. Naimagon, N. L. (1975). "[Foreign body of fire-arm origin in the pterygopalatine fossa]." Ognestrel'noe inorodnye telo krylonebnoi iamki(2): 112-114.

3838. Naimer, S. A., et al. (2004). "Control of massive bleeding from facial gunshot wound with a compact elastic adhesive compression dressing." The American journal of emergency medicine **22**(7): 586-588.

The issue of immediate control of acute external traumatic hemorrhage is poorly dealt with in the medical literature. A compact unit incorporating the desired components capable of applying significant compression over diverse body areas has been suggested in the past but not formally demonstrated effective in practice. In this report we describe the treatment of a young man presenting with a very large, complex, profusely bleeding facial gunshot wound. The calvarium remained intact. The upper airway was diverted and secured by performing a cricothyroidotomy. A transparent elastic adhesive dressing was then applied by covering the anterior aspect of the face by a contact pad followed by sequential wrapping of the roll covering all structures between the forehead and the neck. This procedure successfully controlled the hemorrhage and maintained the victim's condition hemodynamically stable until definitive surgical intervention at the level 1 medical center. We attribute the survival of this victim to the innovative dressing technique and excellent cooperation between the trauma team and hospital staff. This case demonstrates the contribution of elastic adhesive compression dressing towards saving the lives of those inflicted by severely challenging bleeding wounds. We suggest this technique be considered by Emergency personnel working in the prehospital arena in selected cases.

3839. Najenson, T., et al. (1974). "Rehabilitation after severe head injury." Scandinavian journal of rehabilitation medicine **6**(1): 5-14.

3840. Nakagawa, A., et al. (2002). "[A temporal head injury involving intracranial penetration by glass]." No shinkei geka. Neurological surgery **30**(5): 529-533.

The authors report a rare case of intracranial glass injury due to a temporal head injury. This 72-year-old man slipped on a bathroom floor, impacting a glass door with his head and right shoulder. His right temporal scalp and right shoulder were cut by the broken glass. He visited our emergency unit four hours after sustaining the injury. Physical and neurological examinations showed no abnormalities except for two lacerated wounds on both the right temporal scalp (1.5 cm) and the right shoulder skin (10 cm). Foreign bodies were not palpable around the lacerated wounds. Skull X-ray and CT studies disclosed a single, 5-cm long, radiopaque foreign body penetrating the temporal skull bone into the right temporal lobe, but no evidence of intracranial bleeding was found. Under the diagnosis of intracranial glass injury, total removal of the foreign body with dural repair was carried out. On surgical exploration, glass penetrating the skull bone 5-mm distant anteriorly to the scalp laceration was observed. Postoperative angiography showed no vascular lesions, and one-week later he was discharged with no complications. According to the literature, most of the intracranial foreign bodies occur around the orbital, the frontal sinus, and the nasal areas. To our knowledge, this is the first report of an intracranial glass penetrating injury to the temporal lobe. Since the clinical manifestations occasionally do not correspond to the appearance of the laceration after glass penetrating injuries, serious caution concerning patients with intracranial glass penetrating injuries is important.

3841. Nakaji, P. (2010). "Comments." Neurosurgical review **33**(4): 504.

3842. Nakamura, N., et al. (2017). "[A Case of Transoral Penetrating Head Injury from a Crossbow-Fired Arrow]." No shinkei geka. Neurological surgery **45**(9): 799-804.

Penetrating head injuries are extremely rare in Japan. The authors describe a case involving a penetrating head injury from an arrow fired from a crossbow. A 52-year-old man who had shot himself transorally in a suicide attempt was admitted to the authors' hospital. On admission, he was conscious and exhibited no neurological deficits. The end of the arrow was visible inside his oral cavity. Computed tomography revealed the arrow had penetrated the right cerebellum and occipital lobe, resulting in a very small hematoma. Digital subtraction angiography revealed no significant vascular injuries. After considering these findings and the nature of the object, the authors decided to remove the arrow from the cranium by pulling it from the patient's oral cavity. To remove the arrow, surgery was performed with several devices, including intraoperative X-ray, endoscopy, and intraoperative angiography. The authors were able to completely remove the arrow, and the patient experienced no new deficits, except mild ataxia and mild dysphasia, and no signs of cerebral infection or cerebrospinal fluid leakage after the surgery. Although most cases of penetrating

head injuries require craniotomies, the authors were able to safely remove the foreign object in this case without performing a craniotomy. Because guidelines for the treatment of penetrating head injuries have not been established, the treatment of each case must be modified according to the nature of the foreign object and the findings of preoperative imaging techniques.

3843. Nakamura, T., et al. (2004). "[Multiple cerebral white matter lesions following head trauma with eyeball contusion]." Rinsho shinkeigaku = Clinical neurology **44**(2): 108-110.

We reported a 36-year-old man with multiple cerebral white matter lesions following head trauma with eyeball contusion. He had suffered from optic neuritis on non-injured side after one and half months from the head trauma. Brain MRI revealed multiple cerebral white matter lesions and lumbar puncture disclosed an elevated level of protein of the cerebrospinal fluid after two and half months from the head trauma. He was treated with steroid pulse therapy and resulted in an improvement of his visual acuity and a remarkable decrease of multiple cerebral white matter lesions. There has been a controversy concerning the causal relationship between trauma and multiple sclerosis (MS). In this case, MS-like multiple cerebral white matter lesions are considered to be relevant to the head trauma.

3844. Nakayama, D. K. (2019). "Vesalius: Surgeon to monarchs." American Surgeon **86**(3): 173-175.

3845. Nakayama, Y., et al. (1995). "[Penetrating head injury caused by weed--case report]." No to shinkei = Brain and nerve **47**(12): 1192-1194.

A case of penetrating head injury caused by weed was reported. A 69-year-old man fell from a bicycle and was stuck by the hard stalk of weed through the right nasal cavity. On admission the patient was fully alert and with no neurological deficits. The weed was pulled out at an out-patient department and then he became semicomatose and hemiplegic on the left side together with an occurrence of nasal bleeding. Subsequent computed tomographic (CT) scan showed an intracerebral hematoma in the right frontal lobe. The hematoma was immediately evacuated and the dural defect, lateral to the cribriform plate, was closed. It is stressed that neuroradiological evaluation with CT scan and/or magnetic resonance imaging (MRI) is mandatory because an information about an anatomical location of penetrating objects and intracranial complications are essential to a decision-making of surgical strategy. The objects should be urgently removed in a surgical exposure of the intracranial lesion and the contused brain should be debrided with a repair of the lacerated dura mater.

3846. Nam, J. and W. Kelly (2020). "PNEUMOMEDIASTINUM FROM PNEUMATIC NAIL GUN INJURY TO THE HAND." Chest **158**(4): A736.

SESSION TITLE: Fellows Critical Care Posters SESSION TYPE: Fellow Case Report Posters PRESENTED ON: October 18-21, 2020 INTRODUCTION: Pneumatic nail guns are important in manufacturing and construction due to increased production rates. These tools use a great deal of energy to make a nail into a projectile. Most nail gun injuries are superficial1 and tend to affect extremities, but there are documented cases affected brain, eyes, neck, heart, thorax, spinal cord, bowel, and liver.2 We report a case of pneumomediastinum from nail gun injury to the hand. CASE PRESENTATION: 40-year-old male presented from a construction site with nail extending from his left thumb to his left middle finger. He was alert and oriented with pain in his left arm and mildly dyspneic. On exam, a nail had pierced the pneumatic tube with a section of tubing in between his two digits pinned by the nail. There was noticeable crepitus and subcutaneous emphysema in his left hand extending to his shoulder and decreased breath sounds on right lung. While being evaluated in the Emergency Department, he became progressively dyspneic. He described a sensation of fullness in his throat. Due to worsening hypoxia the patient underwent rapid sequence intubation. Imaging showed extensive subcutaneous emphysema in chest, pneumomediastinum, pneumopericardium, and a small right pneumothorax. Right thoracostomy tube was placed and the nail and pneumatic tubing were successfully removed, with extubation and discharge after several days. DISCUSSION: The construction industry first used pneumatic nail guns in 1959. There have been increasing numbers of accidents related to these devices as they become more popular.2 Injuries often occur when the operator misses the intended surface, the tool becomes accidentally activated, or the hose becomes disconnected from the tool. There have been 151,000 nail gun injuries in US Emergency Departments from 2006 to 2011. Although 90% of patients were treated and released, there have been case reports involving paralytic spinal cord transection,

bowel perforation, long bone fracture, liver laceration, hemo-pneumothorax, blindness, cerebral damage, and fatalities.3 CONCLUSIONS: We believe this to be the first case of pneumomediastinum from a distal hand nail gun injury, caused by air insufflation from the nail passing through the tubing, which can be added to the list of hazards as pneumatic tools become increasingly prevalent at both work sites and in homes. Reference #1: Migliorini F, Bizzotto L, Curti P, Porcaro AB, Artibani W. An unusual case of pneumatic nail gun scrotal injury and revision of the literature. Arch Ital Urol Androl. 2017;89(4):325-326. Reference #2: Pierpont YN, Pappas-Politis E, Naidu DK, Salas RE, Johnson EL, Payne WG. Nail-gun injuries to the hand. Eplasty. 2008;8:e52. Reference #3: Lipscomb HJ, Schoenfisch AL. Nail gun injuries treated in U.S emergency departments, 2006-2011: not just a worker safety issue. Am J Ind Med. 2015;58(8):880-885. DISCLOSURES: No relevant relationships by William Kelly, source=Web Response No relevant relationships by Jason Nam, source=Web Response

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3847. Nan, B., et al. (2011). "A clinical investigation of the mechanism of growing skull fractures in children." Journal of neurotrauma **28**(5): A39-A40.

Background: Many theories have been offered to explain growing skull fractures (GSFs), such as dural tears, arachnoid herniation, increased intracranial pressure, bone absorption due to ischemia of the fracture line, and delayed or ceased bone growth. These theories, however, are limited by certain inadequacies. In this prospective study, we sought to uncover the mechanisms of GSFs, and their treatment methods in children. Methods: Ten patients with GSFs who received treatment at our hospital between November 2000 and October 2009 were retrospectively analyzed. The age at injury, duration from the time of injury to the appearance of the GSF, fracture width, and imaging characteristics were analyzed. Cranioplasty was carried out, while duraplasty was not performed. Results: The age at injury ranged from 7-21 months, and the age at surgery ranged from3-5 years. The injuries included 4 fall injuries and 6 automobile collision injuries. All were linear skull fractures. The duration from the time of injury to the appearance of a GSF was <1month in 4 cases and<2 months in 6 cases. Six patients had frontal bone fractures, 2 had parietal bone fractures, and 2 had occipital bone fractures. The fracture width ranged from 1.5-3.0 cm. The growing fractures became stationary just after onset, without further progression. CT revealed 4 cases of encephalocele underneath the fracture, and 6 cases of encephalomalacia due to brain contusion. Follow-up ranged from6 months to 7 years. Titanium plate fixation was stable, without loosening or displacement. There were no skull deformities in any patient. Conclusion: GSFs usually occur in young children. The rapid growth of the brain in young children produces an outward expansion force, which plays a crucial role in GSF development. It is possible that the current theories such as dural tear, arachnoid herniation, increased intracranial pressure, bone absorption due to ischemia of the fracture line, and delayed or ceased bone growth, only constitute secondary causes.

3848. Nance, M. L., et al. (2003). "Nonintracranial fatal firearm injuries in children: implications for treatment." The Journal of trauma **55**(4): 631-635.

BACKGROUND: Understanding the injury characteristics of nonintracranial fatal (NIF) gunshot wounds in children treated in a statewide trauma system will help guide effective treatment strategies., METHODS: This study was a retrospective analysis of children fatally injured with firearms. The review included demographic information, firearm injury characteristics, and outcome. The setting included trauma centers participating in a statewide trauma registry. Patients were all children (age < 18 years) treated in trauma centers for NIF gunshot wounds from January 1988 through December 2000. The main outcome measures were characteristics of fatal firearm injuries in children., RESULTS: Over the 13-year period, there were 1,954 children with firearm injuries including 368 (18.8%) children with fatal wounds. Of the fatally wounded children, 177 (48.1%) had no intracranial injury. The NIF injury population was 90.4% male, with a mean age of 14.9 years (range, <1-17 years) and an Injury Severity Score of 38.2 (range, 9-75). Over 95% of deaths in this group occurred within 24 hours of admission. Although injuries to the thorax were most common (78.5%), 48.6% of the NIF cohort had injuries to multiple body regions, including 31% with injuries in both the abdomen and thorax. Compared with all children wounded by firearms, NIF firearm injury patients had, on average, more body regions injured (1.6 vs. 1.1, $p < 0.001$) and a greater total number of injuries (6.0 vs. 3.5, $p < 0.001$). Patients with an NIF injury were more likely to suffer a major vascular injury (54.8% vs. 13.8%, $p < 0.001$), lung injury (56.5% vs. 12.9%, $p < 0.001$), or cardiac injury (44.6% vs. 4.6%, $p < 0.001$) than all children with a firearm injury., CONCLUSION: Most children who arrive at trauma centers alive and subsequently die from NIF firearm injuries do so rapidly from major vascular and thoracic injury. Almost half of these children have injuries to multiple body regions, further complicating management. Innovative, aggressive treatment approaches should be sought to improve survival in this extremely injured cohort of children.

3849. Nandra, B., et al. (2017). "Free Bone Grafts for Mandibular Reconstruction in Patients Who Have Not Received Radiotherapy: The 6-cm Rule-Myth or Reality?" Craniomaxillofacial Trauma and Reconstruction **10**(2): 117-122.

Bony reconstruction of the mandible after surgical resection results in improved rehabilitation and aesthetics. Composite tissue transfer has transformed reconstruction, particularly in patients who have received radiotherapy. However, there is morbidity related to free tissue transfer. Free nonvascularized bone grafts have much lower morbidity. Surgeons believe that free bone grafts greater than 6.0 cm are prone to failure. The aims of this study was to assess whether bone grafts greater than 6.0 cm in length have a high risk of failure. A retrospective study was performed on all patients who had free bone grafts greater than 6.0 cm in length at Birmingham, UK, and Florida, the United States. None of the patients received radiotherapy. A total of 14 patients had undergone bone grafts for mandibular defects greater than 6.0 cm in length; 13 of the bone grafts were successful. Of these 13, none were infected and there was radiographic evidence of bony union. Some of the patients have been dentally rehabilitated with implants. Contrary to much of the literature and many surgeons belief, our study has shown that long mandibular defects (>6.0 cm) are not a contraindication to the use of free bone grafts. Key principles to achieve success are discussed in this article.

3850. Nap, R. C., et al. (1985). "[Frontal sinusitis in a horse with a neurological complication]." Sinusitis frontalis bij een paard met een neurologische complicatie. **110**(23): 997-1001.

The case of a horse affected with frontal sinusitis, in which neurological complications occurred following trepanation, is reported. The previous history of the animal as well as the clinical, radiological and pathological findings are discussed.

3851. Naresh, P. K. and P. Veneet (2001). "Penetrating foreign body presenting as an aural polyp." Indian Journal of Otology **6**(4): 33-34.

A case of penetrating foreign body [Gunshot pellets] presenting as aural polyp is described. In any case of recurrent aural polyp not responding to standard therapeutic measures, a foreign body should be suspected which may be lying outside the external auditory canal or in middle ear.

3852. Narotam, P. K., et al. (1994). "Operative sepsis in neurosurgery: a method of classifying surgical cases." Neurosurgery **34**(3): 409-406.

Neurosurgical operations have traditionally been classified along the lines of general surgical procedures. A prospective study, during an 18-month period, was undertaken in 2249 patients undergoing neurosurgical procedures to establish and evaluate a method of classifying surgical cases by the use of specific neurosurgical criteria. Patients were placed in one of five categories according to the level and type of contamination at the time of surgery. Infection included all abnormal wounds and was documented as deep when infection occurred beneath the galea (subgaleal pus, osteitis, abscess/empyema, ventriculomeningitis) and as superficial if only the scalp (including wound erythema) was involved. A statistically significant difference in the sepsis rate was found in the different categories ($P < 0.0001$). Of the 342 "dirty cases," 9.1% of patients developed further wound sepsis. Concomitant cerebrospinal fluid fistulae (44%), second operations (11.8%), and patients with penetrating injuries (9.2%) were the major factors implicated in sepsis in the "contaminated" category (9.7%). In the "clean contaminated" category, a sepsis rate of 6.8% was found. Prolonged surgery (longer than 4 hours) was also implicated in higher infection rates (13.4%). This study strongly supports the separation of patients who have foreign materials implanted (sepsis rate = 6.0%) from "clean" patients, essentially cases categorized as having no known risk factors that may affect sepsis, in whom a sepsis rate of 0.8% was found ($P < 0.001$). Importantly, surgery for the repair of so-called "clean" neural tube defects in neonates requires separate consideration. An infection rate of 14.8% existed in this subgroup. A uniform system of reporting wound abnormalities is also proposed.

3853. Naseem, M., et al. (1986). "Traumatic pneumocephalus caused by stab wound to the neck." AJNR. American journal of neuroradiology **7**(1): 174-175.

3854. Nashed, A., et al. (2011). "The outcome of early surgical repair with vitrectomy and silicone oil in open-globe injuries with retinal detachment." American journal of ophthalmology **151**(3): 522-528.

PURPOSE: To determine the functional and anatomic outcome of early surgical repair with vitrectomy and silicone oil in open-globe injuries with retinal detachment (RD)., DESIGN: Retrospective consecutive interventional case series., METHODS: All patients with open-globe injuries with RD treated between 1997 and 2007 underwent primary repair including vitrectomy with silicone oil within 8 hours after presentation. For data analysis, patients were divided into 3 groups according to the BETT classification: Group 1, intraocular foreign body; Group 2, penetrating injury; Group 3, globe rupture. Outcome measures were final reading visual acuity (0.4 logMAR or better), final ambulatory visual acuity (1.6 logMAR or better), endophthalmitis, and postoperative proliferative vitreoretinopathy (PVR)., RESULTS: Eighty-eight patients were included (Group 1, n = 13; Group 2, n = 36; Group 3, n = 39). Mean follow-up was 22 months (standard deviation [SD] = 23, range 6-107 months). Eight percent of patients retained reading vision without significant difference between the 3 groups. Fewer patients in Group 3 than in Group 1 or 2 retained ambulatory visual acuity (Group 1, 62%; Group 2, 64%; Group 3, 33%, P = .024). Endophthalmitis occurred in 3.4% of eyes (1 eye in each group). PVR grade B-C, type 1-3 developed in 44% of patients without significant difference between the 3 groups. Re-RD occurred in 38% of eyes., CONCLUSIONS: Few patients achieved reading vision while 50% of patients retained ambulatory visual acuity. Final visual outcome is related to the severity of the injury. The frequency of postoperative endophthalmitis is low. Postoperative development of advanced PVR is avoided in most patients.

3855. Nasr, A. M., et al. (1999). "Penetrating orbital injury with organic foreign bodies." Ophthalmology **106**(3): 523-532.

OBJECTIVE: The authors reviewed the clinical features, diagnostic workup, and management of patients of penetrating orbital injuries with retained organic foreign bodies., DESIGN: Retrospective, noncomparative case series., PARTICIPANTS: Nineteen patients (15 males, 4 females) with penetrating orbital injuries due to organic foreign bodies., RESULTS: The series included 15 (78.9%) males and 4 (21.1%) females who ranged in age from 6 months to 40 years (mean = 14.6 years); 12 (63.2%) patients were younger than 12 years of age. Twelve (63.2%) right and 7 (36.8%) left orbits were involved. Time between injury and presentation varied from a few hours to 9 months. Most common injury site was the superior orbit in 11 (57.9%) patients leading to abnormal extraocular motility (84.2%), proptosis (68.4%), and upper lid ptosis (47.4%). Associated pathologies also included acute cellulitis in 11, orbitocutaneous fistula in 5, and osteomyelitis in 2 patients. Preoperative computed tomography (CT) and magnetic resonance imaging (MRI) identified the foreign bodies in 42% and 57% of the patients, respectively., CONCLUSION: Preoperative identification of the foreign material in the orbit was found to be very helpful for patient management but was only possible in approximately 50% of our cases with the use of CT and MRI. The vision in our patients usually improved shortly after treatment; the long-term complications more often included extraocular muscle and eyelid motility problems and periorbital scarring.

3856. Nasr, M. M. (2015). "Bilateral external carotid artery ligation: A life saving procedure in severe maxillofacial trauma." International journal of surgery case reports **8**: 81-83.

Introduction Bilateral external carotid arteries ligation is a rare practice in cases of extensive maxilla-facial injuries. Defining indication criteria in the management of such cases is highly demanded in emergency surgery. Case presentation Reported case presents a male patient 67 years old man with a gunshot to the face. The whole face was macerated. Patient was operated surgically performing bilateral external carotid artery ligation, tracheostomy, pharyngostomy, gastrostomy and pressure dressing to face and head. Conclusion The procedure of bilateral external carotid artery ligation has no defined role in the management of maxillofacial trauma. The current status of such procedure in maxillofacial trauma needs revision.

3857. Nasser, R., et al. (2016). "Penetrating thoracic spinal cord injury with ice pick extending into the aorta. A technical note and review of the literature." Surgical neurology international **7**(29): S763-S766.

Background: Penetrating spinal cord injuries pose a great challenge to both patients and the treating physicians. Although the overall incidence of penetrating spinal cord injury is the highest in the military, the ubiquity of guns in our society continues to make penetrating spinal cord injury prevalent in the civilian population. These types of injuries are particularly complicated because, beyond the trauma to the neural elements and supporting structures, other organs

can be affected and a team approach is required for successful treatment. Case Description: In this report, the authors present a unique case of an ice pick penetrating posteriorly through the spinal canal into the aorta. The described surgical management involved careful consideration and planning to prevent worsening vascular and neurological compromise. Among the challenges faced are neurological compromise, vascular injury, spinal instability, and cerebrospinal fluid leak. Conclusion: To the author's knowledge, this challenging case represents the first description of a successful removal of a penetrating thoracic spinal foreign body that terminated within the lumen of the thoracic aorta.

3858. Nassiri, N., et al. (2009). "Is cranial reconstruction with a hard-tissue replacement patient-matched implant as safe as previously reported? A 3-year experience and review of the literature." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **67**(2): 323-327.

PURPOSE: This study aimed to verify the low complication rates (0% to 11%) previously reported in cranial reconstruction using hard-tissue replacement patient-matched implant (HTR-PMI)., PATIENTS AND METHODS: A 3-year multidisciplinary experience involving 21 patients undergoing HTR-PMI reconstruction of large cranial defects was reviewed. Complications were defined as implant exposure, implant infection, or soft-tissue infection., RESULTS: A statistically higher rate of complications was observed, compared with previous series (P= .043). We also determined whether previous bone infection, a history of diabetes, or smoking were risk factors for the development of complications. Diabetes, smoking, and pre-existing bone/implant infections were not significant risk factors for HTR-PMI failure. The higher rate of complications can be partially attributed to a diverse and complicated patient population, with multiple comorbid conditions and various indications for HTR-PMI reconstruction. In particular, decompressive craniectomies in trauma patients can be risky indications for the use of HTR-PMI., CONCLUSION: Larger studies are suggested to verify our findings.

3859. Nassuphis, P. (1968). "[Cholesteatoma of the ear and brain abscess following gunshot injury]." Cholesteatom des Ohres und Hirnabscess nach Schussverletzung. **191**(2): 652-658.

3860. Nast-Kolb, D., et al. (1998). "[Abdominal trauma]." Abdominaltrauma. **101**(2): 82-91.

While a great part of the Anglo-American medical literature addresses the topic of penetrating trauma the German speaking countries rather publish on blunt abdominal injury. The presented paper discusses the strategic principles of acute clinical management of abdominal trauma on the combined basis of own research results and a comprehensive review of the literature. Blunt abdominal injuries in most cases from a part in the pattern of multiple trauma. The early, first-hours mortality is most often caused by severe traumatic brain injury or abdominal trauma with massive hemorrhage. The prehospital management of penetrating injuries is characterized rather by the concept of 'load and go', whereas the onscene stabilization of the patient with blunt abdominal injury should precede transport to the adequate hospital. On arrival in the accident and emergency room an immediate blood transfusion is recommended for hemodynamically unstable patients. If then a stabilization is not achieved, an emergency laparotomy should follow. Abdominal stab injuries should be explored by laparoscopy if an intraperitoneal lesion is suspected. If then the possibility of an intestinal lesion is present a laparotomy should be performed directly thereafter. Firearm injuries require open revision in almost all cases. The standard diagnostic technique in blunt abdominal trauma is sonography, assisted by computed tomography and, if indicated, angiography in hemodynamically stable patients. Isolated abdominal injuries without hemodynamic or coagulation disorders allow conservative treatment in the intensive care setting. In severe multiple trauma as well as in manifest shock even the smallest fluid detection should lead to laparotomy. The surgical treatment of splenic rupture is still a matter of discussion. Splenectomy is indicated in patients with severe concomitating injuries or shock whereas in the remainder of cases the total or partial preservation of the spleen should be pursued. Hepatic injuries offer a broad spectrum of operative interventions, ranging from superficial hemostatic measures over compression techniques like 'packing' and 'mesh-wrapping' to atypical and anatomical resections and to liver transplantation in exceptional cases. Lesions of tubular organs and the pancreas pose especially difficult diagnostical problems but regularly allow a rather easy operative treatment.

3861. Nath, F. P., et al. (1984). "Penetrating injury of the tuberculum sellae." Neurosurgery **14**(5): 598-600.

An unusual case of perforation of the tuberculum sellae and right ethmoid bone by a 10-in. serrated bread knife is described. The patient survived with no neurological or endocrine deficit. The importance of preoperative angiography and control of the proximal and distal vasculature is stressed.

3862. Nathoo, N., et al. (2000). "Transcranial brainstem stab injuries: a retrospective analysis of 17 patients." Neurosurgery **47**(5): 1117-1123.

OBJECTIVE: Transcranial stab injuries remain a frequent cause of emergent neurosurgical admissions to neurosurgical units in South Africa. Brainstem stabs are an uncommon, yet often fatal, form of brain injury., METHODS: A retrospective audit of 597 patients with transcranial stab injuries admitted to our unit over a 12-year period (January 1987 to December 1998) identified 17 patients (2.85%) with brainstem stab injuries. The computed tomographic scans of all patients were analyzed, and a detailed autopsy examination of the skull and its contents was performed in all patients who died. Stepwise linear regression analysis was used to formulate a predictive model of outcome for the entire series of 597 patients., RESULTS: The majority of the patients were males (16 patients), and the study group had a mean age of 28.65 +/- 9.59 years and a mean Glasgow Coma Scale score of 8.59 +/- 2.76. Knives (82%) were the most common instruments of penetration. Cerebral angiography identified 3 patients with vascular abnormalities, and autopsy revealed an additional 4 patients with vascular injury. Emergency ventriculostomy was performed in 10 patients for obstructive hydrocephalus. Four of the 17 patients survived (76.5% mortality). Factors significantly predictive of outcome in patients with transcranial stab injuries were the Glasgow Coma Scale score (F = 43.7), the occurrence of intraventricular hemorrhage (F = 22.8), the type of associated lesion (intracranial bleed, vascular abnormality, or brain abscess) (F = 5.9), and the number of operations (F = 3.2)., CONCLUSION: The Glasgow Coma Scale score is the most significant predictor of outcome in low-velocity transcranial stab injuries. Brainstem stab injuries have a great propensity for vascular damage. Survivors are incapacitated by severe, fixed neurological deficits.

3863. Nathoo, N., et al. (2002). "Civilian infratentorial gunshot injuries: outcome analysis of 26 patients." Surgical neurology **58**(3-4): 225-223.

BACKGROUND: Craniocerebral missile injuries have steadily increased to become the most common form of penetrating neurotrauma in our environment resulting in continued morbidity and neuropsychological sequelae. Civilian infratentorial gunshot injuries are uncommon but generally regarded as fatal injuries, with many patients dying before reaching hospital., METHODS: A retrospective analysis of 1,069 patients with civilian gunshot wounds (GSW), admitted to our unit over a 14-year period (1986-2000), identified 26 patients with infratentorial gunshot injuries (2.4%). A detailed analysis of these patients was carried out, which included demographic factors, clinical and anatomic correlation, computed tomography scans, surgical management, and outcome., RESULTS: All patients were male. The mean age was 26.5 +/- 11.5 years and the mean admission Glasgow Coma Score 11.8 +/- 2.7. Twenty-four of 26 patients required cerebrospinal fluid (CSF) diversion to control secondary hydrocephalus. The second commonest surgical procedure was posterior fossa decompression. Five of 26 patients died (19.2%). Severe morbidity was noted in 9 of 21 surviving patients (42.8%). Significant predictors: good outcome was associated with primary missile entry of the infratentorial compartment ($p = 0.005$), while patients with supratentorial to infratentorial missile trajectory were noted to have a poorer outcome ($p = 0.041$). Location of cerebellar injury (lateral or medial) and missile caliber had no significant influence on patient outcome., CONCLUSION: Early control of incipient or established hydrocephalus and aggressive surgical management where appropriate, with careful postoperative monitoring, is necessary for good outcome in patients with civilian infratentorial missile injuries.

3864. Nathoo, N. and S. S. Nadvi (1999). "Intracranial malposition of a nasogastric tube following repair of choanal atresia." British journal of neurosurgery **13**(4): 409-410.

Intracranial penetration during attempted nasogastric intubation is a rare, often lethal occurrence. We report the inadvertent introduction of a nasogastric tube intracranially in a neonate following repair of unilateral choanal atresia. Following manual removal of the tube, the patient made a good recovery.

3865. Nathoo, N. and S. S. Nadvi (1999). "Traumatic intracranial aneurysms following penetrating stab wounds to the head: two unusual cases and review of the literature." The Central African journal of medicine **45**(8): 213-217.

Two patients with rare complications of traumatic intracranial aneurysms following penetrating cranial stab wounds are described. One patient had a good outcome despite a secondary rupture of a traumatic proximal middle cerebral artery aneurysm, while the second patient had a traumatic basilar bifurcation artery aneurysm. To our knowledge neither the survival from a secondary rupture of a traumatic intracranial aneurysm, nor the development of a basilar bifurcation aneurysm secondary to a transcranial stab wound has been described previously. Furthermore, this is the first report of the technique of deep hypothermic cardiac arrest utilized to treat a traumatic false aneurysm. Traumatic intracranial aneurysms are a rare clinical entity, most often diagnosed after rupture and often resulting in fatal haemorrhage. A high index of suspicion needs to be maintained when managing patients with transcranial stab wounds. Early surgical intervention improves outcome by preventing initial aneurysmal rupture or rebleeding.

3866. Nathoo, N., et al. (2011). "Brain abscess: management and outcome analysis of a computed tomography era experience with 973 patients." World neurosurgery **75**(5-6): 716-717.

OBJECTIVE: Brain abscess (BA) is a neurosurgical emergency and despite significant medical advances, it remains a surgical challenge. A single institution's two decade computed tomography era management experience with BA is reported., METHODS: A retrospective analysis of patients with BA, admitted to the Department of Neurosurgery, Wentworth Hospital, Durban, KwaZulu-Natal, South Africa, was performed. The medical records were analyzed for demographic, clinical, neuroimaging, neurosurgical and otolaryngology management, microbiological characteristics, and their relationship to outcome., RESULTS: During a 20-year period (1983-2002), 973 patients were treated. The mean age was 24.36 +/- 15.1 years (range: 0.17-72 years) and 74.2% (n = 722) were men. The mean admission Glasgow Coma Score was 12.5 +/- 2.83. The majority of BAs were supratentorial (n = 872, 89.6%). The causes were otorhinogenic (38.6%), traumatic (32.8%), pulmonary (7%), cryptogenic (4.6%), postsurgical (3.2%), meningitis (2.8%), cardiac (2.7%), and "other" (8.6%). Surgical drainage was performed in 97.1%, whereas 19 patients had nonoperative management. The incidence of BA decreased during the study period. Patient outcomes were good in 81.3% (n = 791), poor in 5.3% (n = 52), and death (13.4%, n = 130) at discharge. The management morbidity, which included postoperative seizures, was 24.9%. Predictors of mortality were cerebral infarction (odds ratio [OR] 31.1), ventriculitis (OR 12.9), coma (OR 6.8), hydrocephalus (OR 5.1), dilated pupils (OR 4.8), bilateral abscesses (OR 3.8), multiple abscesses (OR 3.4), HIV co-infection (OR 3.2), papilledema (OR 2.6), neurological deterioration (OR 2.4), and fever (OR 1.7)., CONCLUSIONS: Optimal management of BA involves surgical drainage for medium-to-large abscesses (>=2.5 cm) with simultaneous eradication of the primary source, treatment of associated hydrocephalus, and administration of high doses of intravenous antibiotics. The incidence of BA is directly related to poor socioeconomic conditions and therefore, still poses a public health challenge in developing countries.

3867. Natrella, M., et al. (2012). "Treatment of a transorbital penetrating injury: a particular endovascular approach." Interventional neuroradiology : journal of peritherapeutic neuroradiology, surgical procedures and related neurosciences **18**(2): 191-194.

The management of craniocerebral penetrating injury currently represents a challenge for neurosurgeons and neuroradiologists and requires innovative planning. This report describes the case of a worker admitted to hospital with an intracranial piece of concrete-cutting saw stuck through the right eye. At the time of admission the patient was conscious and this fact influenced the choice of a particular approach. This patient escaped without neurological deficit or complications, except for the inevitable removal of an eye.

3868. Natung, T., et al. (2018). "A challenging case of a large intraorbital foreign body perforating the nasal septum in a child." Indian journal of ophthalmology **66**(10): 1511-1513.

A 5 year old boy with a history of fall from a height of about 4 feet, presented after one week with swelling, watering and discharge of the right eye. He had severe conjunctival chemosis with superior displacement of the globe. Computed Tomography (CT) showed a linear low attenuation tract in the right orbit extending from the inferolateral wall up to the left uncinate process of the ethmoid bone with increasing Hounsfield unit after 10 days. The parents did not agree for early exploration. After 10 days an exploration was done and a large linear and irregular wooden foreign body (FB) measuring 4.5 x 1.5 cm2 was removed from the right orbit and a smaller one from the nasal cavity. Four weeks post surgery, his vision was 6/9 in the right eye with the eyeball in the normal position. This case was challenging because of

the late presentation, parents not agreeing for early exploration, difficulty in diagnosing by CT and a large and very deep penetrating FB.

3869. Navaneetham, A., et al. (2010). "Submental intubation: our experience." Journal of maxillofacial and oral surgery **9**(1): 64-67.

INTRODUCTION: Airway management for patients who suffered midfacial fractures is complicated. In maxillofacial injuries, a choice has often to be made between different ways of intubation when surgical access to both the nasal and oral cavities is necessary. Submental intubation technique is an alternative to nasoendotracheal intubation and tracheostomy in the management of patients with severe midfacial fractures. This procedure is simple to do and has a low morbidity., MATERIAL: Submental intubation-paramedian technique has been used in 15 cases from May 2005-April 2007 in Hosmat Hospital, Bangalore. All patients had fractures disturbing the dental occlusion plus either an associated fracture of the skull base or a displaced nasal fracture., RESULTS: Average duration of procedure was 7 minutes. Average duration of tube in vitro after surgery was 20 hours. There were 2 postoperative complications of tube obstruction which were successfully managed., CONCLUSION: Submental intubation demands certain technical skills but it is simple, rapid and may avoid tracheostomy in selected patients.

3870. Navarro Artiles, G. and V. Crespo-Lopez (1970). "[Surgical indications in skull and brain injuries and bone collapse]." Indicaciones quirurgicas en las heridas craneocerebrales y en los hundimientos oseos. **116**(2): 151-154.

3871. Navarro León, D., et al. (2020). "Low-cost mandibular reconstruction workflow." Oral and Maxillofacial Surgery Cases **6**(2).

Introduction: The utility of CAD/CAM technology in the treatment of mandibular defects has been demonstrated, allowing effective analysis, diagnosis and treatment for bone defects, however the high cost and sometimes the difficult access to this technology limits its use. Materials and methods: observational descriptive cross-sectional study in which craniofacial bone defects were analyzed with emphasis at the mandibular level, with free 3D reconstruction software, determining characteristics of the population and bone defect. A management workflow is proposed and some cases analyzed are presented. Results: 50 patients with craniofacial bone defects were collected over a one year period. Mandibular defects account for 44% of the total sample, the majority of cases involving more than one mandibular area; the most affected areas were the body and parasymphysis; the average bone defect size was 36mmx56 mm × 15 mm. The proposed low cost workflow allows multidisciplinary work with industrial design teams to ensure the best treatment for the patient. Conclusions: It is possible to implement low-cost management of mandibular defects. The multidisciplinary work between reconstructive surgeons, industrial design and biomedical engineering is useful for the treatment of patients.

3872. Navarro Suay, R., et al. (2012). "Gunshot and improvised explosive casualties: a report from the Spanish Role 2 medical facility in Herat, Afghanistan." Military medicine **177**(3): 326-332.

OBJECTIVE: To provide an analysis of casualties treated during medical evacuation (MEDEVAC) or/and at the Spanish Role 2 in Herat, Afghanistan, including type of weapon, injuries, and effects of protective measures., METHOD: A retrospective analysis was carried out concerning patients who had suffered injuries from either gunshot or explosive devices treated during MEDEVAC or/and at this facility during the period 2005-2008., RESULTS: The total number of cases analyzed was 256. The majority of the casualties were produced by explosive devices (71%). The anatomical regions most affected were the lower limbs (48%). There was a higher New Injury Severity Score in casualties wounded by gunshot (14 +/- 1) than in those wounded by explosive devices (8.5 +/- 1.5) ($p < 0.001$). Surgical procedures for injuries caused by gunshots were 1.7 times more likely than for those due to explosive devices (95% confidence interval: 1.4 to 2.1). Protective devices were used only by 25% of casualties., CONCLUSIONS: The injury score indices of firearm casualties were higher than the explosive device casualties' injury score indices. The possible reasons for this finding are discussed.

3873. Navarro Suay, R., et al. (2015). "Perioperative pain treatment in combat casualty: Experience from the Spanish Military Hospital in Herat (Afghanistan)." Revista de la Sociedad Espanola del Dolor **22**(3): 112-115.

Analgesia has been considered always a vital role in the casualty medical assistant. This opinion is present in Irak and Afghanistan conflicts, too. Since 2005, Spanish military corps has been deployed in the Spanish Military Hospital in Herat (Afghanistan). In this medical facility 30.000 patients (some of them casualties) have been treated, kept an important experience in the treatment of this kind of politrauma. We show a medical report about a military, who is injured by an gunshot and explosive attack suffering traumatic brain injury, ocular lesion, abdominal and leg trauma. Perioperative painkiller treatment is described in this casualty.

3874. Navarro-Suay, R., et al. (2016). "Retrospective study about 211 combat casualties with traumatic brain injury by gunshot or improvised explosive devices treated in the spanish military hospital deployed in herat (afghanistan) from 2006 to 2014." Journal of neurosurgical anesthesiology **28**(2): S18.

Background: Over the last 10 years, conflicts in Afghanistan and Iraq have resulted in a high numbers of casualties, some of them with blunt or penetrating brain injuries. The aim of this study is to analyze casualties who suffered gunshots wounds (GSW) and explosive device injuries (IED) and were treated in the Spanish Military Hospital from 2006 to 2014. Methods: We carried out a retrospective study of patients seen from January 1, 2006 to December 31, 2014. The population chosen for the study was all patients who were wounded by gunshots or by explosive devices and who were treated at Spanish Military Hospital in Herat (Afghanistan). This study was approved by Spanish Medical Authorities, with NATO medical study policies. Results and Discussion: During the period studied, 738 combat casualties were treated at our medical facility (211 combat casualties with head and/or neck trauma). In total, 199 (94.3%) were male and 12 (5.7%) were female. A total of 89 (42.1%) were Afghan soldiers, 80 (37.9%) were NATO members, and 42 (20%) were civilian. In total, 185 (87.6%) were evacuated by helicopter to military hospital and the rest (26, 12.4%) were transferred by ground ambulance. The majority were wounded by explosive devices (74.4%), and the rest had GSW (25.6%). We did not see any casualties who were injured by both gunshots and explosives. In total, 32.2% of the casualties were 25 to 29 years old. The mortality of the casualties treated was 4.2% (N=9 to 7 by IED and 2 by GSW). In total, 52 (24.6%) casualties were evacuated to another military hospital. A total of 138 (65.4%) casualties needed a surgical procedure. A total of 108 (51.1%) casualties were admitted into the intensive care unit. Applying the NISS, 146 (69.3%) of casualties were categorized as minor injuries, 37 (17.5%) suffered mild injuries, and 28 (13.2%) suffered severe injuries (25% to 89.2% by improvised explosive device and 3% to 10.8% by gunshot). Conclusions: During the period studied, 211 combat casualties with head and/or neck trauma were treated in the Spanish Military Hospital deployed in Herat (Afghanistan). The majority (74.4%) were wounded by explosive devices and the rest by gunshot. In total, 69.3% were categorized by NISS like minor injuries, 13.2% like mild injuries, and 13.2% like severe injuries (89.2% of this grade by improvised explosive devices).

3875. Naveed, S., et al. (2019). "Weaponry pattern of homicidal deaths in district Peshawar." Journal of Medical Sciences (Peshawar) **27**(3): 194-197.

Objective: To determine the weaponry pattern due to homicidal deaths in tertiary case setup. Materials & Methods: The cross-sectional descriptive study was held in Forensic Medicine Department, Khyber Medical College, Peshawar from Jan 2016 - June 2016. Out of total 537 autopsies in this department, 377 samples of homicidal deaths were taken and studied in detail. A pre-designed questionnaire with demographic details was used as research tool. SPPS v 25.0 was used as analytical tool, categorical variables were presented/tabulated in the form of frequency and percentages while numerical variables were presented in the form mean ± S.D. Results: Out of 377 autopsies, in 86.7% cases cause of death was due to firearm injury followed by sharp cutting object 6.1%, bomb blast and ligature related deaths were 3.2% and blunt trauma had only 0.8% cases. The male to female preponderance of homicidal cases is not unique one with male more dominant with 87.5% and only 12.5% female cases. The cause of death in these cases shows that maximum died due to injury to brain with 38.5% followed by Heart/Lung injury 93 (24.7%) and then injuries to other organs. Conclusion: This study concludes that homicide was the most common manner of death in Peshawar. Out of the total unnatural deaths, firearms were used in the maximum number of cases.

3876. Nawaz, K., et al. (2017). "Case report acute necrotizing pancreatitis following percutaneous transhepatic biliary drainage in post Liver transplant patient: A rare and serious complication." Hepatology International **11**(1): S599-S600.

Background: The percutaneous transhepatic approach to the biliary tree plays an important role in the management of biliary obstruction. ERCP is preferred over percutaneous transhepatic cholangiography (PTC) in patients with hilar biliary obstruction as it is less invasive. Studies indicate that percutaneous drainage or stent insertion carries a small risk of severe bleeding (0.5-4.1%), bile leak (0.5-1.6%) and subsequent sepsis (0.5-1.9%) with an overall rate of complications of 3-10% and procedure related mortality of 0.1-0.8%. These risks are comparable to those of the endoscopic approach, which has a complication rate of 3.6-14% and a mortality rate of 0.5%2. Pancreatitis is a rare but recognized complication of PTBD and necrotizing pancreatitis is even rarer and may preferably be explained in routine as a possible complication of the procedure while taking consent. Methods: Case History: 55 year old male status post LDLT was admitted for PTBD and CBD stent placement for anastomotic stricture six months ago. The patient underwent PTBI and ballooning the stricture without any intra-procedural complications. Next day patient had complaints of abdominal pain, radiating to back and vomiting. O/E abdomen was tender. Diagnosis of acute pancreatitis was made. CT showed peri-pancreatic inflammatory changes with necrosis along with peri-pancreatic fluid collection. The patient was kept npo and managed with i/v fluids, analgesia and antibiotics. A drain was placed for peri-pancreatic fluid collection & Fluid amylase was checked which was>20,000 IU. Fluid was large in amount>1000 ml per day and there was suspicion of pancreatic fistula. ERCP confirmed it for which pancreatic stent was placed. Drain output decreased gradually. Initially it was 1000 ml per day to <50 ml per day in 6-7 days. Improvements were followed by the normalization of transaminases. He was discharged and follow up visit patient was unremarkable and Abdominal drain was removed. Result: Necrotizing pancreatitis is a very rare complication of PTBI for anastomotic stricture in liver transplant recipients, ion. Endoscopic retrograde route is preferred over PTBD in patients with hilar obstruction. My patient developed the rare complication of necrotizing pancreatitis. Similar pattern has been observed before by Al- Bahrani AZ et al. who reported cases of pancreatitis as a complication percutaneous transhepatic intervention (PTBI) and documented five patients with pancreatitis following PTBI7. Another observation was a risk of pancreatitis comparable to ERCP. This risk was greater with distal biliary intervention than with proximal. Similarly in our patient. Conclusion: Although pancreatitis is being reported with PTBI but necrotizing pancreatitis is not a usual occurrence as known by literature till date. So it is important to keep this complication in consideration while taking consent for PTBI. (Figure presented).

3877. Nayak, G. H. and P. Muthamizh Selvan (2017). "Pattern of craniocerebral injuries among homicidal deaths in Hubballi Dharwad region - One year retrospective study." Medico-Legal Update **17**(2): 56-59.

Inflicting injury to the head is one of the most effective methods of homicide. The aim of the present study was to evaluate the pattern of head injury among homicidal death victims. In present study, out of 45 homicidal deaths, 23 cases of homicide infliction over the head were studied in one year period from 1st January 2015 till 31st December 2015. Majority of cases were in 21-40 years of age comprising of 12 cases (52.17%). Injuries were inflicted by blunt weapons in significant number of cases; 13 cases (56.5%) which were followed by injuries by sharp weapons in 9 cases (39.1%) and firearm in 1 case (04.34%). The skull was fractured in 21 cases (91.30%) of victims and 2 cases (08.69%) of deceased presented without skull fracture. Most common intracranial hemorrhage observed was combination of subdural hemorrhage and subarachnoid hemorrhage(73.91%).

3878. Naylor, K. L., et al. (2016). "Fracture Incidence in Adult Kidney Transplant Recipients." Transplantation **100**(1): 167-175.

BACKGROUND: It remains uncertain whether kidney transplant recipients are a high-risk group for fracture., METHODS: We conducted a cohort study using Ontario, Canada health care databases to estimate the 3-, 5- and 10-year cumulative incidence of nonvertebral fracture (proximal humerus, forearm, hip) in adult kidney transplant recipients between 1994 and 2009, stratifying by sex and age (<50 versus >=50 years) at transplant. We also assessed the 3-year cumulative incidence of all fracture locations (excluding skull, toes, and fingers) and falls, 10-year cumulative incidence of hip fracture alone, and nonvertebral fracture incidence in recipients compared to nontransplant reference groups matched on age, sex, and cohort entry year. We studied 4821 recipients (median age, 50 years)., RESULTS: Among the age and sex strata, female recipients aged 50 years or older had the highest 3-year cumulative incidence of nonvertebral fracture (3.1%; 95% confidence interval [95% CI], 2.1-4.4%). Recipients had a higher 3-year cumulative incidence of nonvertebral fracture (1.6%; 95% CI, 1.3-2.0%) compared to the general population with no previous nonvertebral fracture (0.5%; 95% CI, 0.4-0.6%; P < 0.0001) and nondialysis chronic kidney disease (1.1%; 95% CI, 0.9-1.2%; P = 0.03), but a lower fracture incidence than the general population with a previous nonvertebral fracture (2.3%; 95% CI, 1.9-2.8%; P = 0.007). The 10-year cumulative incidence of hip fracture in all recipients was 1.7% (>=3% defined as high risk in

clinical guidelines)., CONCLUSIONS: Kidney transplant recipients may have a lower fracture risk than previously suggested in the literature. Results inform our understanding of fracture incidence after kidney transplantation and how it compares to nontransplant populations.

3879. Nazarali, S., et al. (2017). "A rare case of perfluoro-n-octane in the orbit following vitreoretinal surgery." Canadian journal of ophthalmology. Journal canadien d'ophtalmologie **52**(3): e113-e115.

3880. Ndhlovu, L. C., et al. (2017). "CSF S100B and CX3CR1 monocytes in acute HIV infection predict putamen atrophy." Topics in Antiviral Medicine **25**(1): 155s.

Background: We previously reported decreases in brain regional gray matter (GM) volumes over 24 months in individuals who initiated combination antiretroviral therapy (cART) during acute HIV infection (AHI). Here we examined relationships of caudate, putamen, pallidum and total subcortical GM volumetric reductions to peripheral immune activation/inflammation (sCD163, sCD14, IL-6, TNF-α, MCP-1) and neuronal (S100B and neurofilament light protein) markers and to monocyte phenotypes implicated in HIV neuropathogenesis. Methods: We prospectively enrolled individuals with AHI (Fiebig stages I-IV) who underwent brain magnetic resonance imaging (MRI) at 1.5T and then immediately initiated cART. MRI was repeated at 24 months. Biomarkers in cerebrospinal fluid (CSF) were assayed by ELISA or Luminex. Peripheral blood mononuclear cells were assayed by flow cytometry to measure monocyte frequencies based on CD14, CD16, CCR5, CCR2 and CX3CR1 expression. Nonparametric statistics were used. Results: Biomarkers and monocyte frequency data at baseline prior to cART and at 24 months were obtained for 15 participants [14 male; baseline median (range) age=28.0 (19-45) years; exposure time=15 (8-28) days; CD4 count=339 (132-740) cells/mm3; plasma HIV RNA=5.53 (2.78-7.56) log10 copies/mL]. Regional volumes at both timepoints were available for 13 individuals. S100B increased from 966 (540-1493) pg/mL at baseline to 1024 (649-1590) pg/mL at 24 months post-ART initiation (p=0.009). At baseline, higher S100B correlated with higher frequencies (%) of non-classical (patrolling/inflammatory) monocytes (ρ=0.56, p=0.029), and on a per cell basis for non-classical monocytes expressing CX3CR1, a receptor that facilitates monocyte migration and survival (ρ=0.64, p=0.010). % decrease in putamen volume from baseline to 24 months post-cART correlated positively with baseline S100B (ρ=0.58, p=0.002) and with baseline % CX3CR1+ monocytes (ρ=0.76, p=0.004). Conclusion: S100B, serves as a marker of brain damage and AHI participants exhibited an increase in CSF S100B over 24 months despite immediate initiation of cART. CSF S100B in AHI may predict atrophy of the putamen, a region which has been suggested to be preferentially susceptible to early HIV-related damage (Wright et al, 2016). CX3CR1 monocytes may penetrate the brain and be involved in neuronal-microglial interactions that contribute to brain volumetric changes ultimately reflected by elevated CSF S100B. (Figure Presented).

3881. Ndung'u, A., et al. (2019). "Patterns and outcomes of paediatric trauma at a tertiary teaching hospital in Kenya." African Journal of Emergency Medicine **9**: S47-S51.

Introduction: Trauma continues to be a major cause of morbidity and mortality especially in the paediatric population of low- and middle-income countries such as Kenya. The aim of this study was to establish the profile and outcomes of admitted paediatric trauma cases at the Aga Khan University Hospital, Nairobi. Methods: This retrospective, descriptive study involved a 12-month chart review (January 2016–December 2016). A total of 218 records were identified of which 144 were reviewed. Results: Most injuries were amongst boys (65.3%) and the very young (mean age 6), occurred in private residences (42.4% homes, 25.7% residential institutions), were typically caused by falls (56.3%) or penetrating trauma (13.2%), mostly resulted in extremity fractures (45.8% closed, 4.9% open) and burn or head injuries (in infants and small children), and got very little or no pre-hospital care (51.4% no care). Additionally, children with burns, brain injuries, or poly-trauma had the longest hospital stays and highest rates of mortality. A more detailed description of the patterns and outcomes seen are included in the study. Discussion: Paediatric injuries remain a major public health problem and contribute a substantial proportion of all paediatric surgical admissions at the Aga Khan University Hospital in Nairobi. Based on the patterns and outcomes seen in this study, we therefore recommend for Nairobi (and possibly Kenya) to establish greater supervision and safety measures for children; targeting safety interventions at all children but particularly at boys, the very young, at home and in residential buildings; building pre-hospital emergency care that can accommodate children; and equipping paediatric trauma hospitals to especially handle bony fractures, burns, head injuries, and poly-traumas. A bespoke trauma registry would benefit the hospital, and likely the country as a whole.

3882. Neal, C. J., et al. (2007). "Effect of penetrating brain injury on aquaporin-4 expression using a rat model." Journal of neurotrauma **24**(10): 1609-1617.

Cerebral edema (CE) is a frequent and potentially lethal consequence of various neurotraumas, including penetrating brain injury (PBI). Aquaporin-4 (AQP4) water channel is predominantly expressed by astrocytes and plays an important role in regulating water balance in the normal and injured brain. Using a rat model of PBI, we show that AQP4 immunoreactivity was substantially increased in the peri-injury area at both 24 and 72 h after PBI. The increase in AQP4 expression was paralleled by increased GFAP expression. The two proteins were co-expressed by peri-vascular astrocytes, whereas reactive astroglia identified by their stellar morphology did not express AQP4 at either time points after injury. Western analysis confirmed the increase in AQP4 immunoreactivity observed in the injured tissue. The apparent increase in AQP4 immunoreactivity was likely due to de novo AQP4 protein synthesis, as most of the increased AQP4 immunoreactivity was found in the soluble (cytosolic) fraction. Our results demonstrate dynamic spatial and temporal changes in AQP4 expression that contribute to the molecular pathophysiology of PBI.

3883. Neal, G. and E. F. Downing (1996). "Clostridial meningitis as a result of craniocerebral arrow injury." The Journal of trauma **40**(3): 476-480.

We report a case of a 6-year-old girl who presented with an arrow lodged in the temporal lobe and carotid sinus. Her postoperative recovery was complicated by a rare penicillin-resistant clostridial meningitis. A review of the literature reveals no other cases of this nature in the pediatric population.

3884. Neal, M. D., et al. (2011). "Over reliance on computed tomography imaging in patients with severe abdominal injury: is the delay worth the risk?" The Journal of trauma **70**(2): 278-284.

BACKGROUND: Computed tomography (CT) has a high sensitivity and specificity for detecting abdominal injuries. Expeditious abdominal imaging in "quasi-stable" patients may prevent negative laparotomy. However, the significance of potential delay to laparotomy secondary to abdominal imaging remains unknown. We sought to analyze whether the use of abdominal CT (ABD CT) in patients with abdominal injury requiring laparotomy results in a significant delay and a higher risk of poor outcome., METHODS: A retrospective analysis of data from the National Trauma Data Bank (version 7.1) was performed. Inclusion criteria were adult patients (age>14 years), a scene admission (nontransfer), hypotension on arrival (emergency department systolic blood pressure<90 mm Hg), an abdominal Abbreviated Injury Scale (AIS) score>3, and undergoing a laparotomy within 90 minutes of arrival. Patients with severe brain injury (head AIS score>3) were excluded. The independent mortality risk associated with a preoperative ABD CT was determined using logistic regression after controlling important confounders., RESULTS: This cohort of patients (n=3,218) was significantly injured with a median Injury Severity Score of 25 ([interquartile range, 16-34]). Patients who underwent ABD CT had similar Glasgow Coma Scale scores, a lower head AIS, longer time delays to the operating room, and a higher crude mortality (45% vs. 30%; p=0.001). Logistic regression revealed that ABD CT was independently associated with more than a 70% higher risk of mortality (odds ratios, 1.71; 95% CI, 1.2-2.2; p<0.001). When stratified by injury mechanism, intubation status and whether or not a head CT was performed, the mortality risk remained significantly increased for each subgroup. When the laparotomy was able to occur within 30 minutes of arrival, an ABD CT was independently associated with more than a sevenfold higher risk of mortality (odds ratios, 7.6; p=0.038)., CONCLUSION: Delay secondary to abdominal imaging in patients who require operative intervention results in an independent higher risk of mortality. ABD CT imaging is an important and useful tool after injury; however, these results suggest that delay caused by overreliance on ABD CT may result in poor outcome in specific patients. Clinicians who take care of critically injured patients should be aware of and understand these potential risks.

3885. Nedugov, G. V. (2011). "[Morphometric diagnostics of the age of encapsulated subdural hematomas]." Sudebno-meditsinskaia ekspertiza **54**(3): 19-22.

The present morphometric investigation was carried out using dura matter preparations, capsules, and contents of 94 encapsulated subdural hematomas obtained from the corpses of subjects with a non-penetrating craniocerebral injury and the duration of the post-traumatic period ranging from 8 days to 2.5 years. The correlation analysis confirmed the necessity of differentiation between resorbed and unresorbed encapsulated subdural hematomas. The data

obtained were used to construct 5 regression models for the estimation of the age of unresorbed encapsulated subdural hematomas and 1 regression model for the identification of the age of resorbed encapsulated subdural hematomas. The regression models included different combinations of three morphometric characteristics of the hematoma capsule as the independent variables, viz. maximum thickness, relative extent of hemosiderosis, and relative amount of macrophages in the cellular infiltrate. The amount of variability in the age of encapsulated subdural hematomas accounted for by the regression models is 62%. It is concluded that the results of the study can be used in the practical work of forensic medical experts.

3886. Nedugov, G. V. (2011). "[Qualitative histological diagnostics of the remoteness of traumatic subdural hematomas]." Sudebno-meditsinskaia ekspertiza **54**(2): 19-22.

The present histological study was based on the examination of dura mater, capsules, and contents of 200 subdural hematomas (SDH) obtained from the corpses of subjects with a non-penetrating craniocerebral injury within a period from 1 hour to 2.5 years after the trauma. A total of 14 well-reproducible qualitative morphological criteria have been identified for diagnostics of the prescription of subdural hematomas; the probability and the exact earliest and latest times of their manifestation at different dates of the posttraumatic period were calculated. Sensitivity, specificity, and prognostic value of the proposed qualitative morphological criteria for the prescription of traumatic subdural hematomas were evaluated. The results of the study can be used in the practical work of forensic medical experts.

3887. Nee, R., et al. (2012). "A near fatal miss in a penetrating neck injury." Irish journal of medical science **181**: S38-S39.

A 25 year old male presented to the Emergency Department with a stab wound to the right mandible. Bleeding was managed by pressure applied to the area. Patient was awake but confused. Patient was intubated to allow proper examination of the wound. On intubation a small amount of blood was noted and the tongue was bitten. There was a 3 cm wound to the depth of the mandibular bone. ENT examination inside the mouth did not reveal any abnormalities. The next morning he was extubated. Approximately 15 min later the patient began perfusley bleeding. He was taken to theatre and intubated. Post induction he had a PEA arrest. CPR was commensed, adrenaline was given, cardiac output was restored. He was stablised and blood products commensed. ENT assessment found that bleeding had stopped and a small penetrating injury to the left palate/pharynx was noted and sutured. The patient recovered well. Pentrating neck injuries offer particular challenges. Due to the presence of many vital structures in a small area the risk of fatal injury is high. It also poses problems for anaesthesia as there is risk of airway compromise. This case raises many important points such a the importance of extubating these patients when senior staff are present, the imporatnce of thorough examination and imagining in neck penetrating injuries and the need for rapid action and resuscition.

3888. Neff, L. L., et al. (2008). "Transoral endoscopic removal of a bullet from the infratemporal fossa." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **138**(1): 113-114.

3889. Nehme, A. E. (1980). "Intracranial bullet migrating to pulmonary artery." The Journal of trauma **20**(4): 344-346.

A young male patient with a gunshot wound to the head is presented. The .22-caliber bullet initially lodged in the superior sagittal sinus migrated to the chest and permanently embolized in a branch of the left pulmonary artery. The patient is asymptomatic except for focal epilepsy.

3890. Neidlinger, N. A., et al. (2004). "Cardiac thromboemboli complicating a stab wound to the heart." Cardiovascular pathology : the official journal of the Society for Cardiovascular Pathology **13**(1): 56-58.

A 27-year-old man was noted to have neurologic deficit 4 days following cardiorrhaphy to repair a penetrating cardiac injury. Cerebral computed tomography scan showed multiple embolic infarcts and two-dimensional echocardiography revealed the source as thrombus in the left ventricle. Although this entity has been described following blunt chest trauma and cardiac contusion, it has not been noted in association with penetrating injury. Intracardiac thrombus with systemic emboli should be considered as a possible complication following cardiorrhaphy for penetrating trauma.

3891. Nejad, Y. J. (1992). "Cerebrospinal fluid--a reliable guide to dural puncture?" Anaesthesia **47**(11): 1007.

3892. Nelson, T. J., et al. (2006). "Predictors of mortality in close proximity blast injuries during Operation Iraqi Freedom." Journal of the American College of Surgeons **202**(3): 418-422.

BACKGROUND: Blast injury is an increasingly common problem faced by military surgeons in the field. Because of urban terrorism worldwide, blast injury is becoming more common in the civilian sector as well. Blast injuries are often devastating and can overwhelm medical resources. We sought to determine whether simple factors easily obtained from the clinical history and primary survey could be used to triage patients more effectively., STUDY DESIGN: A retrospective review of 18 consecutive close-proximity blast injury patients presenting to a forward deployed surgical unit in Iraq was performed. Patients' injuries and outcomes were recorded. We compared the presence of sustained hypotension, penetrating head injury, multiple (three or more) long-bone fractures, and associated fatalities (whether another patient involved in the same explosion died) between nonsurvivors and survivors using Fisher's exact test., RESULTS: All patients who presented alive but exhibited sustained hypotension (n = 5) died, versus 0% who did not exhibit sustained hypotension (n = 9, p < 0.01). There was no marked increase in mortality with presence of multiple long-bone fractures, penetrating head injury, or associated fatalities individually. Having two or more of these factors was associated with a mortality of 86% (6 of 7) versus 20% (2 of 10, p = 0.015) in those who had less than two factors., CONCLUSIONS: Blast injury can overwhelm military and civilian trauma systems alike. Sustained hypotension and presence of two or more easily determined factors, including three or more long-bone fractures, penetrating head injury, and associated fatalities, are associated with increased mortality and can potentially help triage patients and allocate scarce resources more efficiently.

3893. Nemec, P., et al. (2010). "Successful re-use of the transplanted heart." The Annals of thoracic surgery **90**(4): 1337-1338.

The case of re-use of a previously transplanted heart after brain death of the first recipient is reported. The second recipient was a 60-year-old man who suffered end-stage ischemic heart disease. The operative and postoperative course was uneventful, with the exception of secondary diabetes. The patient is post-transplantation by more than 10 months and is now in New York Heart Association functional class I. This case confirms the possibility of using this procedure, particularly in the situation when there is a shortage of organ donors.

3894. Nemkova, S. A., et al. (2002). "[New possibilities of the use of space technologies in the treatment of children with injuries of the central nervous system]." Novye vozmozhnosti ispol'zovaniia kosmichskikh tekhnologii v lechenii detei s travmaticheskimi porazheniiami tsentral'noi nervnoi sistemy. **36**(3): 55-58.

The computerized stabilography was used to study the role of the visual analyzer (VA) in vertical posture acquisition and specifics of posture implementation by patients with craniocerebral injury (CCI) wearing suit Adele for dynamic proprioception correction (SDPC). Results of the investigation revealed a decreased vertical stability (VS) of CCI patients and a greater reliance on VA, which may be a compensatory instrument. Following the SDPC course, vertical stability was improved and the VA role in posture acquisition normalized suggesting alteration of the interanalyzer interaction in CCI patients owing to the treatment of proprioception impulsation.

3895. Nemzek, W. R., et al. (1996). "Prediction of major vascular injury in patients with gunshot wounds to the neck." AJNR. American journal of neuroradiology **17**(1): 161-167.

PURPOSE: To determine whether plain film and CT findings help predict the presence and severity of vascular trauma., METHODS: The records of 65 patients with gunshot wounds of the neck were reviewed. There were 58 men and 7 women ranging in age from 2 to 72 years. All had angiography of the cervical vessels; in addition, 64 had plain radiography, 22 had CT, and 14 had a barium swallow. The results of plain films, barium swallow, and CT scans were correlated., RESULTS: Eighteen patients (28%) had major vascular injury, which included 10 pseudoaneurysms, six vascular occlusions, four intimal injuries, and one arteriovenous fistula. Ten patients had prevertebral soft-tissue

swelling (sensitivity, 59%; specificity, 77%), 14 had a bullet fragment close to a vessel (sensitivity, 78%; specificity, 36%), and 13 had missile fragmentation (sensitivity, 72%; specificity, 45%)., CONCLUSION: Prevertebral soft-tissue swelling, missile fragmentation, and missiles adjacent to major vessels are useful but nonspecific radiographic signs and are present in many patients with normal angiographic findings. A knowledge of the physical findings, including the entry and exit wounds, plus the results of plain radiography and CT can help define bullet trajectories and guide angiographic evaluation.

3896. Nerobeev, A. I., et al. (1997). "[A clinical x-ray analysis of the results of using titanium mandibular endoprostheses]." Kliniko-rentgenologicheskii analiz rezul'tatov ispol'zovaniia titanovykh endoprotezov nizhnei cheliusti. **76**(4): 40-42.

Late results of repair surgery are analyzed in 40 patients with segmented mandibular defects of different origin. Titanium constructions were used for repair of defects in 21 patients and in 19 others combined endoprostheses were used, consisting of the crest of the patient's iliac bone and a titanium carcass. Check-ups 1.5-2 years after repair showed a higher reliability of combined endoprostheses.

3897. Nesbitt, K. M., et al. (2013). "Pharmacological mitigation of tissue damage during brain microdialysis." Analytical chemistry **85**(17): 8173-8179.

Microdialysis sampling in the brain is employed frequently in the chemical analysis of neurological function and disease, but implanting the probes, which are substantially larger than the size and spacing of brain cells and blood vessels, is injurious and triggers ischemia, gliosis, and cell death at the sampling site. The nature of the interface between the brain and the microdialysis probe is critical to the use of microdialysis as a neurochemical analysis technique. The objective of the work reported here was to investigate the potential of two compounds, dexamethasone, a glucocorticoid anti-inflammatory agent, and XJB-5-131, a mitochondrially targeted reactive oxygen species scavenger, to mitigate the penetration injury. Measurements were performed in the rat brain striatum, which is densely innervated by axons that release dopamine, an electroactive neurotransmitter. We used voltammetry to measure electrically evoked dopamine release next to microdialysis probes during the retrodialysis of dexamethasone or XJB-5-131. After the in vivo measurements, the brain tissue containing the microdialysis probe tracks was examined by fluorescence microscopy using markers for ischemia, neuronal nuclei, macrophages, and dopamine axons and terminals. Dexamethasone and XJB-5-131 each diminished the loss of evoked dopamine activity, diminished ischemia, diminished the loss of neuronal nuclei, diminished the appearance of extravasated macrophages, and diminished the loss of dopamine axons and terminals next to the probes. Our findings confirm the ability of dexamethasone and XJB-5-131 to mitigate, but not eliminate, the effects of the penetration injury caused by implanting microdialysis probes into brain tissue.

3898. Neto, A. S., et al. (2020). "Moral distress in pediatric neurosurgery: Discussing the withdrawal of a shunt in the context of severe traumatic brain injury." Child's Nervous System **36**: 2130.

Introduction: The decision to operate or not a child with a severe neurological disease can generate moral distress in pediatric neurosurgery routines. One of the most frequent situations is shunting or not a seriously compromised young patient. Methods: Case report: An 11 years-old girl was admitted to the hospital with a history of traumatic brain injury by a gunshot over the right parietal bone. Initial Glasgow coma Scale(GCS) was 6, with orotraqueal ventilation, StO2 of 98%and blood pressure of 150x80mmHg. Both pupils react to the light.A Computed tomography of skull revealed the trajectory of the bullet crossing themidline at the level of splenius of corpus callosum. There was evidence of moderate brain swelling and the patient was moved to operate room for treatment of entry site injury, with cleaning of trashes, craniectomy and local duroplasty. Results: The patient remained 03 months in intensive care unit(ICU) where after withdrawal of sedative drugs mainteined GCS of 4. Serials CT scans showed progressive dilation of ventricular system and bulging of craniectomy site. The multi-professional team of ICU brought up questions concerning about the patient age, media pressure(involviment with drug traffiking) and neurological prognosis. Initially an External ventricular derivation(EVD) was inserted with no changes at GCS score. After an opportunity of clear communication with the parents the team decided for remove the EVD. The patient died after 04 days. Conclusion: In cases with ethical dillema the choice of the best therapeutic option can raise a moral suffering for the health practitioners. Avoid put a shunt in a young patient with poor neurological prognosis is a difficult decision . Paliattive care education, multi-

professional discussion and better communicattion process are helpful to overcome those problems and facilitate the decision-making process.

3899. Neto, T., et al. (2013). "A 10-year (2002-2011) retrospective review of 1786 patients and 2212 maxillofacial fractures treated surgically at Coimbra University Hospital, Portugal." International journal of oral and maxillofacial surgery **42**(10): 1230.

The aim of the present study was to analyse the patterns and treatment modalities of maxillofacial fractures treated surgically during the last decade at the Department of Maxillofacial Surgery of University Hospital Center of Coimbra, Portugal. The medical records of 1786 patients, and 2212 maxillofacial fractures treated surgically between 1 January 2002 and 31 December 2011 were analysed retrospectively. Age, sex, type of fracture, association of fractures and methods of treatment were studied. From the 2212 fractures operated in the last 10 years, 77.55% were in male patients, predominantly in young adults, between 19 and 30 years. Pediatric fractures accounted for 12% of cases. The most common fractures were jaw (35%), malar (22%), nasal (21%), LeFort (7%), zygomatic arch (5%) and orbital floor (5%). Submental intubation was used in 1.51% and tracheostomy in 0.83% of patients. The challenging ballistic trauma facial fractures corresponded to 1.06% of cases. Open surgery with internal stable fixation was indicated for most of the patients. There was a progressive decrease in maxillofacial fracture cases in the last decade. This large 10 years review study could improve our understanding of the pattern and treatment of maxillofacial fractures in Portugal. Maxillofacial, facial, fracture, trauma, retrospective.

3900. Neubauer, D. C., et al. (2022). "The new face of war: Craniofacial injuries from Operation Inherent Resolve." The journal of trauma and acute care surgery **93**(2S Suppl 1): S49-S55.

BACKGROUND: During the last 20 years of conflict in the Middle East, improvements in body armor and the use of improvised explosive devices have resulted in an increased incidence of complex craniofacial trauma (CFT). Currently, CFT comprises up to 40% of all casualties. We present new data from the recent conflict in Iraq and Syria during Operation Inherent Resolve., METHODS: Data were collected for patients treated at role 1, role 2, and role 3 facilities in Iraq and Syria over a 1-year period. During this time, a specialized head & neck surgical augmentation team was deployed and colocated with the central role 3 facility. Data included for this cross-sectional study are as follows: injury type and mechanism, triage category, initial managing facility and subsequent levels of care, and procedures performed., RESULTS: Ninety-six patients sustained CFT over the study period. The most common injuries were soft tissue (57%), followed by cranial (44%) and orbital/facial (31%). Associated truncal and/or extremity injuries were seen in 46 patients (48%). There were marked differences in incidence and pattern of injuries between mechanisms (all $p < 0.05$). While improvised explosive devices had the highest rate of cranial and truncal injuries, gunshot wounds and blunt mechanisms had higher incidences of orbital/facial and neck injuries. Overall, 45% required operative interventions including complex facial reconstruction, craniotomy, and open globe repair. Mortality was 6% with 83% due to associated severe brain injury. Most patients were local nationals (70%) who required discharge or transfer to the local health care system., CONCLUSION: Complex craniofacial trauma is increasingly seen by deployed surgeons, regardless of subspecialty training or location. Deployment of a centrally located head and neck team greatly enhances the capabilities for forward deployed management of CFT, with excellent outcomes for both US and local national patients., LEVEL OF EVIDENCE: Therapeutic/care management; Level V.

3901. Neubauer, D. C., et al. (2021). "Craniofacial Trauma on the Modern Battlefield: Initial Management and Techniques." Current Trauma Reports **7**(2): 44-51.

Purpose of Review: This review focuses on the literature from the recent conflicts in Iraq/Syria and Afghanistan as well as techniques for addressing combat related craniofacial trauma. This review also includes practical lessons, techniques, tips, and “pearls” from several military experts with operational deployment experience. Recent Findings: Craniofacial trauma is increasing in incidence in modern conflicts due to improved body armor and the use of IEDs. The most common injuries are soft tissue defects, midface fractures, and mandible fractures. Recent data from Operation Inherent Resolve shows that these injuries are increasing in their complexity with many patients having injury to

multiple sites on the head and neck. Many of these injuries can be safely and effectively addressed in theater through debridement, immediate reduction and repair of the fractures, and closure of the soft tissue. Summary: Craniofacial injuries are an increasing proportion of the surgical care provided by deployed surgeons and all military surgeons should be familiar with their basic management.

3902. Neubaure, H., et al. (1975). "Intra-orbital foreign bodies." Modern problems in ophthalmology **14**: 482-488.

3903. Neupert, E. A., 3rd and S. B. Boyd (1991). "Retrospective analysis of low-velocity gunshot wounds to the mandible." Oral surgery, oral medicine, and oral pathology **72**(4): 383-387.

A retrospective study was conducted of 32 patients with mandibular fractures resulting from low-velocity gunshot injuries. Airway management was required in 25% of the patients, and 9% sustained major vessel injury. Patients were divided into two groups, depending on site of mandibular fracture: condyle, ramus, and coronoid (n = 10), and angle, body, and symphysis (n = 22). All patients in the condyle, ramus, coronoid group achieved clinical union without infection. Average postinjury maximal mandibular opening was restricted (28 mm), but the average follow-up period was relatively short (2 months). In the angle, body, symphysis group the infection rate was 27%, and in 18% of patients a continuity defect of the mandible developed. The average length of follow-up in this group was 5.4 months with a mean maximal mandibular opening of 36 mm.

3904. Nevin, R. L. (2012). "Hallucinations and persecutory delusions in mefloquine-associated suicide." The American journal of forensic medicine and pathology **33**(2): e8.

3905. Newcombe, F., et al. (1987). "Dissociable visual and spatial impairments following right posterior cerebral lesions: clinical, neuropsychological and anatomical evidence." Neuropsychologia **25**(1B): 149-161.

A double dissociation of visual and spatial performance is reported in two men with chronic focal missile injuries of the right cerebral hemisphere. The clinical, neuropsychological and post-mortem anatomical data are considered in relation to evidence from physiological research of two major cortico-cortical pathways for object-recognition and spatial perception.

3906. Newell, D. W. (1995). "Transcranial Doppler measurements." New horizons (Baltimore, Md.) **3**(3): 423-430.

Transcranial Doppler ultrasonography (TCD) has served a useful purpose in further defining the pathophysiology of disordered cerebrovascular control after head injury. The evaluation of altered cerebrovascular responses in individual patients may be useful in their clinical management. TCD can be a clinically useful tool in the early diagnosis of a variety of complications that can occur in head-injured patients, such as vasospasm, markedly increased intracranial pressure (ICP), low cerebral perfusion pressure, carotid dissection, and disordered cerebral autoregulation. Although the TCD waveforms alone can alert clinicians to the presence of markedly increased intracranial pressure, these waveforms are not specific for predicting moderate ICP increases. Experienced interpreters can identify TCD waveforms that indicate the arrest of the cerebral circulation. Cerebral circulatory arrest can be a useful confirmatory finding in the diagnosis of brain death in questionable cases, and also can be used to shorten the observation period in those patients in whom organ donation is contemplated or discontinuation of ventilatory support and nursing care may be indicated.

3907. Newell, S. W. (1990). "Double penetrating nail injury to the eye: a case report." The Journal of the Oklahoma State Medical Association **83**(3): 119-121.

We report an unusual double penetrating eye injury in which a 26 mm carpenter's nail pierced the eye. The nail penetrated the sclera equatorially and pierced the retina posteriorly just above the superior temporal retinal vascular arcade. Six hours following the injury the nail was removed from the eye, trans-scleral cryotherapy was applied to the entry site, and an episcleral silicone band was used to create an encircling buckle. Visual acuity at 2 months and most recently at 33 months following the injury was 20/30. This case demonstrates that selected double penetrating injuries

of the posterior segment may be successfully managed with conventional scleral buckling techniques and underscores the importance of protective eye wear for hobby work or leisure activities.

3908. Newman, T. L. and P. A. Russo (1998). "Ocular sequelae of BB injuries to the eye and surrounding adnexa." Journal of the American Optometric Association **69**(9): 583-590.

BACKGROUND: BB injuries continue to be one of the most common causes of severe ocular injury among adolescent males. Extraocular and nonperforating anterior globe injuries most commonly result in favorable visual outcomes. The appropriate medical management of both perforating and nonperforating anterior globe injuries resulting from BB trauma and their potential ocular sequelae are reviewed., CASE REPORTS: Three cases illustrating typical as well as atypical anterior globe injuries caused by BBs are presented. Two cases involve nonperforating anterior globe injuries--one with intracranial and one with intraorbital involvement. The third involves a retained intraocular foreign body. The biomicroscopic and ophthalmoscopic features of these injuries are discussed, as are potential complications and management strategies associated with these types of trauma., CONCLUSIONS: Injuries associated with intraocular BBs often result in enucleation if functional vision is not salvageable. Sequelae to such injuries include endophthalmitis, traumatic hyphema, ocular siderosis, and sympathetic ophthalmia. Plain-film radiography and axial computed tomography are critical first steps in determination of the position of any intracranial or intraorbital metallic foreign body. Routine observation for the development of ocular sequelae resulting from retained intraocular, intracranial, and intraorbital BB injuries is recommended.

3909. Ng, J. D., et al. (2004). "Orbital trauma caused by bicycle hand brakes." Ophthalmic plastic and reconstructive surgery **20**(1): 60-63.

PURPOSE: This report aims to increase awareness of an unusual mechanism of orbital injury sustained by bicycle riders., METHODS: In this retrospective small case series, we describe two cases of orbital injury caused by upper eyelid penetration. A 5-year-old boy (patient 1) and a 6-year-old boy (patient 2) presented to our service within a 2-week period. Both had been injured by similarly styled, handlebar-mounted bicycle hand brake levers. Patient 1 had an orbital roof fracture and penetrating brain injury and underwent repair of a left upper eyelid laceration, craniotomy for pseudoencephalocele, and ptosis repair. Patient 2 had orbital hemorrhage and underwent repair of left upper eyelid laceration., RESULTS: In both cases, a handlebar-mounted bicycle hand brake lever perforated the left eyelid when the rider fell onto it. Neither patient was wearing protective headwear or eyewear. Two months after surgery, patient 1 had 20/25 visual acuity OU and excellent cosmetic appearance. Patient 2 had baseline amblyopic vision 2 days after surgery but moved from town and was lost to follow-up., CONCLUSIONS: Orbit injuries from bicycle brake levers are rare, and helmets or protective eyewear probably would not have prevented these injuries. However, a change in the design and/or mounting location of handlebar-mounted brake levers might help prevent further injuries of this type.

3910. Nga, V. D. W., et al. (2015). "Effects of polycaprolactone-based scaffolds on the blood-brain barrier and cerebral inflammation." Tissue engineering. Part A **21**(3-4): 647-653.

Severe pathoanatomical and mechanical injuries compromise patient recovery and survival following penetrating brain injury (PBI). The realization that the blood-brain barrier (BBB) plays a major role in dictating post-PBI events has led to rising interests in possible therapeutic interventions through the BBB. Recently, the choroid plexus has also been suggested as a potential therapeutic target. The use of biocompatible scaffolds for the delivery of therapeutic agents, but little is known about their interaction with cerebral tissue, which has important clinical implications. Therefore, the authors have sought to investigate the effect of polycaprolactone (PCL) and PCL/tricalcium phosphate (PCL/TCP) scaffolds on the maintenance of BBB phenotype posttraumatic brain injury. Cranial defects of 3 mm depth were created in Sprague Dawley rats, and PCL and PCL/TCP scaffolds were subsequently implanted in predetermined locations for a period of 1 week and 1 month. Higher endothelial barrier antigen (EBA) expressions from PCL-based scaffold groups ($p>0.05$) were found, suggesting slight advantages over the sham group (no scaffold implantation). PCL/TCP scaffold group also expressed EBA to a higher degree ($p>0.05$) than PCL scaffolds. Importantly, higher capillary count and area as early as 1 week postimplantation suggested lowered ischemia from the PCL/TCP scaffold group as compared with PCL and sham. Evaluation of interlukin-1beta expression suggested that the PCL and PCL/TCP scaffolds did not cause prolonged inflammation. BBB transport selectivity was evaluated by the expression of aquaporin-4 (AQP-4). Attenuated expression of AQP-4 in the PCL/TCP group ($p<0.05$) suggested that PCL/TCP scaffolds altered BBB

selectivity to a lower degree as compared with sham and PCL groups, pointing to potential clinical implications in reducing cerebral edema. Taken together, the responses of PCL-based scaffolds with brain tissue suggested safety, and encourages further preclinical evaluation in PBI management with these scaffolds.

3911. Nguyen, B. N., et al. (2022). "Clinical and radiographic predictors of the need for facial CT in pediatric blunt trauma: a multi-institutional study." Trauma Surgery and Acute Care Open **7**(1).

Background Facial injuries are common in children with blunt trauma. Most are soft tissue lacerations and dental injuries readily apparent on clinical examination. Fractures requiring operative intervention are rare. Guidelines for utilization of maxillofacial CT in children are lacking. We hypothesized that head CT is a useful screening tool to identify children requiring dedicated facial CT. Methods We conducted a multicenter retrospective review of children aged 18 years and under with blunt facial injury who underwent both CT of the face and head from 2014 through 2018 at five pediatric trauma centers. Penetrating injuries and animal bites were excluded. Imaging and physical examination findings as well as interventions for facial fracture were reviewed. Clinically significant fractures were those requiring an intervention during hospital stay or within 30 days of injury. Results 322 children with facial fractures were identified. Head CT was able to identify a facial fracture in 89% (287 of 322) of children with facial fractures seen on dedicated facial CT. Minimally displaced nasal fractures, mandibular fractures, and dental injuries were the most common facial fractures not identified on head CT. Only 2% of the cohort (7 of 322) had facial injuries missed on head CT and required an intervention. All seven had mandibular or alveolar plate injuries with findings on physical examination suggestive of injury. Discussion In pediatric blunt trauma, head CT is an excellent screening tool for facial fracture. In the absence of clinical evidence of a mandibular or dental injury, a normal head CT will usually exclude a clinically significant facial fracture. Level of evidence III.

3912. Nguyen, F. M., et al. (2019). "Delayed diagnosis of traumatic sciatic neuropathy in setting of severe traumatic brain injury: A case report." PM and R **11**: S122.

Case Description: The patient was admitted to acute rehabilitation 3 weeks after motor vehicle accident and was nonverbal, agitated, and requiring max-total assistance for mobility and ADLs. He subsequently emerged from post-traumatic amnesia and showed gradual improvement in mobility. However, he had a persistently flaccid left ankle, weakness in left hamstrings, and absent sensation over dorsal and plantar foot. Electromyography (EMG) was performed at 6 weeks post-injury and revealed acute denervation without recruitment of motor units in multiple tibial and fibular innervated muscles as well as biceps femoris. As lumbar paraspinals and other left lower extremity muscles not innervated via a sciatic pathway were normal on EMG, a severe axonal sciatic neuropathy was suspected. Further review of outside records revealed patient presented with a small posterior left thigh puncture wound, which was irrigated and closed while attention was given to his life-threatening injuries. MRI of proximal left leg was obtained and demonstrated a transection of the sciatic nerve with 5-cm gap. Patient subsequently underwent surgical sciatic nerve reconstruction with cabled allografts. Setting: Acute Rehabilitation Unit. Patient: A 26-year-old male with severe TBI and major multiple trauma from a motor vehicle accident including liver laceration resulting in hemorrhagic shock and emergent exploratory laparotomy. Assessment/Results: EMG diagnosis of sciatic nerve neurotmesis resulted in patient undergoing surgical reconstruction. Discussion: While difficult to assess in a patient with life threatening injuries, early diagnosis of traumatic nerve injuries may assist in improved outcomes by leading to earlier surgical reconstruction. Physiatrists have a unique ability to assess such patients, including the use of EMG as an extension of physical examination. Conclusion: In cognitively impaired patients such as those with TBI, EMG is a useful tool to evaluate for peripheral nerve lesions and can aid in determining appropriate further diagnostic workup and treatment.

3913. Nguyen, H. S., et al. (2016). "Transnasal Penetration of a Ballpoint Pen: Case Report and Review of Literature." World neurosurgery **96**: 611.e611-611.e610.

BACKGROUND: Transnasal penetration by a nonmissile foreign body is a rare injury. Consequently, appropriate management remains controversial. We report a case of transnasal penetration by a ballpoint pen and review the literature. To our knowledge, this is the first living patient who sustained carotid artery damage from a transnasal penetrating intracranial injury., CASE DESCRIPTION: A 56-year-old female presented with a ballpoint pen lodged through her left nostril. She exhibited right cranial nerve palsies (III, IV, VI, and V1). A computed tomography (CT) scan of the head revealed a foreign body in the left nasal cavity traversing the ethmoid/sphenoid and likely through the right

superior orbital fissure and cavernous sinus, with the distal tip adjacent to the right atrium. CT angiography revealed nonopacification of the right internal carotid artery (ICA) from the mid-petrous segment to the ophthalmic segment. Subsequently, she underwent coil embolization of the proximal right ICA, followed by a right frontotemporal craniotomy with anterior temporal lobectomy to skeletonize the pen and right distal ICA, and finally clipping of the ICA distal to the pen and prompt transnasal endoscopic removal of the pen. There were no hemorrhagic complications. She awoke at her neurologic preoperative baseline., CONCLUSION: Injuries such as the one described here should be managed through a multidisciplinary approach. The trajectory of the foreign body should be delineated through CT imaging, along with vascular imaging if appropriate. If there are signs of vascular injury, then attempts to maintain proximal and distal control are prudent to avoid hemorrhagic complications. This combined endovascular-endoscopic-open craniotomy approach has not been reported previously in the literature.

3914. Nguyen, J., et al. (2008). "Conjunctival squamous cell carcinoma in the anophthalmic socket." Ophthalmic plastic and reconstructive surgery **24**(2): 98-101.

PURPOSE: To describe 2 patients in whom squamous cell carcinoma of the conjunctiva developed in the anophthalmic socket more than 44 years after enucleation and chronic use of an ocular prosthesis., METHODS: Retrospective case reports., RESULTS: These 2 patients did not have known risk factors for squamous cell carcinoma, including solar ultraviolet radiation or exposure (since they wore their prosthesis full-time), HIV infection, chronic orbital inflammatory disease, or immune-compromising systemic disease. Both patients had an orbital exenteration and underwent a full work-up including evaluation of the regional lymph nodes and systemic work-up to rule out distant metastasis., CONCLUSIONS: Squamous cell carcinoma of the anophthalmic socket can develop many years after enucleation. Regular inspection of the anophthalmic socket containing a prosthesis to rule out conjunctival squamous cell carcinoma is prudent.

3915. Nichols, A. D. and K. J. Drummond (2011). "First seizure in a young woman." Journal of Clinical Neuroscience **18**(6): 874.

3916. Nicolaisen, N., et al. (2012). "Field airway management of a construction worker with an impaling rebar injury to the neck and brain." Prehospital emergency care : official journal of the National Association of EMS Physicians and the National Association of State EMS Directors **16**(4): 548-552.

This article discusses a case of airway management by air ambulance emergency medical services (EMS) providers in a 22-year-old man impaled through the neck into the brain with 0.5-inch rebar. Penetrating neck injuries (PNIs) with impalement are extraordinarily rare. It is important for EMS providers and emergency medicine physicians to have an understanding of the initial management of an impaled patient with PNI, including having an organized approach to establishing a definitive airway and recognizing the airway complications that PNI may cause. This article discusses out-of-hospital management of impaled patients.

3917. Niederhuber, J. and I. Feller (1970). "Permanent skin homografting in identical twins." Archives of surgery (Chicago, Ill. : 1960) **100**(2): 126-128.

3918. Nielsen, T. K. and C. H. Hahn (2018). "[Transorbital penetrating injury without sequlae]." Ugeskrift for laeger **180**(26).

A 33-year-old man was admitted to hospital with a butter knife stuck in his head after having attempted to commit suicide by forcing the knife through his skull. Physical examination revealed a stable patient with only minimal associated haemorrhage. A CT scan revealed, that the penetrating knife had passed through the sphenoid bone, the posterior orbit and the ethmoid cells and ended in the contralateral nasal cavity. The knife was removed by its own trajectory. After surgery, the patient was neurologically intact with normal sight and well-functioning eye movements, and he made a full recovery.

3919. Niemcunowicz-Janica, A., et al. (2005). "[Suicide by detonation of an explosive placed in the oral cavity]." Samobojstwo w wyniku zdetonowania ladunku wybuchowego umieszczonego w jamie ustnej. **55**(2): 171-173.

The object of this analysis was a suicide case of a young male (aged 33) who placed and subsequently detonated an explosive in his oral cavity. Medical inspection of the suicide scene at a recreational site, autopsy and results of criminal analysis are discussed. The skull of the corpse was heavily damaged. The characteristic body position featured crossed lower limbs with the right limb overlying and hands positioned regularly on the abdomen.

3920. Niess, C., et al. (2002). "Incidence of axonal injury in human brain tissue." Acta neuropathologica **104**(1): 79-84.

Diffuse axonal injury (DAI) is considered to be the morphological correlate of traumatic brain injury as seen in acceleration/deceleration trauma and is believed to be the main cause for a poor clinical outcome in the absence of detectable intracranial lesions. To estimate the overall incidence of DAI, and since most changes are only seen microscopically to rule out whether there is a high number of undetected cases, 450 non-selected human brains were examined. Samples from two brain areas (pons and cerebrum) were immunostained for beta-amyloid-precursor-protein (betaAPP), and axonal damage was assessed microscopically. Axonal injury was detected in 12% of all cases, but only one third had a history of traumatic brain injury. The majority of the positive cases were associated with drug intoxication, chiefly due to opiates. betaAPP staining was positive in both pons and cerebrum to a much higher extent in intoxication than in trauma cases; the latter showing axonal damage mainly in the pons area. This may reflect a more generalized pathomechanism in the intoxication group as compared to more biomechanical mechanisms in the trauma group. The findings also show that various causes may produce diffuse axonal injury and suggest that traumatic brain injury is not the only and probably not even the main cause of the observed neuropathological changes. A correlation between axonal damage and age-related processes could not be shown.

3921. Nieves, G. G., et al. (2022). "Gunshot wounds and nonsurvivable brain injury: Predictors and barriers of successful organ donation." Critical care medicine **50**(1 SUPPL): 782.

BACKGROUND: Trauma patients are potentially eligible for organ donation. Previous reports demonstrate that the trauma population is underutilized for organ donation. In this pool of trauma patients lies a subset of patients who suffered traumatic brain injuries sustained from gunshot wounds (GSW). Our study aims to identify the barriers to organ donation in this pool of potential donors. METHODS: A dataset from 1/2010 - 6/2021 of potential organ donors (POD) who suffered head GSWs was obtained from our donor program (Gift of Life) in Pennsylvania, Delaware, New Jersey. Patients who died prior to initiation of procurement discussions and patients without family were excluded. 521 patients were included and barriers to donation were analyzed with regards to sex, ethnicity, age, donor designation, family involvement, and hospital demographics (location, trauma center designation, transplant center). RESULTS: Of the 521 patients included, conversion to organ donation was 66%. Nearly all patients were male (89%). Designated donors had a high likelihood of donation, 136 vs 9 ($p< 0.001$). POD with conversion to donation were generally older (31.6 vs 27.5, $p< 0.001$), Hispanic (41 vs 9, $p=0.01$) or White (181 vs 25, $p< 0.001$), and the cause of injury was suicide (178 vs 38, $p< 0.001$). Unsuccessful PODs were younger, African American (138 vs 121, $p< 0.001$) or Asian (3 vs 1, p0.082) and cause of injury was homicide (128 vs 155, $p< 0.001$). On multivariate regression designated donors had highest predictive value of success with OR 8.55 ($p< 0.001$) followed by White patients (OR 6.4, $p< 0.001$) and Hispanic patients (OR 4.5, $p< 0.001$). Hospital demographics (location, trauma center level, transplant designation) had no significant impact on multivariate regression. Similarly, family decision makers, parent, son/daughter, sibling, or spouse had no significant effect on donation decision. CONCLUSION: The most common barriers to donation identified in patients who sustained GSW to the head were non-designated patients, younger patients, African Americans, and homicide as cause of death. Interestingly, hospital demographics and family decision makers had no significant impact on donation success. On multivariate regression, the highest chance of successful donation were patients who were designated donors, White or Hispanic.

3922. Nikolaev, A. G. and A. S. Saribekian (1998). "[Ultrasonic scanning of the brain in the postoperative period in patients with an acute neurosurgical pathology]." Ul'trazvukovoe skanirovanie golovnogo mozga v posleoperatsionnom periode u bol'nykh s ostroi neirokhirurgicheskoi patologiei.(2): 19-23.

Authors present the results of ultrasound scanning in 130 adult patients with CNS trauma, brain tumors and hemorrhagic stroke. Forty three variants of ultrasound pictures were described. There was a discrepancy between

ultrasound and CT-based diagnoses in 44% of cases. The method is recommended for routine use in neurosurgical clinics, especially in those unequipped with CT scans.

3923. Nikolic, S. and V. Zivkovic (2013). "Attempted suicide with an axe: a hanged waiter with multiple healed chop wounds to the crown of the head." Forensic science, medicine, and pathology **9**(1): 117-121.

3924. Nikolic, S. and V. Zivkovic (2013). "A healed bony puzzle: an old gunshot wound to the head." Forensic science, medicine, and pathology **9**(1): 112-116.

3925. Nikolic, S. and V. Zivkovic (2013). "The possible reconstruction of a sharp injury to a skull." Forensic science, medicine, and pathology **9**(2): 270-273.

3926. Nikolic, S. and V. Zivkovic (2015). "Suicidal Kronlein shot with a home manufactured firearm." Forensic science, medicine, and pathology **11**(2): 297-299.

3927. Nikolic, S., et al. (2012). "Suicidal single gunshot injury to the head: differences in site of entrance wound and direction of the bullet path between right- and left-handed--an autopsy study." The American journal of forensic medicine and pathology **33**(1): 43-46.

The aim of this study was to determine the differences in the anatomical site of a gunshot entrance wound and the direction of the bullet path between right- and left-handed subjects who committed a suicide by a single gunshot injury to the head. The retrospective autopsy study was performed for a 10-year period, and it included selected cases of single suicidal gunshot head injury, committed by handguns. We considered only contact or near-contact wounds. The sample included 479 deceased, with average age 47.1 +/- 19.1 years (range, 12-89 years): 432 males and 47 females, with 317 right-handed, 25 left-handed, and 137 subjects with unknown dominant hand. In our observed sample, most cases involved the right temple as the site of entrance gunshot wound (about 67%), followed by the mouth (16%), forehead (7%), left temple (6%), submental (2%), and parietal region (1%). The left temple, right temple, and forehead were the sites of the gunshot entrance wounds, which were the best predictors of the handedness of the deceased (Spearman rho = 0.149, P = 0.006). Our study showed that the direction of the bullet intracranial path in cases of suicide was even a more potent predictor of the handedness of the deceased (Spearman rho = 0.263, P = 0.000; Wald = 149.503, P = 0.000).

3928. Nikolic, S., et al. (2011). "Planned complex occupation-related suicide by captive-bolt gunshot and hanging." Journal of forensic sciences **56**(1): 248-251.

Planned complex suicides are committed by using two or more previously planned methods simultaneously to make sure that death will occur even if one method fails. Herein, we presented a case of occupation-related planned complex suicide, committed by captive-bolt gunshot and hanging. A 29-year-old man, who worked as a butcher, was found dead in the stable, hanging by the neck with a captive-bolt gun embedded in the forehead region of his head. The hanging was complete. Along the bolt canal were bone fragments, and at the end of the path was the punched-out fragment of the skin and soft tissue. There were no fractures of the hyoid bone and laryngeal cartilages, and a superficial hemorrhage was present in the right sternocleidomastoid muscle. Our case underlines the utility of forensic autopsy and death scene investigation in reconstructing the mechanism of death, as well as the dynamics of the event.

3929. Nikova, A. S., et al. (2019). "Does nationality matter for the gunshot brain injury? Ten-year retrospective observational cadaveric comparative study for gunshot tbi between Greece and Bulgaria." Korean journal of neurotrauma **15**(2): 95-102.

Objective: Penetrating brain trauma (PBT) caused by gunshot is one of the most lethal traumatic brain injuries (TBIs) and its management and confrontation is of great importance. Methods: The authors searched retrospectively the archives from 2 similar autonomous laboratories of forensic science and toxicology in the Balkan peninsula for a 10-year period of time and included only fatal penetrating brain injuries. Results: The study is conducted in 61 cadavers with gunshot PBT. All of the cadavers were victims of suicide attempt. The most common anatomical localization on the skull were the facial bones, followed by skull base, temporal and parietal bone, conducting a trajectory of the gunshot. Additional findings were atherosclerosis of the blood vessels and chronic diseases such as chronic obstructive pulmonary disease, cancer and fatty liver. Conclusion: PBI has a high mortality rate. There are factors and findings from the collected data differing between the 2 aforementioned nations. Either way, better preventative measures, gun control and healthcare system are highly necessary.

3930. Nilles, E. J. and D. M. Spiro (2007). "Delayed intracerebral hemorrhage from an extracranial ball bullet pellet." Pediatric emergency care **23**(6): 409-411.

The evaluation of superficial penetrating injuries to the face and scalp is common in the emergency department. We present a patient who presented with a ball bullet pellet to the forehead with an initially negative computerized tomographic (CT) scan of the head, who represented 18 hours later with nausea, vomiting, and mental status changes. A repeat CT scan of the head revealed intraparenchymal hemorrhage immediately posterior to the site of pellet entry. Upon review, the initial CT scan was limited by scatter artifact. In this case report, we discuss the potential for significant injury with compressed air-driven arms, the limitation of CT in the presence of metallic foreign bodies, and the significant risks associated with pediatric radiation exposure.

3931. Nilsson, L. N., et al. (2001). "Alpha-1-antichymotrypsin promotes beta-sheet amyloid plaque deposition in a transgenic mouse model of Alzheimer's disease." The Journal of neuroscience : the official journal of the Society for Neuroscience **21**(5): 1444-1451.

Alpha(1)-antichymotrypsin (ACT), an acute-phase inflammatory protein, is an integral component of the amyloid deposits in Alzheimer's disease (AD) and has been shown to catalyze amyloid beta-peptide polymerization in vitro. We have investigated the impact of ACT on amyloid deposition in vivo by generating transgenic GFAP-ACT-expressing mice and crossing them with the PDGF-hAPP/V717F mice, which deposit amyloid in an age-dependent manner. The number of amyloid deposits measured by Congo Red birefringence was increased in the double ACT/amyloid precursor protein (APP) transgenic mice compared with transgenic mice that only expressed APP, particularly in the hippocampus where ACT expression was highest, and the increase was preceded by elevated total amyloid beta-peptide levels at an early age. Our data demonstrate that ACT promotes amyloid deposition and provide a specific mechanism by which inflammation and the subsequent upregulation of astrocytic ACT expression in AD brain contributes to AD pathogenesis.

3932. Niño-Taravilla, C., et al. (2021). "Intracranial Injury after a Dog Attack in a Neonate." Journal of Pediatric Neurology **19**(3): 173-176.

Dog bites are a common event, especially in the pediatric population. Common anatomic site of dog bites is the head. Despite this, intracranial injuries due to dog bites are reported anecdotally, especially in neonates. In this article, we reported a 7-day-old female neonate attacked in the head by the family dog. She presented penetrating bilateral intracranial injuries that required urgent surgery and pediatric intensive care unit (PICU) admission. She received rabies and tetanus prophylaxis, wide-spectrum antibiotic, and anticonvulsive prophylaxis. She was hospitalized in PICU for 9 days, developing intracranial hypertension. One year after the dog bite, she showed moderate psychomotor retardation and focal epilepsy.

3933. Niryana, W., et al. (2018). "An intracerebral penetration of air shotgun pellet in toddler: A case without neurological sequelae." Open access Macedonian journal of medical sciences **6**(8): 1446-1449.

BACKGROUND: A non-powder firearm including air shotgun remains a significant source of injury to children. It causes severe damage and can involve the brain, eyes, heart, abdomen, and other body parts. CASE REPORT: A toddler boy was accidentally shot by an air shotgun at the forehead, and there was no sign of neurological deficit, both before and after surgical removal of the pellet. Herein, we report a case of air shotgun pellet which penetrated a toddler's head

from the forehead, all the way up to the occiput. Removal of the pellet was successfully performed without eliciting any neurological sequelae. CONCLUSION: Air shotgun pellet may potentially cause severe injury to the central nervous system when the head is affected, which can be safely prevented by a prompt but deliberate surgical removal. The study would also like to emphasise the importance of education to reduce gunshot incidence in the pediatric population.

3934. Nisanci, M., et al. (2003). "Reconstruction of the middle and lower face with three simultaneous free flaps: combined use of bilateral fibular flaps for maxillomandibular reconstruction." Annals of plastic surgery **51**(3): 301-307.

A 23-year-old man sustained massive maxillofacial destruction from a close-range, high-velocity gunshot injury. The devastating nature of the injury led to extensive soft-tissue and bone loss involving nearly the total middle and lower portions of his face, including the deeper anatomic structures. Reconstruction of this extraordinarily extensive and three-dimensional defect was accomplished by simultaneous transfer of three free flaps during one session. A specially designed radial forearm flap replaced the internal lining and external cover of the nose, a large fibular osteocutaneous flap restored the lower face, and a second fibular osteocutaneous flap harvested from the other leg restored the midface. The second fibular flap was revascularized by combining it with the first one in a flow-through manner, and its pedicle vessels were anastomosed to the distal ends of the vessels of the first flap. Dorsal nasal reconstruction with an expanded paramedian forehead flap, commissurotomy, and intraoral flap debulking were additional procedures performed to improve cosmetic and functional outcome during the following 1-year period. Along with a radial forearm flap, combined use of bilateral osteocutaneous fibular flaps provided simultaneous, single-stage reconstruction of a huge facial defect involving both the lower and middle face with an acceptable result.

3935. Nishihara, T., et al. (1995). "A case of transsphenoidal penetrating skull base injury by gerdening prop." Japanese Journal of Neurosurgery **4**(3): 311-313.

The authors report a rare case of transnasal penetration of the skull base from injury by a gardening prop. When a 57-year old female stambled and fell over, the prop was impaled a length of about 5 cm into her left nostril. She had a nose bleed with a severe headache just after it was pulled out. On her admission, she was clearly conscious, and there was cerebrospinal fluid (CSF) leaking from her left nostril. Plane skull X-rays showed a fracture of the sellae turcica, and a computed tomography (CT) scan showed a lot of air in the subarachnoid space and ventricles. We diagnosed CSF rinorrhea and pneumocephalus due to the perforation of the tuberculum sellae. At that time an emergency operation was performed. The operative findings showed that small bone fragments could be seen in the scarred pituitary fossa. The floor of the sellae turcica was repaired with temporal muscle and fascia. She had a good postoperative course. While the clinical signs and symptoms of a patient with a transnasal penetrating injury of the nasal cavity are occasionally not so serious, we should keep in mind the possibility of intracranial complications and perform radiologic evaluations, particularly using CT scan and/or magnetic resonance imaging (MRI).

3936. Nishihiro, S., et al. (2014). "[A case of penetrating brain injury by a javelin]." No shinkei geka. Neurological surgery **42**(3): 243-248.

3937. Nishiike, S., et al. (2005). "Brain herniation into the middle ear following temporal bone fracture." Acta oto-laryngologica **125**(8): 902-905.

Otorrhea of leaked cerebrospinal fluid and meningitis in a 33-year-old male originated from an encephalic herniation into the middle ear following traumatic temporal bone fracture. CT demonstrated a mixed-type fracture consisting of a longitudinal fracture and a posterior oblique fracture of the left temporal bone. The left tegmen tympani was broken into a bellows-like shape and a bone splinter from it had stuck in the epitympanum at the level of the incus body. Surgery via a middle cranial fossa approach confirmed penetration of the brain tissue between the incus and lateral semicircular canal. The diagnosis and management of this condition are discussed in the context of a literature review.

3938. Nishijima, D. K., et al. (2017). "Do EMS Providers Accurately Ascertain Anticoagulant and Antiplatelet Use in Older Adults with Head Trauma?" Prehospital emergency care : official journal of the National Association of EMS Physicians and the National Association of State EMS Directors **21**(2): 209-215.

OBJECTIVE: Prehospital provider assessment of the use of anticoagulant or antiplatelet medications in older adults with head trauma is important. These patients are at increased risk for traumatic intracranial hemorrhage and therefore field triage guidelines recommend transporting these patients to centers capable of rapid evaluation and treatment. Our objective was to evaluate EMS ascertainment of anticoagulant and antiplatelet medication use in older adults with head trauma., METHODS: A retrospective study of older adults with head trauma was conducted throughout Sacramento County. All 5 transporting EMS agencies and all 11 hospitals in the county were included in the study, which ran from January 2012 to December 2012. Patients >=55 years who were transported to a hospital by EMS after head trauma were included. We excluded patients transferred between two facilities, patients with penetrating head trauma, prisoners, and patients with unmatched hospital data. Anticoagulant and antiplatelet use were categorized as: warfarin, direct oral anticoagulants (DOAC; dabigatran, rivaroxaban, and apixaban), aspirin, and other antiplatelet agents (e.g., clopidogrel and ticagrelor). We calculated the percent agreement and kappa statistic for binary variables between EMS and emergency department (ED)/hospital providers. A kappa statistic >=0.60 was considered acceptable agreement., RESULTS: After excluding 174 (7.6%) patients, 2,110 patients were included for analysis; median age was 73 years (interquartile range 62-85 years) and 1,259 (60%) were male. Per ED/hospital providers, the use of any anticoagulant or antiplatelet agent was identified in 595 (28.2%) patients. Kappa statistics between EMS and ED/hospital providers for the specific agents were: 0.76 (95% CI 0.71-0.82) for warfarin, 0.45 (95% CI 0.19-0.71) for DOAC agents, 0.33 (95% CI 0.28-0.39) for aspirin, and 0.51 (95% CI 0.42-0.60) for other antiplatelet agents., CONCLUSIONS: The use of antiplatelet or anticoagulant medications in older adults who are transported by EMS for head trauma is common. EMS and ED/hospital providers have acceptable agreement with preinjury warfarin use but not with DOAC, aspirin, and other antiplatelet use.

3939. Nishimon, S., et al. (2010). "An autopsy case of missile head injury who survived 68 years." Neuropathology **30**(3): 336.

Case: 90-year-old male,an invalid soldier. At the age of 22,during the Second World War, he sustained a penetrating gunshot injury from the upper part of the right orbit laterally. He became blind in the right eye and was in a comatose state for 2 days. He worked as a barber with tenacious personality. In 1993,paresis of right leg, hypoacousia and intellectual deterioration incapacitated him. He was admitted to our hospital. In 1999,CT scan revealed a large low density area in the right frontal white matter and a cystic lesion in the right temporal pole. He became bedridden without any response to phonetic stimuli. He died of pneumonia in 2007. Neuropathology:Brain weighed 1,320 g.Marked tissue defect was noted in the right base of the fronto-temporal lobes with diffuse ventricular dilatation. There were a moderate number of senile plaques (SPs) which were scattered all over the cerebral cortices. By contrast, only small number of neuro-fibrillary tangles (NFTs) were found in the parahippocampal gyrus. Protoplasmic astrocytes were noted in the 2nd and 3rd layers of the cerebral cortex and in the deep white matter. Discussion: The predominance of SP over NFTs might be related to the penetrating head injury.

3940. Nishioka, T., et al. (2002). "Unexpected delayed rupture of the vertebral-posterior inferior cerebellar artery aneurysms following closed head injury." Acta neurochirurgica **144**(8): 839-845.

Subarachnoid haemorrhage secondary to closed head injury is rarely associated with traumatic aneurysms of the posterior circulation. We report two cases of ruptured vertebral-posterior inferior cerebellar artery (VA-PICA) pseudoaneurysms following closed head injuries. In each case, there was no associated penetrating injury or skull fracture. The first patient was kicked followed by disturbed consciousness. The computerized tomography (CT) scan on admission and cerebral angiography on the 11th day after the trauma revealed a massive subarachnoid haemorrhage (SAH) with pan-ventricular haemorrhage and an aneurysm of the right PICA near its origin. Further ruptures occurred on the 12th, 15th, and 66th day, and he died on the 69th day. The second patient complained of persistent headache and nausea following a fight on the previous day. A CT scan and angiography on the 1st day after the trauma showed posterior fossa SAH with fourth ventricular blood and a tiny protrusion of the left VA-PICA. On the 14th day, repeated angiography revealed a remarkable growth of the aneurysm, followed by the second rupture. The repair of the VA-PICA junction was urgently performed with successful exclusion of the aneurysm. To our knowledge, only eight cases of traumatic aneurysms located at the VA or the PICA near its origin have been reported. When intraventricular blood is

found with massive subarachnoid blood or with posterior fossa SAH, this ominous complication should be considered. Traumatic VA-PICA pseudoaneurysms are curable by refined microsurgical techniques, if diagnosed in time.

3941. Niu, X. G., et al. (2020). "Clinical use of internal distraction osteogenesis in the rehabilitation of gunshot injuries of the mandible." The British journal of oral & maxillofacial surgery **58**(3): 324-328.

Rehabilitation of gunshot injuries that require combined reconstruction of bone and soft tissue poses a considerable challenge. We describe three cases of rehabilitation for mandibular defects and deformities caused by gunshot injuries. After debridement, three kinds of internal distractors were used. The bony transport discs were distracted about 10-22mm, and the new bone formed well in the distracted gaps. There was no evidence of infection during the consolidation period or follow up. Aesthetic appearance was also pleasing after treatment. Internal distraction osteogenesis after debridement might be a practical way of synchronously reconstructing bony and soft tissue after mandibular gunshot injuries.

3942. Nixon, R. G. (1995). "A penetrating dilemma." Emergency medical services **24**(1): 42-43.

3943. Noack, R. and U. Welcker (1969). "[2 unusual head injuries in infants]." Zwei aussergewohnliche Schadelverletzungen bei Sauglingen. **94**(17): 582-585.

3944. Nobe, J. R., et al. (1990). "Results of penetrating keratoplasty for the treatment of corneal perforations." Archives of ophthalmology (Chicago, Ill. : 1960) **108**(7): 939-941.

We retrospectively analyzed 46 consecutive cases of penetrating keratoplasty performed as part of the treatment of corneal perforations; the minimum follow-up time after keratoplasty was 7 months. Predisposing conditions leading to perforation were an infectious keratitis in 26 eyes (57%), trauma in 14 eyes (30%), and corneal melt associated with ocular surface disorder in 6 eyes (13%). The success of penetrating keratoplasty in the treatment of corneal perforation depended on the timing of surgery and the cause of the perforation. If the perforation was traumatic in origin, delaying surgery for at least 3 months significantly improved the chances for graft success. Eighty percent of the penetrating keratoplasties delayed 3 months following primary repair of corneal laceration remained clear, and 50% of these patients had a visual acuity of 20/60 or better. If penetrating keratoplasties were performed for an infectious corneal perforation, grafts had a better chance to remain clear if surgery could be delayed. All grafts performed for corneal perforation associated with melting and ocular surface abnormalities failed.

3945. Nobe, M. Y., et al. (2010). "Deep penetrating orbitocerebral steel spring injury with minimal sequelae: a case report." Ophthalmic plastic and reconstructive surgery **26**(6): 475-479.

The authors report a penetrating orbitocerebral steel mattress spring injury without permanent ophthalmic or neurologic sequelae. A 44-year-old female mattress factory worker sustained an injury to her right orbit by a high-velocity projectile foreign body. Imaging revealed a metallic spring in the right orbit traversing the optic nerve and superior orbital fissure and lodging in the temporal lobe of the brain. Cerebral angiography demonstrated the steel coil around, but not damaging, the middle cerebral artery and other vessels. With a combined craniotomy and frontal orbitotomy, the spring was removed by meticulous counterclockwise rotation. Postoperatively, the patient had mild left-sided weakness that resolved after several weeks. Ocular examination was normal, including full extraocular movements and a visual acuity of 20/20 in each eye. The authors theorize that the spiral shape and on-axis rotational movement allowed the projectile to follow a path of least resistance penetrating deeply and coiling around, but not injuring, vital structures. Careful counterclockwise rotation under direct intracranial and intraorbital visualization was effective in removing the spring.

3946. Nocini, P. F., et al. (2000). "Vertical distraction of a free vascularized fibula flap in a reconstructed hemimandible: case report." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **28**(1): 20-24.

The authors report a case of vertical distraction osteogenesis of a free revascularized fibula flap used to reconstruct an hemimandible lost as a result of a gunshot injury. The reconstruction procedure and the distraction protocol are described; clinical and radiological results are presented. The vertical discrepancy between the fibula and the native right hemimandible was corrected.

3947. Nohra, G., et al. (2002). "[Infections after missile head injury. Experience during the Lebanese civilian war]." Infections et plaies crAnio-cerebrales par arme a feu. **48**(4): 339-344.

OBJECTIVE: Establish the risk factors for infection following missile head injuries (MHI)., METHODS: Between 1975 and 1990, 500 cases of MHI were admitted, with only 272 responding to inclusion criteria. After initial evaluation including CT scan for 177 patients, all underwent craniectomy with debridement and duroplasty. A retrospective study was undertaken in order to identify the risk factors that increase the infection rate., RESULTS: The global infection rate was 11.39%. Among the studied factors, those increasing the infection rate were: coma on admission (17.6% vs 7.6%), penetrating wounds (12.93% vs 7% for tangential wounds), intracerebral trajectory length over 6 cm (18.42% vs 6.32%), air sinuses effraction (25.8% vs 9.54%), a surgical delay over 72 hours (41.6% vs 10.6%), inadequate duroplasty (28% vs 7.33%), cerebrospinal fluid (CSF) fistulae (58.62% vs 5.76%). The presence of postoperative bone fragments did not increase the infection rate (11.4% vs 11.2%)., DISCUSSION AND CONCLUSION: Adequate duroplasty and aggressive treatment of CSF fistulae decrease the infection rate. There is no need to reoperate on residual bone fragments after adequate debridment. A delay of 24 to 48 hours should be considered, to facilitate the procedure without increasing the infection risk.

3948. Noje, C., et al. (2016). "Disposition of children with mild to moderate traumatic brain injury and positive head imaging." Critical care medicine **44**(12): 276.

Learning Objectives: The optimal disposition of infants and young children with isolated, mild-moderate traumatic brain injury (TBI) with neuroimaging findings is unknown, due to paucity of data and lack of expert consensus. As such, we present our 3 year experience with mild-moderate TBI and positive neuroimaging at a level one pediatric trauma center. Methods: We reviewed the charts of all children ≤ 4 years of age with isolated mild-moderate TBI (GCS 9-15) and positive neuroimaging evaluated at Johns Hopkins pediatric trauma center between 01/01/2013 and 12/31/2015. Patients requiring intubation, vasoactive infusions, and polytrauma victims were excluded. Results: A total of 221 children (mean age/weight/GCS: 14 months/8.8 kg/14.5) met inclusion criteria. The most common mechanism of injury was fall (77%). Only 10% had loss of consciousness or seizures. Most neuroimaging showed skull fractures with extra-axial hemorrhage/no midline shift (MLS) (29%), non-displaced skull fractures (22%), and intracranial hemorrhage (ICH) without fractures/MLS (21%). Trauma bay disposition varied: ICU (48%), ward (37%), intermediate care unit (IMC) and home (7% each). All patients with MLS and most patients (60%) with displaced/comminuted skull fractures and ICH with/without fractures were admitted to the ICU, whereas most patients (60%) with non-displaced/ minimally displaced/multiple skull fractures were admitted to the ward. Less than 2% required intubation, 4% seizure management and 5.8% neurosurgical procedures. Ultimately, 17% were diagnosed with non-accidental trauma. None of the ward/IMC patients required transfer to ICU. Only 18% of ICU patients required neurocritical care/neurosurgical interventions. Median ICU/hospital length of stay was 2 days. Most patients (97%) were discharged home without neurologic deficits, with 3.5% readmitted within 7 days. Conclusions: In our cohort, nearly half of the patients were briefly monitored in the ICU, yet only 10% required ICU-specific interventions, suggesting that a less conservative approach to patient disposition may preserve safety while optimizing healthcare resource utilization.

3949. Nonaka, S., et al. (2021). "Traumatic cervical vertebral artery aneurysm associated with suicidal stabs." Surgical neurology international **12**.

Background: Cervical vertebral artery (VA) aneurysm occasionally develops in association with penetrating injury. However, its treatment strategy is not yet determined. Case Description: A 50-year-old woman with bipolar disorder attempted suicide by stabbing herself in the lateral neck. At presentation, focal neurological deficits were not observed. Spinal computed tomography (CT) showed unclear delineation of the VA in the right C4/5 intervertebral

foramen. CT performed 7 days later identified an aneurysm of the right VA at C4/5, with abnormal arteriovenous shunts between the aneurysm and paravertebral venous plexus. The patient underwent coil embolization of the VA segment involving the aneurysm on the same day that was complicated by cerebellar ataxia due to procedure-associated infarction. Conclusion: Traumatic VA aneurysms associated with penetrating injuries should be carefully managed with a detailed presurgical evaluation of the relevant cranial and spinal structures.

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3950. Nongnuch, A., et al. (2014). "Brain-kidney crosstalk." Critical care (London, England) **18**(3): 225.

Encephalopathy and altered higher mental functions are common clinical complications of acute kidney injury. Although sepsis is a major triggering factor, acute kidney injury predisposes to confusion by causing generalised inflammation, leading to increased permeability of the blood-brain barrier, exacerbated by hyperosmolarity and metabolic acidosis due to the retention of products of nitrogen metabolism potentially resulting in increased brain water content. Downregulation of cell membrane transporters predisposes to alterations in neurotransmitter secretion and uptake, coupled with drug accumulation increasing the risk of encephalopathy. On the other hand, acute brain injury can induce a variety of changes in renal function ranging from altered function and electrolyte imbalances to inflammatory changes in brain death kidney donors.

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3951. Noordally, S. O., et al. (2010). "Retained foreign body in ethmoid with bilateral pneumoencephaly." Acta neurologica Belgica **110**(2): 203-205.

Intracranial penetrating injury through the nose is rare. We present a case of a 79 year-old patient who had intracranial penetrating injury with a wooden object accompanied by massive bilateral pneumoencephaly with the presence of a foreign body in the ethmoid bone with fracture and displacement of crista galli. This is a hitherto unreported retained foreign body with fractured ethmoid resulting in bilateral pneumoencephaly.

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3952. Noorian, A., et al. (2012). "Impact of point-of-care platelet function testing by verifynow on periprocedural antiplatelet therapy in neuroendovascular stenting." Journal of neurointerventional surgery **4**: A36.

Background Proper platelet inhibition is essential for prevention of thromboembolic complications in patients undergoing stent placement. Objective The aim of this study was to analyze the impact of VerifyNow® assay (VNA) on the management of periprocedural antiplatelet therapy in cerebrovascular stenting. Design/Methods Consecutive patients were retrospectively categorized in three groups: elective (Clopidogrel+aspirin (C+A)≥7 days), urgent (C+A for 12-72 h including clopidogrel bolus), and emergent (no previous C+A, intra-procedural abciximab and postprocedural C +A) stenting groups. Clopidogrel resistance (CR) and hypersensitivity (CH) were defined as <20% and >80% platelet inhibition measured by VNA, respectively. Results A total of 72 consecutive patients undergoing cerebrovascular stenting were included in the analysis. Twenty-three patients (age 64614; 65% male) underwent elective stenting to treat symptomatic atherosclerotic lesions. The rates of CR and CH were 26% and 13%, respectively. Three of the six CR patients were treated with abciximab to achieve platelet inhibition. In one of the patients with CH (96% inhibition), stenting procedure was aborted. There were no hemorrhagic or ischemic complications. Twenty patients (age 60612; male, 75%) underwent urgent stenting to treat symptomatic atherosclerotic lesions (n=18), medically refractory carotid dissection (n=1), and carotid pseudoaneurysm due to a gunshot wound (n=1). The rates of CR and CH were 60% (12/20) and 5% (1/20), respectively. Nine of the twelve CR patients were treated with abciximab to achieve an average 42%614% platelet inhibition (range, 22%e52%). There were two hemorrhagic (gastrointestinal bleeding and spontaneous intracranial hemorrhage) with no ischemic events in the CR group. The patient with CH had a spontaneous fatal ICH in the unaffected cerebral hemisphere. Twenty-nine patients (age, 65615; male, 50%) underwent emergent stenting all presenting with acute ischemic stroke. None of these patients were on chronic outpatient C+A therapy. Two received boluses of Clopidogrel before the procedure. The remaining patients received intra-procedural intravenous abciximab (3-13 mg) to achieve 29%e94% platelet inhibition. There was one intracranial and one systemic hemorrhage with no ischemic events. Conclusions Our results suggest the applicability of VNA in assuring adequate platelet inhibition. Future studies are needed to manage CR and CH optimally to prevent thrombosis or hemorrhage.

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3953. Norazit, A., et al. (2011). "Vascular endothelial growth factor and platelet derived growth factor modulates the glial response to a cortical stab injury." Neuroscience **192**: 652-660.

Traumatic injury to the brain initiates an increase in astrocyte and microglial infiltration as part of an inflammatory response to injury. Increased astrogliosis around the injury impedes regeneration of axons through the injury, while activated microglia release inflammatory mediators. The persistent inflammatory response can lead to local progressive cell death. Modulating the astrocyte and microglial response to traumatic injury therefore has potential therapeutic benefit in brain repair. We examine the modulatory effect of a single bolus of vascular endothelial growth factor (VEGF) and platelet derived growth factor (PDGF) in combination on astrocytes and microglia to acute cerebral injury. A combination of VEGF and PDGF (20 pg) was injected into the striatum of adult male Sprague-Dawley rats. The effects of treatment were assessed by quantitative immunofluorescence microscopy analyzing astrocytes and microglia across the stab injury over time. Treatment delayed the onset of astrogliosis in the centre and edge of the stab injury up to day 5; however, increased astrogliosis at areas remote to the stab injury up to day 5 was observed. A persistent astrocytic response was observed in the centre and edge of the stab injury up to day 60. Treatment altered microglia cell morphology and numbers across the stab injury, with a decrease in ramified microglia, but an increase in activated and phagocytic microglia up to day 5 after stab injury. The increased microglial response from 10 until day 60 was comprised of the ramified morphology. Thus, VEGF and PDGF applied at the same time as a stab injury to the brain initially delayed the inflammatory response up to day 5 but evoked a persistent astrogliosis and microglial response up to 60 days.

3954. Norris, O., et al. (2013). "Maxillofacial gunshot injuries at an urban level I trauma center-10-year analysis." Journal of oral and maxillofacial surgery **71**(9): e96-e97.

Purpose: Optimal management of facial gunshot trauma remains controversial in terms of timing and reconstruction techniques. To analyze current trends in surgical management, a 10-year retrospective study of patients admitted with facial gunshot wounds was undertaken. Materials: Retrospective analysis of facial gunshot injuries in patients treated at Boston Medical Center, by the Department of Oral and Maxillofacial Surgery, from 2001 to 2011. Data was obtained from the institutional trauma registry and hospital records; and analyzed with respect to length of hospitalization, patient demographics, treatment cost and payments to hospital, using bivariate and multivariate logistic regression, Fisher's exact test, Wilcoxon rank sum test, and Kruskal- Wallis test. Results: During the study period, there were total of 1,957 patients admitted with gunshot wounds to Boston Medical Center, with 136 (6.9%) involving the facial region. 55 patients met inclusion criteria and were selected for the study. Age ranged from 16 to 61 years, with mean age being 25 years for men and 34 for women. 48/55 (87%) were males and 7/55 (13%) were females. The most common injury was to neck zone III; mandible fractures were encountered in 26 (47%) patients. Fractures were treated within 72 hours from admission for the majority of patients. 12 (22%) patients returned for secondary treatment. 20% patients had associated neurological injuries 9% had cervical spine fractures. Angiography was performed in 33 (60%) patients with 7 (13%) requiring embolization. 38 (70%) patients required airway management. Overall mortality was 9%, and most cases were associated with brain injury or severe bleeding from chest or abdominal injuries; no death occurred from isolated facial gunshot injuries. 18% of patients had private third party medical insurance, 45% had public insurance, and 23% had no insurance. Estimated hospital profit (not including the physician charges) was 11% from treating patients with private insurances. In contrast, there was a loss of 50% while treating patients with public insurance; and a 100% loss when treating uninsured patients. Conclusions: Airway compromise was the most lifethreatening early problems; requiring establishment of definitive airway upon assessment. Brain, vascular and cervical spine injuries were common and warranted further investigation. Patients admittedwith higher stages of shock and lower mental status, due to brain, vascular and/or spinal cord injuries: correlated with prolonged hospitalization, increased treatment costs and extended rehabilitation. We advocated early intervention (less than 72 hours), conservative approach, one-stage reconstruction of all involved bony and soft tissue injuries. In our study, African Americans were more frequently injured as compared to other ethnic groups; this was due to the geographic location of our hospital and mission to serve the underprivileged/ low income patients. The majority of the facial gunshot injuries were not presented as life threatening; but typically resulted in significant morbidity. With respect to the cost of healthcare, the vast majority of patients relied on public aid and had no insurance; in all cases the cost of care was more than the reimbursement provided.

3955. North, S. H., et al. (2012). "Rapid analytical methods for on-site triage for traumatic brain injury." Annual review of analytical chemistry (Palo Alto, Calif.) **5**: 35-56.

Traumatic brain injury (TBI) results from an event that causes rapid acceleration and deceleration of the brain or penetration of the skull with an object. Responses to stimuli and questions, loss of consciousness, and altered behavior are symptoms currently used to justify brain imaging for diagnosis and therapeutic guidance. Tests based on such symptoms are susceptible to false-positive and false-negative results due to stress, fatigue, and medications. Biochemical markers of neuronal damage and the physiological response to that damage are being identified. Biosensors capable of rapid measurement of such markers in the circulation offer a solution for on-site triage, as long as three criteria are met: (a) Recognition reagents can be identified that are sufficiently sensitive and specific, (b) the biosensor can provide quantitative assessment of multiple markers rapidly and simultaneously, and (c) both the sensor and reagents are designed for use outside the laboratory.

3956. Nortje, C. J. (2008). "General practitioner's radiology case 67. Jael's syndrome." SADJ : journal of the South African Dental Association = tydskrif van die Suid-Afrikaanse Tandheelkundige Vereniging **63**(8): 454.

3957. Notarianni, C., et al. (2014). "Penetrating foreign body to the cranial vault in a young child." Pediatric emergency care **30**(12): 902-903.

We present a case of penetrating trauma with a blunt object to the calvarium of a young child. Presentation, emergency room management, radiology, and surgical treatment are illustrated and discussed. It is of utmost importance in these cases to proceed in a way so as to minimize secondary injury that may be caused in removal of the foreign body.

3958. Noterman, J., et al. (1974). "Cerebral bullet wounds. Report on a case with a bullet localized in the lateral ventricle." Acta chirurgica Belgica **73**(4): 458-464.

The authors present a case of missile located in the lateral ventricle. Surgical indications and problems related to antibiotics in cerebral wounds are analyzed.

3959. Nouma, Y., et al. (2016). "Forensic examination after exhumation: Contribution and difficulties after more than thirty years of burial." Journal of forensic and legal medicine **44**: 120-127.

We report a case of a Tunisian footballer who was found dead abroad under suspicious circumstances. The cause of death was, originally, attributed to a lightning strike. The corpse was buried without/autopsy. Over thirty years later, the family requested the exhumation to verify the identity and the cause of death. The exhumation was performed in 2011. DNA profiling from teeth and femur bone samples confirmed the identity of the deceased. The dry bone study revealed defects in the skull and the pelvis evoking firearm injuries. Post-mortem CT with three-dimensional (3-D) reconstruction allowed to confirm the characteristics of firearms injuries and to speculate about the number and the trajectories of potential shots. Nevertheless, the vitality of these injuries as well as the eventual fatal shot and the shooting distance could not be determined. Likewise, the type of the eventual weapon could not be clarified as there were no bullets or any metallic projectile fragments. Despite all doubts, the forensic explorations have allowed to verify the identity of the deceased, to evoke firearms injuries and, mainly, to deny the proposed cause of death after more than thirty years of burial. Moreover, the loss of soft tissues and bone fragility were the major obstacles.

3960. Novák, I., et al. (2003). "Cardiopulmonary resuscitation of children in the Czech Republic." Cesko-Slovenska Pediatrie **58**(6): 356-358.

In 2000 and 2001 physicians of the Medical Emergency Service (MES) resuscitated in the CR 12 861 adults, i.e. 125/100 000 population (on average 62.5/100 000 per year). Of these 5381, i.e. 41.80 % were resuscitated successfully. During the same period 372 children (228 boys - 61.3%) aged under 14 years were resuscitated (on average 10.8/100 000 per year). Resuscitation of children under 14 years was successful in 231 cases, i.e. 62.1%. These data pertain to primary visits of MES (incl. flights of the airborn emergency service). While in adults the reason to start cardiopulmonary resuscitation is circulatory failure in ischaemic heart disease (1), the reasons for resuscitation in children were unknown. The authors addressed several MES and obtained 40 valid replies from all regions of the CR (i.e. 45% of the network of

MES), among others they obtained information from territorial MES in Prague, Brno, Ostrava, Olomouc, Zlín, Jihlava, Plzeň and Ústí nad Labem. Almost no information was obtained from the south and west Bohemian regions, while there was almost complete information from MES from the whole of Moravia. In 2000 and 2001 the respondents resuscitated a total of 148 children (39.87.% of all resuscitated subjects in the given period) incl. 90 boys (39.87%). Resuscitation was successful in 86 children (i.e. 58.1%). As reasons for resuscitation the respondents report (listed by frequency): drowning (23.5%), polytrauma (18.5%), inflammatory obstruction of the respiratory pathways (14.2%), arrhythmia and asphyxia in children with congenital heart disease (10.1%), choking - strangulation, aspiration (8.4%), craniocerebral injuries (8.1%), sudden death syndrome in infants (7%), unconsciousness (4.5%), intoxication (4.5%). Other causes were rare (sepsis, metabolic breakdown, gun shot injury) or the reason for resuscitation was not given. Serious injuries and drowning combined account for more than 50% of urgent resuscitation. Primary, "cardiogenic" reasons account for more than 10%.

3961. Novitskii, I. I. (2003). "[Place of the transplantation of the amniotic membrane in the treatment of corneal diseases concomitant with corneal neovascularization]." Mesto transplantatsii amnioticheskoi obolochki v lechenii zabolevanii rogovitsy, soprovozhdaiushchikhsia ee neovaskuliarizatsiei. **119**(6): 9-12.

Published data and authors' independent observations related with the influence produced by the transplantation of the amniotic sac on corneal neovascularization are described. The epithelial-and-stromal corneal defect as well as the limbic epithelium deficit with a subsequent conjunctivization of the corneal epithelium and corneal neovascularization are one of the key mechanisms of corneal neovascularization. The amniotic sac transplantation, made for the purpose of reconstructing the eye surface, ensures the conditions for a fast recovery of the corneal epithelium and, thus, prevent the corneal neovascularization. The surgery can be recommended as an effective treatment technique applicable to corneal pathologies concomitant with the limbic epithelium deficit, persistent epithelial-and-stromal corneal defect and with the corneal neovascularization.

3962. Novozhilova, A. P., et al. (1996). "[The cerebral cortex in severe penetrating gunshot craniocerebral trauma (an experimental study)]." Sostoianie kory bol'shogo mozga pri tiazheloi pronikaiushchei ognestrel'noi cherepno-mozgovoi travme (eksperimental'noe issledovanie). **109**(2): 17-22.

Gunshot disturbances of different severeness were induced in rabbit brain by means of specifically worked out experimental model. Cerebral cortex was studied using light and electron microscopy in severe gunshot craniocerebral trauma (SGCT), accompanied with cranial bones and cerebral disorders, plentiful external and internal hemorrhages and death of the animals 1-5 minutes after the shot. Peculiarities of responsiveness to trauma were demonstrated in microcirculatory bed elements, neurons and glial cells. SGCT causes rapid appearance of destructive changes in cerebral cortex with degenerative processes not following hemomicrocirculatory bed disturbances, but developing simultaneously with them.

3963. Novozhilova, A. P., et al. (1996). "[Changes in the cerebral cortex in closed craniocerebral trauma of gunshot origin (experimental research)]." Izmeneniia kory golovnogo mozga pri zakrytoi cherepno-mozgovoi travme ognestrel'nogo proiskhozhdeniia (eksperimental'noe issledovanie). **110**(6): 25-31.

Cerebral cortex was studied morphologically in rabbits with concussion of brain induced by gunshot injury. The extent of severity was modelled by the bullet rate. No significant bleeding followed the injury allowing to observe the animals during the necessary terms (7-14 d.) Morphological study included light optical and electron microscopy. In neurons, glial cells and synapses a series of essential destructive changes in shown detectable predominantly on ultrastructural level that might be the base of psychoneurological complications of a distant period. Ballistic properties of a bullet were obviously fundamental to pathogenesis of brain concussion in these experiments as kinetic energy of the bullet was only sufficient for non significant damage of the skull soft tissue. But in contrast to the dull trauma, the blow was of a high speed and despite mild clinical characteristics caused essential diffuse structural disturbances in brain tissues.

3964. Nozawa, H., et al. (2005). "2. An unusual death due to the impalement of a gear stick into the brain stem through the nasal cavity: a case report." Medicine, science, and the law **45**(2): 176-178.

A 59-year-old male was driving a car on the road and was involved in a traffic accident, colliding with a tanker and a big lorry. When an ambulance arrived at the scene, he was in a state of cardiopulmonary arrest and was bleeding profusely from his right nostril. He was confirmed dead at hospital. The autopsy showed a laceration of the right upper lip extending to the right nostril. In the basal skull there was a notable perforation at the ethmoid bone together with the central part of the sphenoid bone including the sella turcica. In accordance with the basal skull bone fractures, there were pronounced contusion injuries at the brain stem and a contusion injury was also observed in the right part of the cerebellum. After careful investigation of a causative stick-like item that was present inside the car, it was concluded that a severe movement of the man's body, as a result of the traffic collision, caused the gear stick which was fixed to the steering wheel to become impaled in the man's right nostril. The gear stick passed through the nasal cavity and into the basal skull bones, resulting in fatal brain stem injuries.

3965. Nussbaum, E. S., et al. (2018). "Air gun orbitocranial penetrating injury: emergency endovascular treatment and surgical bypass following pellet migration to middle cerebral artery: case report." Journal of neurosurgery. Pediatrics **21**(3): 270-277.

The authors describe a 14-year-old boy presenting with an orbitocranial penetrating injury (OPI) from a metallic air gun pellet to the left eye who developed hemiparesis and speech difficulty due to migration of the pellet to the left middle cerebral artery. They highlight the potential complications associated with both OPIs and intravascular foreign body migration and occlusion by describing the patient's presentation, results of imaging evaluation, and the combined endovascular treatment and extracranial-intracranial bypass, which resulted in rapid restoration of blood flow and full neurological recovery with intact vision. Based on this case and a review of the literature on intracranial foreign body migration with resultant vascular occlusion, the authors recommend that complex OPIs be treated at centers that offer both neuroendovascular and neurovascular surgical capabilities on an urgent basis to manage both the primary injury and potential secondary vascular compromise.

3966. Nwafor, D. C., et al. (2022). "Pediatric Traumatic Brain Injury: An Update on Preclinical Models, Clinical Biomarkers, and the Implications of Cerebrovascular Dysfunction." Journal of central nervous system disease **14**: 11795735221098125.

Traumatic brain injury (TBI) is a leading cause of pediatric morbidity and mortality. Recent studies suggest that children and adolescents have worse post-TBI outcomes and take longer to recover than adults. However, the pathophysiology and progression of TBI in the pediatric population are studied to a far lesser extent compared to the adult population. Common causes of TBI in children are falls, sports/recreation-related injuries, non-accidental trauma, and motor vehicle-related injuries. A fundamental understanding of TBI pathophysiology is crucial in preventing long-term brain injury sequelae. Animal models of TBI have played an essential role in addressing the knowledge gaps relating to pTBI pathophysiology. Moreover, a better understanding of clinical biomarkers is crucial to diagnose pTBI and accurately predict long-term outcomes. This review examines the current preclinical models of pTBI, the implications of pTBI on the brain's vasculature, and clinical pTBI biomarkers. Finally, we conclude the review by speculating on the emerging role of the gut-brain axis in pTBI pathophysiology. Copyright © The Author(s) 2022.

3967. Nzeh, D. A., et al. (2006). "Sonographic evaluation of ocular trauma in Ilorin, Nigeria." European journal of ophthalmology **16**(3): 453-457.

UNLABELLED: PURPOSE .: Ultrasound (US) evaluation of the eye and orbit has become an essential component of clinical ophthalmology. Requests for its use are frequent in the authors' hospital in spite of the absence of a dedicated eye scanner. The extent to which this has influenced the authors' patient management, especially for those with orbito-ocular trauma, informed the decision to carry out this study., METHODS: A retrospective review of cases of orbito-ocular trauma with media opacities and/or intraocular hemorrhage sent for ultrasonography over a 5-year period (January 1997-December 2001) at the University of Ilorin Teaching Hospital (UITH), Ilorin, Nigeria, was carried out. The sonographic diagnosis was reviewed with the management outcomes as found in the patients' records., RESULTS: A total of 71 patients (45 male, 26 female) were included in the study (M:F=1:1.7). The minimum age was 1 1 /2 years and maximum was 70 years. The 11- to 20-year age group was mostly affected by trauma (31%). Retinal detachment (22.5%) was the most common posterior segment lesion diagnosed, followed by vitreous hemorrhage (18.3%) and hyphema (11.3%). Visual acuity improved to between 6/9 and 6/18 in 23 (41.4%) of the 56 injured eyes., CONCLUSIONS: The

usefulness of orbito-ocular ultrasonography in ophthalmic trauma management has been demonstrated in this study, especially using nondedicated eye scanners when a dedicated one is unavailable.

3968. Obach, V. and J. Berenguer (1997). "[Shot wounds to the cerebral cortex]." Perdigonada cortical. **12**(2): 87.

3969. Obajimi, M. O., et al. (2004). "Computed tomography (CT) in civilian gunshot head injuries in Ibadan." West African journal of medicine **23**(1): 58-61.

BACKGROUND: There is data on civilian gunshot injuries in Nigerians. The purpose of the study is to describe the Computed Tomography findings of civilian gunshot injuries (GSI) to the head in Ibadan, Nigeria., METHOD: This is a retrospective study of Computed Tomography (CT) films and clinical records of 28 consecutive civilian gunshot injuries to the head from 1996 to 1999., RESULTS: The gunshot injuries to the head were mostly armed robbery related. Though there was a steady annual increase of civilian gunshot injuries during the study period, a low CT Scan frequency (0.61%) was recorded. The following CT findings were present in all the patients; bullet fragments, intraparenchymal haemorrhage, vault fractures and soft tissue swelling. The resting position of the bullets showed a predilection for the parietal lobe (32.1%) and the most common fracture site was also the parietal bone (42.8%)., CONCLUSION: CT findings simplified the management of civilian gunshot injuries to the head in the patients studied by demonstrating the exact pathology sequel to the injury. Despite important constraints, CT remains a cost effective means of managing GSI to the head.

3970. Obradovic, A., et al. (2007). "[Invasive mycoses and trauma]." Invasive Mykosen und Trauma. **157**(19-20): 482-489.

Perforating injury allows the dispersion of environmental fungi and fungal spores together with miniscule foreign bodies into traumatized tissue where they can multiply and cause invasive infection. Acute invasive fungal infection after open fractures is uncommon. The severity of the fungal infections depends on the type of injury (perforating, presence of foreign material), the body area and the general condition of the patient. Fungal infections of the immuncompetent host are generally localized within the dermis, invasion of the fascia, muscles and the bone is rare. Injury-related fungal infections of the immuncompromised host may lead to rapid invasion and generalization of the fungal infection. The following review will focus on the fungal infections after perforating injuries and open fractures including the invasive mycoses as a direct consequence of the trauma, post-traumatic fungal infections, tropical fungal infections (mycetoma), invasive fungal infections after near-drowning and nosocomial invasive fungal infections of the critically ill post-traumatic patient admitted to the intensive care unit.

3971. O'Brien, D., Jr., et al. (1997). "Delayed traumatic cerebral aneurysm after brain injury." Archives of physical medicine and rehabilitation **78**(8): 883-885.

Traumatic aneurysms (TAs) are an unusual etiology for late neurological deterioration after traumatic brain injury (TBI) and represent less than 1% of all cerebral aneurysms. TAs most often are diagnosed acutely but may be delayed in presentation. To increase awareness of this serious but treatable condition when diagnosed early, we report a delayed TA after a motor vehicle accident. The patient experienced a seizure on day 46 postinjury while in rehabilitation and demonstrated persistent lethargy and hemiparesis. Neuroimaging revealed a large, ruptured left pericallosal artery TA, which was surgically clipped. The patient completed his rehabilitation course and was eventually discharged home with family. Among TBIs, TAs are associated with penetrating injuries and skull base or anterior cranial fossa fractures. Associated mortality is high, especially if rupture has occurred. Although TAs are rare, the clinician should be vigilant in the at-risk patient.

3972. Obuchowska, I., et al. (2010). "[Clinical characteristics of penetrating ocular injuries with intraocular foreign body. Part I. Pathogenesis and clinical features]." Charakterystyka kliniczna urazow penetrujacych narzadu wzroku z obecnoscia ciala obcego wewnatrz galki ocznej. Czesc I. Patogeneza i obraz kliniczny. **112**(1-3): 70-76.

Intraocular foreign bodies (IOFBs), are the major cause of penetrating ocular trauma and the most serious problem is the resulting impairment of visual function. In this paper, based on published reports and their clinical experience, authors discuss questions of pathogenesis, epidemiology and clinical features of IOFB injuries. Special

attention was paid on primary and secondary complications, which include mechanical lesions of the ocular tissues, metallosis and endophthalmitis.

3973. Obuchowska, I., et al. (2010). "[Clinical characteristics of penetrating ocular injuries with intraocular foreign body. Part II. Diagnostics and treatment]." Charakterystyka kliniczna urazow penetrujacych narzadu wzroku z obecnoscia ciala obcego wewnatrz galki ocznej. Czesc II. Diagnostyka i leczenie. **112**(1-3): 77-81.

Ocular trauma remains a major cause of blindness, particularly in the working-age population. Intraocular foreign bodies (IOFBs), frequently accompany penetrating ocular injuries and can lead to increased ocular morbidity. In this paper, based on published reports and their authors clinical experience, we discuss questions of advantages and disadvantages of three imaging methods (radiology, ultrasound and tomography), and evaluate the value of these methods in the diagnosis of IOFBs. Authors discuss also management options in patients with IOFB injuries and describe techniques of primary surgical repair and foreign body removal, especially pars plana vitrectomy.

3974. Ocran, C., et al. (2020). "Vaping May Be Hazardous to Your Eye." Ophthalmology **127**(12): 1756.

3975. Odebode, O., et al. (2015). "Ocular and visual complications of head injury." Journal of Head Trauma Rehabilitation **30**(3): E95.

Introduction/Rationale The purpose of the study was to evaluate the pattern of ocular and visual complications of head injury. Method/Approach A prospective 225 head-injured patients were part of the study. For the purpose of extracting visual complications, a neurosurgeon and an ophthalmologist examined each patient and conducted appropriate investigations. Patients with ocular morbidity were analysed for age, sex, cause of injury, Glasgow Coma Score (GCS) at admission, and associated injuries, in addition to findings from the neurosurgical and ophthalmic evaluations. Results/Effects Two major types of ocular and visual complications were observed in 57 (25.3%) of 225 head-injured patients studied. Soft-tissue injury to the globe and adnexae included periorbital ecchymosis, subconjuctival haemorrhage, lid laceration, or globe rupture in 29 patients. Neuro-ophthalmic ocular cranial nerve palsies occurred in 28 patients, while orbital fracture was encountered in two patients. Ocular injuries were present multiple in 60% of the cases. The patients (aged 9 months to 57 years), and were comprised of 37 male and 20 female subjects. The leading cause of head injuries (84.2%) was traffic accidents. Other causes included falls from heights, assaults and gunshots. Conclusions/Limitations Injury to the globe and adnexae and ocular cranial nerve palsies constitute the most common oculovisual complications following head injury in our center.

3976. O'Dell, M. W., et al. (2015). "Abobotulinumtoxina (Dysport) in the treatment of adult patients with upper limb spasticity due to traumatic brain injury." PM and R. (var.pagings) **7**(9 SUPPL. 1): S103.

Objective: To determine the efficacy and safety of abobotulinumtoxinA 4 weeks after injection in patients with upper limb spasticity (ULS) caused by traumatic brain injury (TBI). Design: Sub-analysis in a randomized, placebo-controlled, doubleblind clinical trial. Setting: International, multicenter study. Participants: Twenty three of 243 (9.5%) hemiparetic patients with ULS caused by TBI. Interventions: In the initial treatment cycle, 14 subjects received abobotulinumtoxinA (500 U or 1000 U) and 9 received placebo, intramuscularly. Main Outcome Measures: Modified Ashworth Scale (MAS); Disability Assessment Scale (DAS); Tardieu scale (TS); Active range of motion (AROM); Physician Global Assessment (PGA), adverse events (AE). Results or Clinical Course: Mean age (SD) of the 23 patients was 35 (13) years and males represented 65%. They had suffered closed (74%) or penetrating brain injury (26%) 10 years (mean) earlier. The majority (74%) had previously been treated with botulinum toxin. Four weeks after injection, a higher proportion of patients treated with abobotulinumtoxinA compared to placebo were responders in terms of tone reduction (>1 point improvement in MAS): 64% versus 22%. This improvement was accompanied by improvement in subjective function (>1 grade decrease from baseline for the principal target of treatment on the DAS scale): 71% versus 22% for placebo. With abobotulinumtoxinA, the angle of catch (XV3 of the TS) improved in finger (+35degree), elbow (+22degree) and wrist (+12degree) flexors, resulting in a gain in active muscle extension of at least 5degree (AROM). The overall clinical improvement (mean PGA score reaching at least grade 1) was higher with abobotulinumtoxinA versus placebo (93% versus 33%). 7 of 23 patients experienced a treatment emergent AE, none were unexpected. Conclusion: In this small sub-population of hemiparetic adults with ULS due to TBI, abobotulinumtoxinA improved muscle tone,

spasticity, passive function and active movements). Efficacy and safety of abobotulinumtoxinA in patients with ULS after a TBI were consistent with the results observed for the total population (TBI and post-stroke patients) in this international placebo controlled study.

3977. O'Dell, M. W., et al. (2015). "Abobotulinumtoxina (Dysport®) in the treatment of adult patients with upper limb spasticity due to traumatic brain injury." PM and R **7**(9): S103.

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3978. Odhiambo, W. A., et al. (2011). "Intra-myocardial bullet causing heart block in a patient with multiple gunshot wounds: Case report." Annals of African Surgery **7**: 54-57.

Elective removal of intra-myocardial bullet remains a controversial subject. A non-operative approach has been recommended as appropriate for a stable asymptomatic patient. In the presence of complications such as bleeding, perforation leading to cardiac tamponade, thrombus formation, embolization, rhythm disturbances and infections, surgical removal may be advised. We present a patient who survived multiple gunshot wounds with a bullet lodged in the wall of the left ventricle of the heart. Details of the injuries sustained, operative removal of the bullet and the challenges that ensued are illustrated.

3979. O'Doherty, D. P. and B. B. Ferris (1988). "Intracranial air after injury to the cervical spine: brief report." The Journal of bone and joint surgery. British volume **70**(3): 488.

3980. O'Donoghue, G. T., et al. (2005). "Unsuspected orbitocranial penetrating injury by a plastic pen cartridge: case report." The Journal of trauma **58**(3): 634-637.

3981. Oearsakul, T., et al. (2021). "Multidisciplinary management of a penetrating cerebellar injury by a fishing speargun: A case study and literature review." Surgical neurology international **12**.

Background: Fishing spearguns are a rare cause of nonmissile penetrating brain injuries (PBIs). Discussion of their injury patterns and treatments has been published only sporadically. Here, we report a case of a self-inflicted PBI caused by this type of weapon and present an extensive review of previous case reports to help ascertain the appropriate surgical approach. Case Description: A 26-year-old man with a preexisting psychiatric illness was transferred to our hospital after a self-inflicted shot with a fishing speargun through his mouth. The ensuing injuries included the

impalement of a spear intracranially through the soft palate and posterior oropharyngeal wall. The spear was surgically accessed by the otolaryngology team by splitting the soft palate and was removed by the neurosurgery team in the retrograde direction. Cerebral angiographies were done pre- and postoperatively, and these did not detect any vertebrobasilar arterial system injuries. The patient's postoperative care was uneventful, and he was followed up by a psychiatrist for his long-term care. Conclusion: This example of a complicated case of nonmissile PBI caused by an uncommon type of weapon shows how this type of medical emergency can be managed successfully with effective teamwork using a multidisciplinary approach.

3982. Oehmichen, M. (1982). "Are resting and/or reactive microglia macrophages?" Immunobiology **161**(3-4): 246-254.

According to recent submicroscopic, cytokinetics, and functional (particularly cytoimmunologic) investigations, no relationship exists between "resting" microglia (the small argyrophilic cells appearing in undamaged brain tissue, first described by Rio Hortega) and "reactive" microglia (the argyrophilic cells appearing under pathologic conditions). While "resting" microglia are apparently cells of neuro-ectodermal origin, all observations tend to indicate that "reactive" microglia are derived from extravasated blood monocytes and should be called brain macrophages. In the intact brain parenchyma, no macrophages are demonstrable. Free subarachnoidal cells in the cerebrospinal fluid (CSF), perivascular cells, and epiplexus and/or supraependymal cells in the CSF-containing spaces of the normal central nervous system are cells of the mononuclear phagocyte system and must be considered as CSF macrophages. According to rough estimates, the normal adult central nervous system contains a maximum of 280,000 CSF macrophages.

3983. Oehmichen, M., et al. (2003). "Forensic pathological aspects of postmortem imaging of gunshot injury to the head: documentation and biometric data." Acta neuropathologica **105**(6): 570-580.

To determine the value of imaging procedures such as computer tomography (CT) and magnetic resonance imaging (MRI) of the head in providing additional information of forensic relevance, we examined 17 cadavers of human victims of gunshot wounds to the head. Three of the victims briefly survived the gunshot wound. The weapons involved were all guns with low muzzle energy (<550 J), i.e., handguns and low-velocity rifles. In the majority of cases (n=15) a penetrating wound to the head was found, only two cases showed the bullet lodged in the brain. In some cases, imaging of the skull and brain was performed prior to autopsy; in others imaging took place after autopsy on the isolated, formalin-fixed brain. The imaging findings were correlated with the criminological data and the results of macroscopic and microscopic examination of the brain. The findings on the bony structures of the head provided imaging criteria for differentiation between entrance and exit of the gunshot wounds, which corresponded to the forensic pathological findings at autopsy. CT scans and MRI of the cerebral parenchyma revealed lanes of opaque bone and missile fragments along the course of the missile, which allowed recognition of the missile track in 3D reconstruction. Biometric reconstruction allowed easy determination of the angle of the missile track in all three planes. Examination of the parenchymal structures and imaging of the isolated, formalin-fixed brain enabled tracking of the missile path directly along the zone of destruction as well as demonstration of secondary changes such as air bubbles along the bullet course, hemorrhage and edema. The significance of a translucent zone surrounding the missile track in several cases remains unclear; it probably represents tissue destruction secondary to temporary cavitation. The imaging procedures described here allowed excellent documentation of in situ conditions, while the storing of data enabled biometric reconstruction for determination of the angle of trajectory, of entrance and exit wounds, and the extent of tissue damage along the missile track and, possibly, in the zone of temporary cavitation.

3984. Oehmichen, M. and C. Meissner (2009). "Routine techniques in forensic neuropathology as demonstrated by gunshot injury to the head." Legal medicine (Tokyo, Japan) **11 Suppl 1**: S50-53.

It will be vital to the practical activity of every forensic and/or clinical pathologist to be able to answer three questions regarding the reconstruction of a lethal event: the type and cause of death, as well as the survival time. The authors offer an overview of the application of selected morphological techniques in general forensic neuropathology, techniques that provide answers to some of the main questions in forensic neurotraumatology. The methods are illustrated by individual cases of lethal gunshot injury to the head from low velocity handguns. Besides the general forensic tasks of interpretation of the crime scene and postmortem external examination of the victim's body a computed tomography is recommended for documentation and reconstruction of the missile track. The microscopic techniques involve Nissl-stain for neurons, hematoxylin and eosin for delayed ischemic neuronal alterations,

microtubule-associated protein (MAP) expression for acute neuronal ischemia, luxol-fast-blue-stain for myelin destruction (and demyelination), silver-stain for axons, beta-amyloid precursor protein (beta-APP) for axonal injury, glial fibrillary acidic protein (GFAP) for astrocytic characterization, naphthol AS-D-chloroacetate esterase for neutrophilic infiltration and CD68-expression for microglial reaction. The pattern of methods lead--in the case of gunshot injury as well as in any traumatic impact to the head--to answers according the extent of tissue destruction (and the cause of death), the biometric reconstruction of the criminal event, and the timing of (gunshot) wounds of the brain. These methods will be indispensable for the preparation of future neuropathological expert reports addressing questions of type of injury, the consequent pathological symptoms, timing of the injury, and the cause of death.

3985. Oehmichen, M., et al. (2001). "Brain injury after survived gunshot to the head: reactive alterations at sites remote from the missile track." Forensic science international **115**(3): 189-197.

Gunshot wounds to the brain usually lead to acute respiratory arrest or death after a brief survival period, even in cases involving only slight direct tissue damage. It can be assumed therefore that the damage extends beyond the zone of recognizable destruction and hemorrhages. To determine the true extent of the tissue injury resulting from gunshot wounds to the brain, we carried out microscopic investigations for reactive changes (emigration of leukocytes and macrophages, axonal expression of beta-amyloid precursor protein (beta-APP) in 10 cases of gunshot wound to the narrow channel of the brain with survival times >2h. Demonstration of leukocytes expressing naphthol AS-D chloroacetate esterase activity in the brain tissue at the border of the missile track established the vitality of the gunshot effect. The presence of macrophages (CD68-epitope) allowed demarcation of a 1-2mm wide necrotic zone around the permanent cavity. Within this zone and beyond, beta-APP showed an initial increase followed by a decline in the number of injured axons. Three types of beta-APP positive staining could be differentiated. In the immediate vicinity of the missile track beta-APP positive neurons were present at a distance of 2-4mm from the margin of the permanent cavity (type 1) as a result of primary injured neuronal tissue by the gunshot itself. At longer distances from the narrow channel and the permanent cavity single beta-APP positive axons or axon fragments and two additional types were found; type 2 shows a parallel, wave-like arrangement of the damaged fibers, which suggests that the injury was produced by mechanical acceleration of the brain tissue created by the energy the projectile expended within the brain; irregular aggregation of beta-APP positive axons or axon fragments within a local edema represents type 3, which may be attributed to secondary ischemia or edema.

3986. Oehmichen, M., et al. (2004). "Gunshot injuries to the head and brain caused by low-velocity handguns and rifles. A review." Forensic science international **146**(2-3): 111-120.

OBJECTIVES: Reconstruction of brain injuries is a basic task of forensic neuropathology. For better understanding of the wound ballistics of gunshot injuries to the brain caused by low-velocity firearms (E(o) < 550 J), we reviewed the respective contributions of: (1) biomechanical reconstruction by postmortem imaging techniques, (2) biometry of the extent of very early microscopic tissue destruction, and (3) microscopic studies on the type and extent of early microscopic reactions around the permanent missile track., MATERIAL AND METHODS: A selected case material of 47 victims of lethal gunshot wounding to the brain was studied. (1) Computed tomography (CT) and magnetic resonance imaging (MRI) techniques were compared with macroscopic findings in 17 cases. (2) Morphometric evaluation of the zones of cellular and axonal destruction around the permanent track was performed in 20 cases (survival time: <90 min). (3) Microscopic studies of the emigration of leukocytes and macrophages plus axonal expression of beta-amyloid precursor protein (beta-APP) were conducted in 10 cases (survival time: >90 min)., RESULTS AND CONCLUSIONS: (1) Imaging procedures provided valuable information on entrance and exit wounds, the missile track and secondary changes. (2) Biometry revealed a destruction zone of ca. 3.6 cm around the permanent track corresponding to the "temporary cavity". (3) Microscopic studies of reactive changes demonstrated axonal injury at sites remote from the permanent cavity that could explain the very early respiratory arrest following low-velocity gunshot injury.

3987. Oesterhelweg, L., et al. (2007). "Virtopsy: fatal stab wounds to the skull--the relevance of ante-mortem and post-mortem radiological data in case reconstructions." Legal medicine (Tokyo, Japan) **9**(6): 314-317.

Homicides with a survival of several days are not uncommon in forensic routine work. Reconstructions of these cases by autopsy alone are very difficult and may occasionally lead to unsatisfying results. For the medico-legal reconstruction of these cases, ante-mortem and post-mortem radiological imaging should always be included in the

expertise. We report on a case of fatal penetrating stab wounds to the skull in which a case reconstruction was only possible by combining the radiological ante- and post-mortem data with the autopsy findings.

3988. Offiah, C. and S. Twigg (2009). "Imaging assessment of penetrating craniocerebral and spinal trauma." Clinical radiology **64**(12): 1146-1157.

Craniocerebral and spinal penetrating trauma, which may be either missile (most typically gun-related) or non-missile (most typically knife-related), is becoming an increasingly common presentation to the urban general and specialized radiology service in the UK. These injuries carry significant morbidity and mortality with a number of criteria for prognosis identifiable on cross-sectional imaging. Potential complications can also be pre-empted by awareness of certain neuroradiological features. Not all of these injuries are criminal in origin, however, a significant proportion will be, requiring, on occasion, provision of both ante-mortem and post-mortem radiological opinion to the criminal investigative procedure. This review aims to highlight certain imaging features of penetrating craniocerebral and spinal trauma including important prognostic, therapeutic, and forensic considerations.

3989. Ogawa, Y., et al. (1994). "Penetration injury of the pyramis caused by a kick from a racehorse." Neurosurgical review **17**(3): 217-219.

A 56-year-old man presented with an unusual cranial penetration injury due to a horse's hoof. The CT number of the hoof was 269, and thus clearly not that of a wooden fragment or bone. An emergency operation was performed to remove the foreign body. The operation went well, and no infection developed. Eight months later he could walk unaided and had only mild disorientation.

3990. Ogilvy, C. S., et al. (1988). "Embolism of cerebral tissue to lungs: report of two cases and review of the literature." Neurosurgery **23**(4): 511-516.

Two patients with head injury and pulmonary emboli of brain tissue are described. Both patients developed persistent bleeding with elevations of prothrombin time, partial thromboplastin time, and decreased platelet counts. Postmortem examination identified multiple skull fractures, subdural and subarachnoid blood, cortical tears, and intraparenchymal hemorrhages. Lacerations of dural venous sinuses were documented in each case. Multiple pulmonary arteries contained plugs of cerebral tissue, including fragments of cerebral and cerebellar cortex, and white matter. The literature concerning brain tissue emboli is reviewed. In neonates, three patients who survived longer than 1 hour were found to have evidence of persistent hemorrhage. Among both children and adults, our two cases are the only ones reported with associated clotting abnormalities. Brain tissue embolism in neonates occurs after difficult vaginal deliveries, often in conjunction with the use of forceps. Tears of the tentorium cerebelli or falx cerebri have been documented at postmortem examination in the majority of these cases. By contrast, brain tissue embolism in children and adults occurs in association with severe closed or penetrating head injury. In several cases, as in the two reported here, postmortem examination has demonstrated a large cerebral venous defect as the probable site of entry of brain tissue into the systemic circulation.

3991. Ogun, O. A., et al. (2008). "Unnoticed eyelid foreign body presenting as ptosis." Neuro-Ophthalmology **32**(5): 273-276.

A patient sustained right orbital trauma with unnoticed penetrating injury and a retained eyelid foreign body. She presented six weeks later with a complaint of persistent ptosis. The circumstances surrounding her injury are described, the issues arising and successful management of the case are discussed.

3992. Ogunleye, A. O. A., et al. (2004). "Arrow injury to the skull base." West African journal of medicine **23**(1): 94-96.

An unsual case of penetrating nasal injury with middle skull base involvement, from fired arrow is reported. The arrow was surgically removed and the patient remains well with no sequelae. We therefore present this case because of its rarity. The anatomical principles underlying the surgical management of the lesions are discussed.

3993. Ogura, K., et al. (2006). "New microsurgical technique for intraparenchymal lesions of the brain: transcylinder approach." Acta neurochirurgica **148**(7): 779-785.

BACKGROUND: Although various minimally invasive approaches, including endoscopic, stereotaxic, and ultrasound-guided surgery, have been introduced to minimize damage to healthy brain tissue, the microsurgical technique has retained a significant role in contemporary neurosurgery. A new microsurgical approach to intraparenchymal brain lesions, namely, the transcylinder approach, was developed to realize both minimal surgical access and sufficient microsurgical technique., METHOD: A 0.1-mm transparent polyester film was used to create a cylindrical surgical route. The film was rolled into a thin stick and used to penetrate the brain, and a computer-aided navigation system was used from inside the stick to access the lesion accurately. After the stick gained access to the lesion, it was dilated to 2 cm, and this diameter was maintained during surgery., FINDINGS: The transcylinder approach was used in 11 cases, including intraparenchymal tumours and haematomas, and the usual microsurgical procedure was performed without difficulty. The film avoided unnecessary enlargement of the surgical field and minimized injury to the brain. Intra-operative ultrasonography also can be used to identify the lesion through the cylinder because the polyester film does not reflect the ultrasound beam. The surgical route was observed to recover to almost the same size as the initial cortical incision after removal of the cylinder., CONCLUSIONS: The transcylinder approach could be advantageous for removing tumours or haematomas in the intraventricular or intraparenchymal regions. By avoiding unnecessary retraction, it significantly reduces the risk of injury to surrounding brain tissue while facilitating precise microsurgical technique. The accuracy of this minimally invasive technique can be enhanced when used in conjunction with frameless stereotaxy and intra-operative ultrasound guidance.

3994. Oguz, M., et al. (1993). "Orbitocranial penetration of a pencil: extraction under CT control." European journal of radiology **17**(2): 85-87.

3995. Oh, C., et al. (2020). "Traumatic Cranio-Orbital Injury: Reconstruction Using Extraocular Muscles." The Journal of craniofacial surgery **31**(3): e258-e259.

Cranio-orbital trauma is an uncommon yet devastating injury, especially one in the setting of a high-energy gunshot wound. Such injuries were historically reported in the setting of military conflict, and are associated with vision-threatening complications, often resulting in anophthalmos. The authors report a case of a self-inflicted gunshot wound to the eye, which requires orbital enucleation with exposed frontal lobe dura. To address the exposed dura, the extraocular muscles were utilized from the enucleation procedure to cover the defect in the acute setting prior to final staged reconstruction.

3996. O'Halloran, H. S., et al. (1997). "Accidental ocular perforation from self-inflicted facial palsy." Retina (Philadelphia, Pa.) **17**(2): 164-166.

3997. Oikonomou, A., et al. (2011). "Head trauma by captive bolt gun." BMJ case reports **2011**.

An 80 year-old former cattle-breeder committed suicide with a captive bolt gun. He was transmitted unconscious to emergency department. He had a large penetrating wound in right temporal area. Lateral radiograph of skull revealed a large rounded bony defect. CT verified a large rounded entry site and bony defect at the right pterion. It disclosed a wide, zonal-like haemorrhagic wound canal bearing intraparenchymal bony fragments at its end with no associated metallic fragments. Subarachnoid haemorrhage with bilateral subepidural hematomas and significant brain oedema was demonstrated.

3998. Okada, T., et al. (1993). "Penetrating injury of the transverse sinus by a nail-gun--case report." Neurologia medico-chirurgica **33**(10): 703-705.

A 46-year-old male presented with a penetrating injury of the transverse sinus caused by a nail-gun. Open craniotomy reflected a doughnut-shaped bone flap and the 45 mm long nail, which was fortunately only touching the edge of the sinus, successfully removed. A wide surgical exposure and careful manipulation of the embedded nail are

important to avoid inadvertent injury to the venous sinus and the surrounding brain tissues during the surgical procedure.

3999. Okada-Rising, S., et al. (2022). "INTRANASAL ADMINISTRATION OF ST266 IN A RODENT MODEL OF TRAUMATIC BRAIN INJURY." Journal of neurotrauma **39**(11-12): A56-A57.

ST266 is human amnion-derived multipotent progenitor cell secretome that is currently being evaluated clinically for ophthalmological/antiinflammatory indications and received FDA approval for Phase 1 intranasal nose-to-brain study in humans. Intracerebroventricular infusion of ST266 after traumatic brain injury (TBI) has significantly improved motor function and moderated neuroinflammation in rats. However, intracranial administration is not clinically feasible, whereas intranasal drug delivery bypasses the blood brain barrier and limits adverse systemic effects. The current study was designed to test the potential efficacy of intranasal administration of ST266 following severe penetrating TBI (pTBI) in rodents. Adult Sprague-Dawley rats were subjected to pTBI and received 48µl ST266 or saline delivered in 8µl drops to each nostril. Experimental groups included: (1) sham, (2) pTBI with saline (pTBI+Veh), (3) pTBI with ST266 (pTBI+ST266), and (4) pTBI with a topical bolus of ST266 followed by intranasal delivery (pTBI+Topical). ST266 was administered immediately after brain injury and at 2hr, 6hr, and 24hr post-injury. Brain tissue from regions of interest were collected for assessment of TNF, IL-1β, IL-6, and IFN-γ. Plasma was collected prior to injury, and at 4h, 24h, and 28h post-injury for quantification of GFAP, UCH-L1, NF-L, and Tau using Quanterix Simoa digital ELISA assay. Intranasal administration of ST266 showed a trend towards reducing inflammatory cytokines in brain tissue. However, ST266 did not ameliorate injury-induced increases of GFAP, UCH-L1, NF-L, and Tau in plasma, which may due to the severity of the injury. Additional work evaluating intranasal administration of ST266 in models of concussion may be warranted.

4000. Okada-Rising, S., et al. (2019). "Tacrolimus-based immune suppression following traumatic brain injury negatively affects cognition." Journal of neurotrauma **36**(13): A134.

Tacrolimus is a calcineurin inhibitor with immunosuppressive properties that is frequently employed in post-transplant immunosuppressant cocktails with mycophenolate and steroids. Tacrolimus has demonstrated neuroprotective effects in models of ischemia, spinal cord injury (SCI), and traumatic brain injury (TBI). Thus, utilization of tacrolimus in cell-based therapy for central nervous system (CNS) injury or disease may confound results. This study aimed to identify any potential neuroprotective effects of tacrolimus-based immunosuppression in a preclinical model of penetrating ballistic-like TBI (pTBI). Adult rats were randomized into TBI or Sham groups with or without immune suppression. PTBI was performed unilaterally in the right hemisphere of anesthetized rats. Five days post-pTBI, daily intraperitoneal (IP) administration of 1mg/kg tacrolimus (Prograf) was initiated. 30mg/kg mycophenolate mofetil (CellCept) was administered IP daily 7-16 days post-PBBI. 10mg/kg methylprednisolone acetate (Depo-Medrol) was delivered 7 days post-injury IP and then weekly at 1mg/kg. Control treatment groups received saline (vehicle). Rotarod (7 days and 6 weeks) and Morris water maze (MWM; 5 weeks) assessments were conducted post-treatment. Peripheral blood was sampled on 2, 7, 30, and 90 days post-treatment at 1hour postdrug administration for complete blood count (CBC) analysis. Histopathological analysis for lesion volume and astrocyte activation were conducted at 1, 6, and 12 weeks post-treatment. By treatment day 7, the Tacrolimus-based cocktail significantly decreased the white blood cell (WBC) count, primarily affecting the lymphocyte population, indicating that 7 days of Tacrolimus-based immune-suppression is optimal for neural stem cell transplantation studies. No neuroprotective effects from Tacrolimus were detected on lesion volume and cortical volume loss assessments. Nor were any beneficial effects observed on motor or cognitive outcomes. In fact, pTBI and sham animals treated with Tacrolimus actually performed worse in the MWM task versus vehicle-treated controls which suggests the longlasting lymphocyte population reduction may be associated with the worsened cognitive outcome.

4001. Okada-Rising, S., et al. (2022). "FDA-APPROVED HUMAN FETAL-DERIVED NEURAL STEM CELLS FAIL TO IMPROVE COGNITIVE OR MOTOR OUTCOMEINARODENTMODELOFTRAUMATIC BRAININJURY." Journal of neurotrauma **39**(11-12): A57.

Penetrating traumatic brain injury (pTBI) inflicts a defined focal injury with neurological impairment. Cellular replacement therapy is a potential restorative strategy. NSI-566 are a FDA-approved human neural stem cell (NSC) line with neuronal differentiation capacity used in stroke and spinal cord injury Phase I and II clinical trials. Preclinical studies

demonstrated NSI-566 transplantation mitigates motor dysfunction. This study evaluated the neuroprotective potential of NSI-566 transplantation into the striatum (STR) or hippocampus (HC) following pTBI. Unilateral pTBI was performed on anesthetized rats. At 7 days post-injury, NSCs or vehicle (VEH) were injected into STR or HC regions in injured hemisphere as experimental groups: sham, STR-NSC, STR-VEH, HC-NSC, and HC-VEH. Rotarod testing assessed prior to transplantation (6 days post-pTBI), 8 and 21 days posttransplant. Morris water maze tasks performed at 5 and 6 weeks posttransplant. Significant motor deficits were found in injured groups prior to transplantation ($p < 0.05$ vs sham); however, this was not true following transplantation, regardless of transplant locations (STR, $p = 0.35$. HC, $p = 0.2$). Significant cognitive deficits were found in injured groups vs shams. Transplantation into injured striatal (i.e. perilesional) region nor hippocampus did not yield cognitive benefits. Our results revealed intracerebral targeted treatment with NSI-566 failed to provide significant therapeutic outcomes regardless of the transplant location. The lack of therapeutic effects for NSC transplantation was unexpected and may preclude continued pre-clinical research on this cell line for TBI.

4002. Okay, O., et al. (2009). "Orbitocerebral injury by a knife: case report." Neurocirugia (Asturias, Spain) **20**(5): 467-469.

Orbital penetrating injuries may cause significant harm to the optic nerves and eyeball as well as to the brain and cerebral vessels. Management of orbital foreign bodies should include prompt recognition of the extent of the injury, broad-spectrum parenteral antibiotics, tetanus prophylaxis, anticonvulsant medication and early surgical intervention under direct vision to remove the foreign body and to avoid immediate and long-term complications. We report a penetrating orbital injury caused by a bread knife that extended from the orbit to the tegmental dura mater of the temporal bone. The knife's main trajectory coursed through the temporal lobe. Adjacent cerebral structures were explored before removal of the knife.

4003. O'Kelly, F., et al. (2010). "Gun shot-101: an 8-year review of gunshot injuries in an Irish teaching hospital from a general surgical perspective." Irish journal of medical science **179**(2): 239-243.

BACKGROUND: Gun-related crime offences have increased in the Republic of Ireland steadily over the past number of years. Regional trauma units are witnessing unprecedented numbers of injuries in the Republic of Ireland with limited prior experience., AIMS: Eight-year retrospective study analysing demographic data, management and outcome of firearm-related injuries., RESULTS: Patients who experience gunshot injuries in this region are statistically likely to be young, male and unemployed with a single shotgun injury to an extremity. Post-operative survival rates of 100% for those who undergo an exploratory laparotomy., CONCLUSION: Ireland has comparable survival outcomes to other international centres with similar patient demographics due to timely and appropriate operative intervention. These results serve to provide a template for further patient management.

4004. Oki, T., et al. (2010). "Unusual intracranial stab wounds inflicted with metal tent stakes for a case involving a family murder suicide." Forensic science international **202**(1-3): e19-21.

This article presents a highly unusual homicide involving intracranial stab wounds. Of three members of a family killed by intracranial stab wounds apparently inflicted with metal tent stakes, two also showed signs of wounds inflicted during an apparent struggle with the assailant. A wooden mallet appears to be the implement use to drive the metal stakes into the cranial cavity. In all victims, toxicological analysis indicated the presence of brotizolam at concentrations ranging from 30 to 50ngml(-1). The one victim who showed no signs of wounds incurred during a defensive struggle was found to have blood alcohol levels of 2.87mgml(-1). The assailant, another family member with a history of major psychiatric disorders, apparently committed suicide by drowning following the attacks.

4005. Oksa, H. and A. Pasternack (1981). "Availability of cadaver kidneys for transplantation from brain-dead donors." Scandinavian journal of urology and nephrology **15**(3): 291-294.

The number of potential donors of cadaver kidneys in Finland was estimated on the basis of the death certificates in 1975. Only patients who had died via one of the two main causes of brain death--subarachnoid haemorrhage and head injury--were included. Exclusions were made on grounds of age at death, quality of hospital,

concomitant disease and survival time in hospital. After these exclusions, 209 patients could be regarded as potential donors of cadaver kidneys, a figure which in relation to the total mean population is 45 million and year. The cadaveric kidney potential, 90 kidneys per million population and year, is considered to be more than twice the demand.

4006. Okunaga, T., et al. (2010). "[A case of transorbital penetrating brain injury by a blunt metal rod]." No shinkei geka. Neurological surgery **38**(3): 293-298.

This report presents a case of a transorbital penetrating brain injury caused by a metal rod. A 47-year-old male injured his left lower eyelid with no witness during working hours. The two days later, he presented with a right hand tremor and abnormal behavior, and was admitted to the hospital. A CT showed a bone fracture of the left orbital roof and a low-density lesion of the left frontal lobe. The initial diagnosis was a cerebral contusion due to a blow-out fracture. However, sagittal MR images on the tenth day in the hospital demonstrated a penetrating tract that was running linearly from the left orbital roof to the left caudate head. Therefore, the final diagnosis was a transorbital penetrating brain injury. This case had no severe complications in spite of the delayed diagnosis. Careful examinations are thus required in order to make a correct diagnosis at the first examination, because a transorbital penetrating brain injury might initially present as a slight wound with no neurological signs.

4007. Okunlola, A. I., et al. (2020). "Awake craniotomy in neurosurgery: Shall we do it more often?" Interdisciplinary Neurosurgery: Advanced Techniques and Case Management **21**.

Background: Awake craniotomy allows intraoperative cortical mapping to prevent injury to the eloquent brain region and minimizes the complications of general anaesthesia. The initial indications include epilepsy surgery and excision of diffuse glioma in eloquent brain region. There have been a remarkable development in the fields of neurosurgery and anaesthesia. Aim: To emphasis the role of awake craniotomy in lesions other than diffuse glioma. Method: Prospective review of awake craniotomies by the corresponding author over eighteen month's period. We obtained consent for surgery as routine surgical procedure with emphasis on awake procedure to avoid the possible complications of general anaesthesia. Awake and cooperative patients with suitable lesion location in the brain convexity whose surgery were expected to last not more than four hours had awake craniotomies under scalp nerve block with local anaesthetic solution containing 0.5% xylocaine with adrenaline and 0.125% Bupivacaine. Results: Eight awake craniotomies were done within the period. The age range was 25–92 years. Male: female ratio was 1:1. There were three tumours, one intracerebral abscess, two acute subdural haematoma, a case of intracerebral haematoma secondary to ruptured AVM and craniotomy for removal of posterior left frontal intacerebral metallic object. There was no intraoperative seizures and there was no need to convert to general anaesthesia in any of the cases. A patient with intracerebral haematoma secondary to ruptured arteriovenous malformation (AVM) had excessive primary haemorrhage which was controlled. There was no neurological deficit or seizures and no incidence of wound infection. Conclusion: Awake craniotomy is beneficial in a variety of supratentorial brain lesions provided the patient comfort is not compromised. Awake craniotomy in suitable patients, will reduce the possible anaesthetic complications associated with general anaesthesia with endotracheal intubation and need for post-operative intensive care unit admission.

4008. Okura, H., et al. (2021). "An unprecedented case of penetrating head trauma caused by shoji (a Japanese-style paper sliding door)." Trauma case reports **36**: 100533.

Penetrating head trauma (PHT) includes any traumatic injury where an object pierces the skull and breaches the dural membrane surrounding the brain. PHTs are less prevalent than blunt head injuries. However, they often have more complex damage, worse prognosis, and higher rates of morbidity and mortality. An 83-year-old man fell at his home and hit his head on the right side toward a shoji (a Japanese-style paper sliding door). He reported to the emergency room the following day with his family. He had a small wound before the right ear, which was sutured in the emergency room. A CT scan demonstrated tiny pieces of bone fragments inside the brain, as well as right temporal subcortical hemorrhage and pneumocephalus. He was admitted to the hospital and received intensive prophylaxis with antibiotics. He developed life-threatening skin disease and subsequent acute kidney disease requiring hemodialysis. He fully recovered from his life-threatening condition. Here, we report an unprecedented case of a penetrating head injury of an older adult caused by a shoji.

4009. Olabe, J., et al. (1993). "[Frontal sinus osteoma associated with intracranial porencephalic cavity]." Osteoma de seno frontal asociado a cavidad porencefalica intracraneal. **44**(6): 461-464.

A case of an eighteen-year-old student, complaining of frontal and periorbital headache is presented. Using conventional radiographies and CT Scan a frontal sinus osteoma is diagnosed, finding a hypodense image located in the left frontal cerebral lobe, without perilesional oedema or contrast uptake. During the surgical act, a destruction of the posterior wall of the left frontal sinus is found, penetrating the anterior cerebral fossa and connecting with the cerebral cavity in the left frontal cerebral lobe through a fistula of mucosal tissue that passes through the dura mater. Complete tumoral exeresis was undertaken as well as plastic reconstruction with excellent clinical and cosmetic results. We conclude that the early diagnosis and treatment of these benign lesions should be undertaken in order to avoid the potential complications they can provoke.

4010. Olack, B., et al. (2021). "Causes of preterm and low birth weight neonatal mortality in a rural community in Kenya: evidence from verbal and social autopsy." BMC pregnancy and childbirth **21**(1): 536.

BACKGROUND: Under-five mortality in Kenya has declined over the past two decades. However, the reduction in the neonatal mortality rate has remained stagnant. In a country with weak civil registration and vital statistics systems, there is an evident gap in documentation of mortality and its causes among low birth weight (LBW) and preterm neonates. We aimed to establish causes of neonatal LBW and preterm mortality in Migori County, among participants of the PTBI-K (Preterm Birth Initiative-Kenya) study., METHODS: Verbal and social autopsy (VASA) interviews were conducted with caregivers of deceased LBW and preterm neonates delivered within selected 17 health facilities in Migori County, Kenya. The probable cause of death was assigned using the WHO International Classification of Diseases (ICD-10)., RESULTS: Between January 2017 to December 2018, 3175 babies were born preterm or LBW, and 164 (5.1%) died in the first 28 days of life. VASA was conducted among 88 (53.7%) of the neonatal deaths. Almost half (38, 43.2%) of the deaths occurred within the first 24 h of life. Birth asphyxia (45.5%), neonatal sepsis (26.1%), respiratory distress syndrome (12.5%) and hypothermia (11.0%) were the leading causes of death. In the early neonatal period, majority (54.3%) of the neonates succumbed to asphyxia while in the late neonatal period majority (66.7%) succumbed to sepsis. Delay in seeking medical care was reported for 4 (5.8%) of the neonatal deaths., CONCLUSION: Deaths among LBW and preterm neonates occur early in life due to preventable causes. This calls for enhanced implementation of existing facility-based intrapartum and immediate postpartum care interventions, targeting asphyxia, sepsis, respiratory distress syndrome and hypothermia.

4011. Olasoji, H. O., et al. (2005). "Penetrating arrow injuries of the maxillofacial region." The British journal of oral & maxillofacial surgery **43**(4): 329-332.

We operated on four civilian patients who had unusual penetrating maxillofacial injuries that resulted from assault with arrows. The patients were fully conscious at the time of presentation. Recovery was uneventful in three, but one died.

4012. Olayemi, A. B., et al. (2013). "Pattern, severity, and management of cranio-maxillofacial soft-tissue injuries in Port Harcourt, Nigeria." Journal of Emergencies, Trauma and Shock **6**(4): 235-240.

Background: The pattern of craniofacial soft-tissue injuries occurring either in isolation or in association with fractures vary in different societies and is multiply influenced. The effects are enormous because of the prominence of the face; therefore, the purpose of this study was to document any changing pattern, severity and management of these craniofacial injuries in our center. Patients and Method: Cranio-maxillofacial region was classified into upper, middle and lower face. The cause, type, and site of the injuries were documented. Gunshot injuries were further categorized as penetrating, perforating or avulsions. Further, classification of injuries into mild, moderate, and severe was carried out based on multiple factors. Result: A total of 126 patients with soft-tissue injuries presented to our hospital out of which 85 (67.5%) were males and 41 (32.5) were females. The age range of the patients was between 10 months and 90 years with a mean ± SD of 26.4 ± 15.5 years. Road traffic accident was the most common etiology of which vehicular accidents constituted 50 (54.9%) and the motorcycle was 2 (2.2%). Assault contributed 16 (17.6%) while cases due to gun shots were 13 (14.3%). A total of 19 (15.1%) patients had associated head injuries, 11 (8.7%) patients had craniofacial fractures involving any of the bones while 3 (2.4%) patients had limb fractures and 2 (1.6%) patients had rib fractures. There were 51 (41.8%) cases classified as mild injuries, 37 (30.3%) cases as moderate injuries and 24 (19.7%) cases as severe injuries.

Total of 126 cases managed, 121 (96.0%) received primary closure of the wounds while 5 (4.0%) received delayed closure under general anesthesia.

4013. Olding, J., et al. (2019). "Penetrating head & neck trauma - Epidemiology and injury characteristics in terror-related violence, interpersonal violence and deliberate self-harm at a level 1 trauma centre." The surgeon : journal of the Royal Colleges of Surgeons of Edinburgh and Ireland **17**(3): 133-138.

INTRODUCTION: Penetrating trauma to the head and neck presents specific clinical challenges. Aetiologies include interpersonal violence, deliberate self-harm and terror-related violence. King's College Hospital is a Major Trauma Centre serving inner-city London boroughs with a high incidence of knife and gun crime. It also received victims of the terrorist attack at London Bridge in June 2017., METHODS: Data was collected prospectively on all patients presenting with penetrating trauma to the head and neck over a one-year period (August 2016-July 2017)., RESULTS: Overall figures for penetrating trauma are the highest since comparable records began with 478 cases (2016/17) compared with 172 (2010/11). Most patients had injuries resulting from interpersonal violence (83%); a group consisting mostly in males (88%) under the age of 30 (69%). The sole fatality among all patients was a result of repeat deliberate self-harm. Terror-related violence victims were equally gender split and older; all patients in this group required surgical intervention and had longer lengths of stay (16.3 days) compared with interpersonal violence (6.3 days) and deliberate self-harm (3 days)., CONCLUSION: Violent crime is increasing. Overall penetrating injury has more than doubled in 6 years. The injury characteristics observed are distinct depending on the assailants and motives. Head and neck trauma requires a multidisciplinary approach, with an understanding of the care needs of patients. Interpersonal violence is the most common aetiology and as such efforts to tackle rising violent crime must involve police and the community. In addition, terror-related violence is evolving in the United Kingdom and globally, and as such healthcare professionals must understand differences in aetiologies to promote optimal patient care.

4014. Olding, M., et al. (1993). "Emergency free flap reconstruction of a facial gunshot wound." Annals of plastic surgery **31**(1): 82-86.

An emergency free rectus abdominis myocutaneous flap was used to reconstruct a massive facial gunshot wound with associated cranial communication immediately after the primary debridement. The bony defect was reconstructed with split calvarial and rib grafts, plates, and screws. The free flap provided adequate coverage of the bony reconstruction and separation of the cranial and sinus cavities.

4015. Oley, M. C., et al. (2021). "Penetrating facial injuries may cause intracranial damage." Journal of Pediatric Surgery Case Reports **75**.

Background: Due to the various injuries that can occur during the removal of odd objects, a penetrating facial trauma injury can cause a wide range of injuries. To avoid ophthalmic and/or neurological abnormalities in addition to the risk of infection and or bleeding, accurate diagnosis and prompt treatment are critical. An optimal treatment outcome is achieved through a thorough examination, radiological evaluation, and prompt decision-making. Case presentation: We report two cases of penetrating facial trauma injury caused by metal objects. Immediate medical examination and multidisciplinary intervention are critical for enhancing prognosis, ensuring a successful neurological recovery, and avoiding delayed consequences. At admission and before and after surgery, our client revealed no neurological deficits. Conclusions: Because of the potential for ocular and cerebral damage, penetrating fascial trauma injuries from metal items must not be overlooked. As a result, the purpose of this paper is to raise awareness of the complexity and severity of intracranial damage in addition to infection-related consequences caused by these types of injuries.

4016. Olick, R. S., et al. (2009). "Accommodating religious and moral objections to neurological death." The Journal of clinical ethics **20**(2): 183-191.

4017. Olivecrona, M., et al. (2012). "Prostacyclin treatment and clinical outcome in severe traumatic brain injury patients managed with an ICP-targeted therapy: a prospective study." Brain injury **26**(1): 67.

OBJECTIVE: To prospectively assess clinical outcome in patients with severe traumatic brain injury (sTBI) managed according to an ICP-targeted programme as well as additional treatment with prostacyclin., MATERIALS AND METHODS: Inclusion criteria were GCS ⩽8, age 15-70 years, first recorded cerebral perfusion pressure (CPP) > 10 mm Hg. Exclusion criteria were pregnancy, breastfeeding or penetrating brain injury. The patients were treated using the same ICP-guided protocol, with one group randomized to receive prostacyclin in a low dose (0.5 ng kg(-1)min(-1)). The clinical outcome was prospectively assessed at 3, 6, 12, 18 and 24 months using structured interviews., RESULTS: Forty-eight patients were included, mean age 35.5 years, median GCS 6 (3-8), 69% were multi-traumatized. Mortality at 3 months was 12.5%. Median Glasgow Outcome Scale (GOS) at all follow-up points was 4. Favourable outcome (GOS 4-5) at 3 months was 52%, at 24 months 64%. Favourable outcome increased over time. There was a statistically significant association between GOS, GCS at admission and age. Higher ICP(max) was associated with worse outcome., CONCLUSION: With this treatment protocol, a low number of deaths and a high number of favourable outcomes in sTBI were observed. Prostacyclin in this low dose does not seem to improve the outcome. ICP(max) is a positive predictor of worse outcome. Higher GCS at admission and lower age are correlated to better outcome.

4018. Olivecrona, M., et al. (2012). "Prostacyclin treatment and clinical outcome in severe traumatic brain injury patients managed with an ICP-targeted therapy: a prospective study." Brain injury **26**(1): 67-75.

OBJECTIVE: To prospectively assess clinical outcome in patients with severe traumatic brain injury (sTBI) managed according to an ICP-targeted programme as well as additional treatment with prostacyclin., MATERIALS AND METHODS: Inclusion criteria were GCS <=8, age 15-70 years, first recorded cerebral perfusion pressure (CPP) > 10 mm Hg. Exclusion criteria were pregnancy, breastfeeding or penetrating brain injury. The patients were treated using the same ICP-guided protocol, with one group randomized to receive prostacyclin in a low dose (0.5 ng kg(-1)min(-1)). The clinical outcome was prospectively assessed at 3, 6, 12, 18 and 24 months using structured interviews., RESULTS: Forty-eight patients were included, mean age 35.5 years, median GCS 6 (3-8), 69% were multi-traumatized. Mortality at 3 months was 12.5%. Median Glasgow Outcome Scale (GOS) at all follow-up points was 4. Favourable outcome (GOS 4-5) at 3 months was 52%, at 24 months 64%. Favourable outcome increased over time. There was a statistically significant association between GOS, GCS at admission and age. Higher ICP(max) was associated with worse outcome., CONCLUSION: With this treatment protocol, a low number of deaths and a high number of favourable outcomes in sTBI were observed. Prostacyclin in this low dose does not seem to improve the outcome. ICP(max) is a positive predictor of worse outcome. Higher GCS at admission and lower age are correlated to better outcome.

4019. Oliveira, E. S., et al. (2019). "Facial trauma caused by sharp weapon: case report." International journal of oral and maxillofacial surgery **48**: 201.

Background: Violence is one of the main causes of facial trauma (FT)it represents a significant part of emergency care and differs to others due to the related physical, psychosocial and economic impacts. Sharp weapon traumas occur less frequently in the face, being men more affected. Objectives: Describe a case of aggression and it's followed up. Methods: A 40 years old man, presented at the Metropolitan Hospital of Urgency and Emergency of the state of Pará, Brazil, were victim of physical aggression by a sharpened weapon (machete). After evaluation and stabilization according to the Advanced Trauma Life Suport, the maxillofacial surgery team attended and diagnosed the patient with right zygomatic complex, naso-orbitoethmoid complex and left Le Fort II fractures. Findings: Physical examination revealed a laceration wound involving the right zygomatic, nasal root and left infraorbital region, with considerable mobility of the middle third of the face with lesion of the right eyeball. Under general anaesthesia, fractures were approached through the wound and debridement was performed followed by medial canthopexy. Right zygomaticofrontal and frontonasal suture, right zygomatic arch and left infraorbital rhyme, lateral nasal and frontal process of maxilla were reduced and fixated. Postoperative course was uneventful and the ophthalmology team eviscerated the right eye after 4 days, being discharged on the 5th day. Conclusion: Sharpened FTs present great potential for aesthetic and functional losses, as well as greater risk of infection, however, with correct diagnosis, adequate planning and immediate surgical treatment, the maxillofacial surgeon is able to minimize sequelae and ensure patient rehab. References: Sali Buckhari SG, Khan I, Pasha B, Ahmad W. Management of facial gunshot wounds.

4020. Oliver, W. R., et al. (1995). "Three-dimensional reconstruction of a bullet path: validation by computed radiography." Journal of forensic sciences **40**(2): 321-324.

Three-dimensional visualization is an important tool in the evaluation and demonstration of injury. Creating convincing graphics, however, requires strict distinction between illustrative and reconstructive visualizations and a method of validation. We present a case in which we used a radiation-planning tool to provide a 3-dimensional illustrative visualization of a contact gunshot wound to the head, and validated the result by comparing computed radiographs with radiographs taken at autopsy. We discuss the use of visualization tools for data exploration in forensic pathology.

4021. Oller, L., et al. (1985). "Versive seizures of probable occipital origin in a case of posttraumatic epilepsy." European neurology **24**(5): 355-359.

Oculoclonic versive elemental partial seizures developed in a 38-year-old male, who has suffered from a grave traumatism by impaling. Posttraumatic epileptic symptoms could be related to anatomical lesions at the exit orifice in the right occipitoparietal region.

4022. O'Loughlin, M. and L. Criddle (2003). "A case of penetrating head trauma in an 8-month-old." Journal of emergency nursing **29**(2): 189-190.

4023. O'Loughlin, M. and L. M. Criddle (2004). "A 79-year-old man with an impalement injury of his face." Journal of emergency nursing **30**(4): 303-306.

4024. Olson, K. A., et al. (2020). "Penetrating Injuries from "Less Lethal" Beanbag Munitions." The New England journal of medicine **383**(11): 1081-1083.

4025. Omari, A., et al. (2022). "Globe dislocation and optic nerve avulsion following all-terrain vehicle accidents." American Journal of Ophthalmology Case Reports **27**.

Purpose: Open-air motor vehicles present unique trauma risks to the eyes and face. We describe two patients who suffered a crash while riding an all-terrain vehicle (ATV), leading to globe dislocation with optic nerve avulsion in order to raise awareness about the risks associated with ATV accidents. Observations: In both cases, the injury was caused by high-speed trauma to the orbit involving a tree branch. One patient sustained a life threatening arrythmia requiring a short stay in the intensive care unit, and both patients required emergent surgical management and eventual socket reconstruction. Conclusions and Importance: These cases highlight the need for greater advocacy on behalf of rider safety. The authors encourage ophthalmologists to counsel patients who use ATVs to wear helmets, seatbelts, and protective eyewear to prevent these types of injuries in the future.

4026. Omel'chenko, V. V. (1995). "[Clinico-biochemical comparisons in the acute period of craniocerebral trauma]." Kliniko-biokhimichni porivniannia u hostromu periodi cherepno-mozkovoi travmy.(5-6): 126-129.

The content of prostaglandin F2 alpha was evaluated in the venous blood of 114 young male patients with acute craniocerebral injury of light to moderate severity. Prostaglandin content was determined by a gas/liquid chromatography technique. In the investigations carried out, the blood level of prostaglandin F2 alpha was found to show a strong tendency to increase from the moment of injury and up to day 3 to 5 following which day it began to slowly decline. There seems to be an association between the above process and severity of injury. Mathematic analysis has shown the blood level of prostaglandin to correlate primarily with disorders in the vegetative subdivision of the nervous system.

4027. Ommaya, A. K. (1970). "Nervous system injury and the whole body." The Journal of trauma **10**(11): 981-990.

4028. Onate Miranda, M., et al. (2015). "Amnestic syndrome of the subcallosal artery with additional penetrating vessel involvement." Journal of the neurological sciences **359**(1-2): 438-439.

4029. Ondracek, R., et al. (2022). "An Unexpected Turn After MVA: Multiple Brain Abscesses and CSF Leak Complicating a Severe Blunt Traumatic Brain Injury." American Journal of Respiratory and Critical Care Medicine **205**(1).

Traumatic brain injuries are a common entity in the United States with roughly 5 million TBIs occurring annually. Complications of TBIs vary from cognitive impairment, diffuse axonal injury, seizures, and permanent coma. Brain abscess formation is a rare complication of TBI that presents a complex treatment challenge in which mortality has decreased over time due to the advancement in surgical techniques. A 25 year old male with no past medical history that presented as a level 1 trauma with a blunt force head injury from a motorcycle accident. Patient presented with a GCS-6 and closed head injuries which included multiple facial fractures, diffuse subarachnoid hemorrhage, intraparenchymal hemorrhage, and subdural hematoma. Patient underwent an extensive ICU course including prolonged stay on mechanical ventilation, ICP monitor, treatment of Acinetobacter ventilator associated pneumonia, tracheostomy, PEG tube placement. Patient was slowly weaned off mechanical ventilation and eventually underwent decannulation of tracheostomy. While on the medical floor awaiting placement the patient became more lethargic prompting further imaging which demonstrated pneumocephalus and several air fluid levels concerning abscess formation. The patient underwent a bicoronal craniotomy, abscess drainage with frank pus evacuated, cranialization of frontal sinus and CSF leak repair, and frontal sinus obliteration. The patient's OR cultures did not grow any bacteria however the patient was treated with broad spectrum antibiotics for 6 weeks postoperatively and discharged to rehab. Post traumatic brain abscess formation is a rare complication most often seen in open skull fractures or penetrating trauma with reported incidence ranging from 3 to 16%. Very few incidences of brain abscess formation have been described after closed head injuries, but can occasionally be seen with the presence of residual bone fragments or debris. Here we describe a unique development of brain abscess after blunt force injury. No organism was isolated in our perioperative culture, which has been reported in around 1 out of every 3 brain abscess cases. Similar to our patient, the average time between injury and abscess formation has been documented as 113 days which is an important, delayed complication for clinicians to be aware of.

4030. Ondruschka, B., et al. (2016). "Unusual planned complex suicide committed with a muzzle-loading pistol in combination with subsequent hanging." Archiv fur Kriminologie **238**(5-6): 207-217.

In Germany, suicides by firearms are not very common in contrast to deaths by hanging and intoxications. The use of historical muzzle-loading firearms in the context of suicides is a rarity. Contact shots from muzzle loaders cause an unusual wound morphology with extensive soot soiling. We report the case of a 59-year-old man, who committed a planned complex suicide by shooting into his mouth with a replica percussion gun in combination with hanging. The gunshot injury showed strong explosive effects in the oral cavity with fractures of the facial bones and the skull associated with cerebral evisceration (so-called Kronlein shot). Due to the special constellation of the case with hanging immediately after the shot, external bleeding from the head injuries was only moderate. Therefore, the head injuries could be assessed and partially reconstructed already at the scene.

4031. O'Neill, O. R., et al. (1994). "Transorbital penetrating head injury with a hunting arrow: case report." Surgical neurology **42**(6): 494-497.

The development of more complex and diverse hunting weapons may result in an increase of uncommon forms of penetrating injury to the brain. We present a case of nonfatal transorbital arrow injury to the brain. High velocity projectile injuries merit certain management adaptations from gunshot or low velocity stab wounds. This case highlights the necessity for anterograde removal of the arrow in the direction of its line of trajectory. Early assessment of the patient with cerebral angiography to identify surgically correctable vascular injury is recommended.

4032. O'Neill, P. J., et al. (2009). "Significant pediatric morbidity and mortality from intracranial ballistic injuries caused by nonpowder gunshot wounds. A case series." Pediatric neurosurgery **45**(3): 205-209.

Nonpowder (ball-bearing and pellet) weapons derive their source of energy from compressed air or carbon dioxide. Such weapons are dangerous toys that cause serious injuries and even death to children and adolescents. A retrospective chart review study was undertaken to describe nonpowder gun injuries at a southwestern US urban level I adult and pediatric trauma center. Specific emphasis was placed on intracranial injuries. Over the past 6 years, a total of 29 pediatric and 7 adult patients were identified as having nonpowder firearm injuries. The patient population was overwhelmingly male (89.7%; mean age, 11 years). Overall, 17 out of 29 pediatric patients (56.8%) sustained serious injury. Nine patients (30.0%) required operation, 6 (20.7%) sustained significant morbidity, and there were 2 deaths (6.9%). Injuries to the brain, eye, head, and neck were the most common sites of injury (65.6%). Specific intracranial injuries in 3 pediatric patients are described that resulted in the death of 2 children. We suggest that age warning should be adjusted to 18 years or older for unsupervised use to be considered safe of these potentially lethal weapons.

4033. Ongom, P. A., et al. (2014). "Atypical gunshot injury to the right side of the face with the bullet lodged in the carotid sheath: A case report." Journal of medical case reports **8**(1).

Introduction. Gunshot injuries of the head and neck from the AK-47 rifle (a common assault rifle, submachine gun type) are a significant contributor to morbidity and mortality among civilians in Sub-Saharan Africa. They may cause significant damage to the closely arranged structures in this region, and the bullet's trajectory can be very difficult to determine. We present an unusual case of gunshot injury with an atypical bullet entry wound, profound injury to the face, lodgment in the right carotid sheath, and 'wandering'; a first of its kind in East Africa. Case presentation. A 27-year-old African-Ugandan woman of Nilotic ethnicity was referred to the Accident and Emergency Department of a tertiary hospital in Uganda, having sustained complex injuries due to an inadvertent AK-47 rifle gunshot injury. The gunshot injury was to the right side of her face with a large ragged entry wound and no exit wound. Prior basic wound care and radiological imaging showed a comminuted fracture of her mandible with lodgment of the bullet in her neck, anterior to her sixth and seventh cervical vertebrae. Standard debridement of her wound was done. A computed tomography scan showed an apparent cephalad shift ('wandering') of the bullet, leaving it lying partially anterior to her fifth cervical vertebra as well as within her carotid sheath. Other injuries were to her facial and trigeminal nerves, and her middle ear. The 'wandering' bullet was successfully removed surgically. It had caused no damage to any part of her neck structure. Conclusion: AK-47 rifle bullet injuries may present with uncharacteristically large entry wounds and cause complex structural injuries at the area of impact. The consequent trajectory is difficult to predict making regional examination and radiological investigations essential in management. Bullets may be retained, leaving no exit wound. Securing the airway, controlling hemorrhage and identifying other injuries are the first vital steps. This case illustrates all these interventions and the important decision to extract the entrapped bullet from the patient's neck because it had started to 'wander' and could have caused grave injury over time with further migration. Maxillofacial, plastic, trauma, general and military surgeons, otorhinolaryngologists and emergency physicians can gain from this experience because it calls for a multidisciplinary team approach.

4034. Onifer, D. J., et al. (2019). "Management of Hemorrhage From Craniomaxillofacial Injuries and Penetrating Neck Injury in Tactical Combat Casualty Care: iTClamp Mechanical Wound Closure Device TCCC Guidelines Proposed Change 19-04 06 June 2019." Journal of special operations medicine : a peer reviewed journal for SOF medical professionals **19**(3): 31-44.

The 2012 study Death on the battlefield (2001-2011) by Eastridge et al.1 demonstrated that 7.5% of the prehospital deaths caused by potentially survivable injuries were due to external hemorrhage from the cervical region. The increasing use of Tactical Combat-Casualty Care (TCCC) and other medical interventions have dramatically reduced the overall rate of combat-related mortality in US forces; however, uncontrolled hemorrhage remains the number one cause of potentially survivable combat trauma. Additionally, the use of personal protective equipment and adaptations in the weapons used against US forces has caused changes in the wound distribution patterns seen in combat trauma. There has been a significant proportional increase in head and neck wounds, which may result in difficult to control hemorrhage. More than 50% of combat wounded personnel will receive a head or neck wound. The iTClamp (Innovative Trauma Care Inc., Edmonton, Alberta, Canada) is the first and only hemorrhage control device that uses the hydrostatic pressure of a hematoma to tamponade bleeding from an injured vessel within a wound. The iTClamp is US Food and Drug Administration (FDA) approved for use on multiple sites and works in all compressible areas, including on large and irregular lacerations. The iTClamp's unique design makes it ideal for controlling external hemorrhage in the head and

neck region. The iTClamp has been demonstrated effective in over 245 field applications. The device is small and lightweight, easy to apply, can be used by any level of first responder with minimal training, and facilitates excellent skills retention. The iTClamp reapproximates wound edges with four pairs of opposing needles. This mechanism of action has demonstrated safe application for both the patient and the provider, causes minimal pain, and does not result in tissue necrosis, even if the device is left in place for extended periods. The Committee on TCCC recommends the use of the iTClamp as a primary treatment modality, along with a CoTCCC-recommended hemostatic dressing and direct manual pressure (DMP), for hemorrhage control in craniomaxillofacial injuries and penetrating neck injuries with external hemorrhage. Copyright 2019.

4035. Onizuka, M., et al. (2001). "[Penetrating head injury caused by an icepick]." No shinkei geka. Neurological surgery **29**(11): 1101-1105.

The patient was a 39-year-old man, with a three year history of schizophrenia, who attempted suicide by piercing his head with an icepick. Spinal cord injuries and shock caused by falling from the fifth floor of the building following this penetrating injury were also noted on admission. The CT scan revealed that the icepick had deeply penetrated the posterior fossa from the forehead. No new neurological deficits or cerebrospinal fluid leakage appeared after admission. The icepick was removed completely without difficulty. In penetrating head injuries, early assessment with cerebral angiography to determine the extent of vascular injury is useful for deciding if surgery should be performed.

4036. Onose, G., et al. (2009). "Neuroprotective and consequent neurorehabilitative clinical outcomes, in patients treated with the pleiotropic drug cerebrolysin." Journal of medicine and life **2**(4): 350-360.

BACKGROUND: Discovery of neurotrophic factors--emblematic: the nerve growth factor (NGF)--resulted in better approaching central nervous system (CNS) lesions. Recently, another crucial property has been unveiled: their rather unique pleiotropic effect. Cerebrolysin is a peptide mixture that penetrates the blood-brain barrier in significant amounts and mimics the effects of NGF., METHODS: Comparative analysis: Cerebrolysin treated (10 ml x 2/day, i.v. x 3 weeks) vs. non-treated, in patients (all received aside, a rather equivalent complementary, pharmacological and physical, therapy). Two lots of patients, admitted in our Physical & Rehabilitation (neural-muscular) Medical-PR(n-m)M-Clinic Division, during 2007-2009: 69 treated with Cerebrolysin (22 F, 47 M; Average: 59.333; Mean of age: 61.0 Years old; Standard deviation 16.583) and 70 controls (41 F, 29 M; A: 70.014; M.o.a.: 70.5 Y.o.; S.d.: 6.270) were studied. The total number of assessed items was 13: most contributive in relation with the score of Functional Independence Measure at discharge (d FIM), were: admission (a FIM), number of physical therapy days (PT), number of hospitalization days (H), age (A) and--relatively--days until the first knee functional extension (KE). Concomitantly, the main/key, focused on neuro-motor rehabilitative outcomes, functional/analytical parameters, have been assessed regarding the speed in achieving their functional recovery., RESULTS: Concerning d FIM, there have not been objectified significant differences between the two lots (p=0.2453) but regarding key, focused on neuro-motor rehabilitative outcomes, functional/analytical parameters: KE (p=0.0007) and days until the first time recovery of the ability to walk between parallel bars (WPB--p=0.0000)--highly significant differences in favor of Cerebrolysin lot resulted., CONCLUSION: Cerebrolysin administration, as neurorehabilitative outcomes, proved to hasten, statistically significant, especially the recovery of some critical, for standing and walking, parameters. Thus encouraged, we have now initiated a comprehensive national, 5 year retrospective, multi-centre--based on unitary data acquisition frame and mathematical apparatus--study, to evaluate the results of the treatment with Cerebrolysin in traumatic brain injuries (TBI).

4037. Opeskin, K. and S. Cordner (1990). "Nail-gun suicide." The American journal of forensic medicine and pathology **11**(4): 282-284.

Two cases are reported of young men who committed suicide using a nail gun. One shot himself through the heart and left lung. The other shot himself in the head. No cases of completed suicide by nail gun have previously been reported in the English literature. These cases are reported because of their uncommon nature and because they represent a potentially fatal use of a relatively common industrial implement.

4038. O'Phelan, K. H., et al. (2015). "Therapeutic temperature modulation is associated with pulmonary complications in patients with severe traumatic brain injury." World journal of critical care medicine **4**(4): 296-301.

AIM: To examine complications associated with the use of therapeutic temperature modulation (mild hypothermia and normothermia) in patients with severe traumatic brain injury (TBI)., METHODS: One hundred and fourteen charts were reviewed. Inclusion criteria were: severe TBI with Glasgow Coma Scale (GCS) < 9, intensive care unit (ICU) stay > 24 h and non-penetrating TBI. Patients were divided into two cohorts: the treatment group received therapeutic temperature modulation (TTM) with continuous surface cooling and indwelling bladder temperature probes. The control group received standard treatment with intermittent acetaminophen for fever. Information regarding complications during the time in the ICU was collected as follows: Pneumonia was identified using a combination of clinical and laboratory data. Pulmonary embolism, pneumothorax and deep venous thrombosis were identified based on imaging results. Cardiac arrhythmias and renal failure were extracted from the clinical documentation. acute respiratory distress syndrome and acute lung injury were determined based on chest imaging and arterial blood gas results. A logistic regression was conducted to predict hospital mortality and a multiple regression was used to assess number and type of clinical complications., RESULTS: One hundred and fourteen patients were included in the analysis (mean age = 41.4, SD = 19.1, 93 males), admitted to the Jackson Memorial Hospital Neuroscience ICU and Ryder Trauma Center (mean GCS = 4.67, range 3-9), were identified and included in the analysis. Method of injury included motor vehicle accident (n = 29), motor cycle crash (n = 220), blunt head trauma (n = 212), fall (n = 229), pedestrian hit by car (n = 216), and gunshot wound to the head (n = 27). Ethnicity was primarily Caucasian (n = 260), as well as Hispanic (n = 227) and African American (n = 223); four patients had unknown ethnicity. Patients received either TTM (43) or standard therapy (71). Within the TTM group eight patients were treated with normothermia after TBI and 35 patients were treated with hypothermia. A logistic regression predicting in hospital mortality with age, GCS, and TM demonstrated that GCS (Beta = 0.572, P < 0.01) and age (Beta = -0.029) but not temperature modulation (Beta = 0.797, ns) were significant predictors of in-hospital mortality [chi(2) (3) = 22.27, P < 0.01] A multiple regression predicting number of complications demonstrated that receiving TTM was the main contributor and was associated with a higher number of pulmonary complications (t = -3.425, P = 0.001)., CONCLUSION: Exposure to TTM is associated with an increase in pulmonary complications. These findings support more attention to these complications in studies of TTM in TBI patients.

4039. Oppenheimer, D., et al. (1987). "Left-hemisphere missile injury. A clinical and anatomical case study, with 25-year follow up." Archives of neurology **44**(8): 857-861.

A case is reported of left-hemisphere missile injury sustained in 1944. A stable pattern of selective loss (dysphasia, dyslexia, dysgraphia, and verbal memory impairment) and intact abilities (perceptual and spatial skills and nonverbal memory) was followed up for 25 years. No progressive or generalized intellectual deterioration to suggest interaction between this brain injury and normal aging was observed. The clinical and neuropsychological sequelae are related to the detailed postmortem findings.

4040. Orbay, A. S., et al. (1997). "Unusual penetrating faciocranial injury caused by a knife: a case report." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **25**(5): 279-281.

Penetrating head and neck trauma in children is uncommon and are potentially life-threatening injuries. Penetrating trauma to the head in children is a challenging problem for both the initial evaluating physicians and surgeons. We report upon a patient who had fallen from a tree while cutting vegetables and sustained a penetrating faciocranial injury caused by his knife. Clinical examination showed a knife which had entered his face in the right preauricular, pre-temporomandibular joint area below the zygomatic arch. His left bulbus oculi was exophthalmic and a complete ptosis was present. He was fully conscious. The only abnormal finding was complete left visual loss. The other neurological ophthalmological and systemic physical evaluations were normal. The Glasgow Coma scale score was 14. The modalities of treatment and the outcome of the operation are described and the management of similar injuries is discussed.

4041. Ordia, J. I. (1989). "Neurologic function seven years after crowbar impalement of the brain." Surgical neurology **32**(2): 152-155.

The management of impalement injuries to the brain presents formidable problems. A 39-year-old man was impaled by a crowbar which penetrated the brain. The prompt rescue and resuscitation, thorough surgical debridement, control of intracranial pressure and rehabilitation are described.

4042. Ordia, J. I. (2009). "Brain impalement by an angle metal bar." Clinical neurology and neurosurgery **111**(4): 368-372.

The author reports the case of a 37-year-old right-handed man who was impaled in the head by an angle metal bar at a construction work site. Impalement injuries of the brain are rare, and their management is complex. The surgical treatment of the injury and the medical management of complications are described in detail. The patient made a good recovery although he has functional deficits related to the injury to his frontal lobes.

4043. Origitano, T. C. (2011). "Use of abdominal free fat for cosmetic augmentation and primary CSF closure in supratentorial skull base surgery: Managing the stigmata of the temporal defect." Skull Base **21**.

The most prominent stigmata of supratentorial skull base surgery is the defect from the wasting of the temporalis muscle. The cause of tissue volume loss can be denervation/devascularization, loss of muscle anatomical insertion, direct trauma, and/or rotation as an in situ vascularized graft. These events lead to temporal defect know to the patient as “the divot in my head” or the perceived swollen cheek. Abdominal free fat is used freely to close posterior fossa defects with excellent results. Over the past 36 months abdominal free fat grafts have been used to bolster the closure of supratentorial skull base surgery 18 times: (1) 2 for primary closure for resected dura, (2) 6 to fill the deficit caused from the rotation of the temporalis muscle as an in situ graft, (3) 2 for primary volume loss from penetrating trauma, (4) 3 for volume loss from previous operations, and (5) 4 for primary closures after extensive removal of orbital and sphenoid bone. Fat was applied in a volume that allowed for 30% loss in the following locations: (1) over the periorbitum under the muscle, (2) over the muscle under a temporalis fascia/pericranium graft, and (3) between the bone flap and muscle. The final contour of the head occurred between 3 and 6 months. One patient required liposuction for cosmesis. The use of fat for supplemental cranioplasty is fiscally prudent - there is little risk of rejection or infection, it serves well to contain CSF leak, and it is readily available. In addition it serves well as an interface for future imaging of recurrence or progression. The cosmetic results were gratifying, especially in the reoperations, which resulted in resolution of previous defects. The basic technique will be presented.

4044. Origitano, T. C., et al. (1992). "Complex cranial base trauma resulting from recreational fireworks injury: case reports and review of the literature." Neurosurgery **30**(4): 570-576.

Two patients who sustained complex skull base trauma secondary to recreational fireworks injuries are reported. Initial assessment and management included axial and coronal computerized tomography, control of hemorrhage, debridement of wound and brain, isolation of brain from external environment, and reconstruction of the cranial base floor. Secondary orbital and facial reconstruction used available bone fragments and iliac bone graft in one patient and vascularized free tissue transfer in the other. In both patients, reconstruction of both the intracranial and extracranial compartments was successful with acceptable cosmetic result. Modification of multiple conventional approaches, along with a multispecialty surgical team, was used to deal effectively with these unique cases.

4045. Orlov, V. P. (2016). "[Comparative evaluation of drainage methods used for penetrating gunshot cerebral injuries]." Voenno-meditsinskii zhurnal **337**(4): 15-20.

The paper presents a comparative evaluation of the methods of gunshot craniocerebral wounds draining, applied when the primary surgical treatment at the stages of medical evacuation of the limited contingent of Soviet troops in Afghanistan. An analysis of occurring infectious complications and outcomes of surgical treatment of the wounded is given. Based on clinical observations revealed most effective method of the active drainage gunshot traumatic brain injuries. The advantages of tidal drainage, appropriate for mechanical cleaning of wounds, allows controlling hemostasis, using antibacterial solutions are given.

4046. Orman, J. A., et al. (2012). "Epidemiology of moderate-to-severe penetrating versus closed traumatic brain injury in the Iraq and Afghanistan wars." The journal of trauma and acute care surgery **73**(6 Suppl 5): S496-502.

BACKGROUND: US combat operations in Iraq and Afghanistan have resulted in a greater proportion of service members with head and neck wounds caused by explosions compared with that of previous wars. Although penetrating traumatic brain injury (TBI) is frequently associated with these wounds, the epidemiology of penetrating TBI from these conflicts has not been well described., METHODS: The Joint Theater Trauma Registry was queried for January 2003 through December 2010 to identify all patients with moderate-to-severe brain injury with a maximum Abbreviated Injury Scale (AIS) score of the head of 3 or greater and a diagnosis of penetrating or closed TBI in accordance with the Department of Defense Traumatic Brain Injury Surveillance definition. The epidemiology of these injuries was examined, including demographics, TBI severity, overall injury severity, and surgical interventions provided., RESULTS: A total of 1,255 TBI patients (774 penetrating, 481 closed) meeting criteria were identified. Penetrating brain injuries were more severe, more likely to be battle related, and less likely to be isolated injuries than a group of moderate-to-severe closed TBIs within the same range of anatomic injury severity. During the 5-year period of the Iraq war with the largest numbers of TBIs (2004-2008), the numbers of penetrating TBIs exceeded closed TBIs by a ratio of 2:1. During the 3-year period of the Afghanistan war with the greatest numbers of TBIs (2008-2010), the ratio of penetrating to closed TBIs was substantially lower, approximately 1.3:1., CONCLUSION: This study represents the first comprehensive report on the epidemiology of moderate-to-severe penetrating and closed TBIs resulting from the wars in Iraq and Afghanistan using Joint Theater Trauma Registry data. With the maturing theater of conflicts, penetrating TBIs were substantially less predominant compared with closed TBIs. While this finding may reflect changes in the use of protective measures and tactics or improvements in diagnosis of closed TBIs, additional research is needed to identify the reason for this shift and the subsequent effect on outcome after combat-related TBIs., LEVEL OF EVIDENCE: Epidemiologic study, level III.

4047. Orrison, W. W., Jr., et al. (1994). "MR 'hot nose sign' and 'intravascular enhancement sign' in brain death." AJNR. American journal of neuroradiology **15**(5): 913-916.

Three cases of MR with gadopentetate dimeglumine in patients diagnosed with cerebral death are presented. Observation of an MR "hot nose sign" and an "intravascular enhancement sign" provided additional imaging support in the clinical diagnosis of brain death. The MR findings in brain death include: 1) transtentorial and foramen magnum herniation, 2) absent intracranial vascular flow void, 3) poor gray matter/white matter differentiation, 4) no intracranial contrast enhancement, 5) carotid artery enhancement (intravascular enhancement sign), and 6) prominent nasal and scalp enhancement (MR hot nose sign). Additional modalities for confirming brain death are discussed.

4048. Orszagh, M., et al. (2009). "Transorbital intracranial impalement injuries by wooden foreign bodies: clinical, radiological and forensic aspects." Forensic science international **193**(1-3): 47-55.

Facial impalement injuries involve the danger of diagnostic pitfalls. Even if the penetrating object extends into the cranial cavity, the clinical symptoms and the radiological signs may be uncharacteristic. In order to illustrate the diagnostic problems, two cases of accidental impalement are reported. In both of them, a wooden foreign body penetrated via the orbita into the cranium and remained undetected at first. Imaging by CT and MRI is presented and compared with regard to the respective diagnostic validity of these methods. Due to its specific anatomic configuration, the orbita constitutes a predilective pathway for low-velocity foreign bodies entering the skull. Based on the clinical data and the radiological findings, transorbital impalement wounds inflicted by wooden objects are discussed under neurosurgical and medicolegal aspects.

4049. Ortakoglu, K., et al. (2006). "Vertical distraction osteogenesis of fibula transplant for mandibular reconstruction: a case report." Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics **102**(4): e8-11.

Bone continuity defects in the mandible are caused by tumor surgery, trauma, infection, or osteoradionecrosis. Today, reconstruction of long-span mandibular defects with a free fibular flap is a routine procedure. However the bone height of the mandible after reconstruction is about half that of the dentulous mandible. Therefore, the deficiency in bone height makes implant placement impractical. In our case, because it was necessary to restore the mandibular height, a vertical distraction osteogenesis was performed on the grafted mandible of the patient who was referred to our clinic with a reconstructed mandible owing to a gunshot injury. As a result, the vertical discrepancy between the fibula and the native hemimandible of the patient was corrected. And the placement of dental implants was performed without any complications. In conclusion, we believe that the vertical distraction osteogenesis of free vascularized fibula flaps is a reliable technique that optimizes implant positioning for ideal prosthetic rehabilitation.

4050. Ortmann, J., et al. (2016). "Lethal hypothermia after firing a suicidal shot to the head in a car." Archiv fur Kriminologie **238**(5-6): 188-197.

In suicide cases involving an automobile, the car is mostly used as a tool/instrument for the suicide (intoxication by exhaust fumes, crash against solid objects such as a pylon). However, a car is uncommonly also used only as the location for a suicide. In the present case, a 70-year-old man had been found dead on the passenger seat of his car. According to witnesses, the car had not been parked there at the same time of the previous day. During that period, the weather had been dry, with temperatures ranging from -10 C at night to +50 C during the day. The man had shot himself with a small-caliber revolver (so-called bulldog-revolver) almost horizontally in the left temple (transtemporal shot through the frontal lobes). Obviously, the suicide had retained the capability to act at least for a short time, as the revolver was found under his left bottom. As morphological signs of prolonged agony some findings of hypothermia were observed (e. g. Wischnewski spots of the stomach).

4051. Osbon, D. B. (1973). "Intermediate and reconstructive care of maxillofacial missile wounds." Journal of oral surgery (American Dental Association : 1965) **31**(6): 429-437.

4052. Osborne, S. F., et al. (2009). "Orbital crossbow injury." Clinical & experimental ophthalmology **37**(5): 527-529.

4053. Oseni, A., et al. (2019). "Outcome of traumatic brain injury at a neurocritical care unit: A review of 189 patients." Southern African Journal of Critical Care **35**(1): 31-32.

Background. Traumatic brain injury (TBI) is a major public health concern, particularly in resource-constrained environments. Management focuses on neuroprotection and the prevention of both secondary brain injury and non-neurological complications. Objective. To retrospectively analyse patients with TBI admitted into neurosurgical ICU in a tertiary hospital between January 2018 and December 2018. Methods. Patients' basic demographics, mechanism of injury, admitting Glascow Coma Score (GCS), radiological findings and clinical diagnosis on ICU admission were reviewed. ICU length of stay, surgeries undergone, complications and adverse events during ICU course were also evaluated. The primary outcome was either survival or death. Results. One hundred and eighty-nine patients (n=166; 87.8% male) with TBI were admitted into the ICU over the study period. The most common mechanism of injury was interpersonal assault, accounting for 40.4% (n=86) of cases, followed by road traffic accidents (22.1%) and head gunshot wound (11.1%). Overall, 13.1% of patients developed complications during the ICU stay, most commonly respiratory (5.2%; including ventilator-associated pneumonia, lung collapse and pneumothoraxes), followed by sepsis (3.8%). The crude ICU death rate among TBI patients was 6.4%. Of the survivors, 59.7% were discharged to the step-down ward with Glascow Outcome Score (GOS) >3. There was significant correlation between admitting GCS and in-ICU mortality. Conclusion. TBI continues to have significant morbidity and mortality; however, with dedicated neurosurgical intensive care focused on preventing secondary brain injury, the immediate short-term outcome appears to have improved.

4054. O'Shaughnessy, B. A., et al. (2005). "Transarterial coil embolization of a high-flow vertebrojugular fistula due to penetrating craniocervical trauma: case report." Surgical neurology **64**(4): 335-340.

BACKGROUND: Vertebrojugular fistulas after penetrating cervical trauma (gunshot or stab wounds) are rarely reported. Successful endovascular coil embolization of an acute fistulizing vertebral artery pseudoaneurysm involving an obstructed internal jugular vein is presented and the various treatment strategies for such a lesion are described., CASE DESCRIPTION: A 23-year-old man presented from an outside institution after sustaining 2 gunshot wounds in a civilian conflict. Neuroimaging revealed a right vertebral artery pseudoaneurysm, which formed a fistulous connection with the internal jugular vein. Because venous outflow obstruction was present just below the fistula, a high-flow shunt was directed intracranially. Both the pseudoaneurysm and arteriovenous fistula were accessed percutaneously via a transfemoral route and coil embolization was performed. Perfusion of the basilar artery circulation was assumed by the contralateral vertebral artery. The ipsilateral posteroinferior cerebellar artery filled through retrograde flow down the vertebral confluence., CONCLUSIONS: Coil embolization is a safe and reliable strategy by which to obliterate an acute

traumatic vertebrojugular fistula as well as pseudoaneurysm. Serial angiographic follow-up is mandatory to document a persistent cure.

4055. O'Shaughnessy, B. A., et al. (2005). "Ruptured traumatic vertebral artery pseudoaneurysm in a child treated with trapping and posterior inferior cerebellar artery reimplantation. Case report and review of the literature." Journal of neurosurgery **102**(2 Suppl): 231-237.

The authors present the case report of a pediatric patient with a ruptured traumatic pseudoaneurysm of the intracranial vertebral artery (VA) from which the posterior inferior cerebellar artery (PICA) emerged. After considering multiple therapeutic options, the patient was treated surgically by trapping of the aneurysm segment and direct reimplantation of the PICA distal to the rupture site. In addition to presenting this unique case, the authors discuss the treatment of VA pseudoaneurysms and the various techniques for PICA revascularization. A review of the literature on PICA reimplantation is provided as an adjunct in the treatment of complex VA aneurysms.

4056. Oshry, T. and T. Lifihitz (2001). "Traumatic wound dehiscence after corneal graft." Ophthalmic surgery and lasers **32**(6): 470-473.

BACKGROUND AND OBJECTIVE: Any trauma to a corneal transplanted eye is likely to lacerate the corneal wound because of persistent wound weakness, even years after keratoplasty. We evaluate the risks and consequences of trauma after penetrating keratoplasty (PKP)., METHODS: Records of 11 patients who had been treated in our department from 1992 to 1998 for traumatic wound dehiscence after PKP were reviewed for the type of insult, visual acuity, operative methods, and outcome., RESULTS: The period between corneal grafting and wound rupture ranged from two months to three years. In 9 patients, the sutures were still in place. All the ruptures occurred at the donor-recipient interface. In 5 patients, the rupture was in the inferior half of the wound, in another 5 patients in the superior half, and in 1 patient it was nasal. In all the patients, the extent of the rupture was over 120 degrees and the lens was effected. All the patients had posterior segment involvement, the extent of which was related to the visual outcome. One eye was enucleated, another eye regrafted, and 8 of the remaining 9 grafts were restored and remained transparent., CONCLUSIONS: Despite severe trauma, most of the grafts' clarity can be restored, and good visual results can be achieved.

4057. Osiac, E., et al. (2021). "Optical coherence tomography microscopy in experimental traumatic brain injury." Microscopy research and technique **84**(3): 422-431.

Worldwide elderly traumatic brain injury (TBI) patients tend to become an increasing burden to the society. Thus, a faster and less expensive way of evaluating TBI victims is needed. In the present study we investigated if optical coherence tomography (OCT) could be used as such a method. By using an animal model, we established if OCT can detect cortical changes in the acute phase of a penetrating TBI, in young (5-7 months) and old (20-22 months) rats. Due to the long-term evolution of TBI's, we wanted to investigate to what extent OCT could detect changes within the cortex in the chronic phase. Adult (7-12 months) male rats were used. Surprisingly, OCT imaging of the normal hemisphere was able to discriminate age-related differences in the mean gray values (MGV) of recorded pixels ($p = .032$). Furthermore, in the acute phase of TBI, OCT images recorded at 24 hr after the injury showed differences between the apparent damaged area of young and aged animals. Changes of MGV and skewness were only recorded 48 hr after injury. Monitoring the chronical evolution of the TBI with OCT revealed changes over time exceeding the normal range recorded for MGV, skewness and kurtosis, 14 and 21 days after TBI. Although in the present study we still used an extremely invasive approach, as technology improves, less invasive and non-harmful ways of recording OCT may allow for an objective way to detect changes within the brain structure after brain injuries.

4058. Osian, G., et al. (2011). "[Non-ulcerous duodenal perforations: a clinical analysis of 23 cases]." Perforatiile neulceroase ale duodenului: analiza a 23 de cazuri. **106**(3): 321-325.

Non-ulcerous duodenal perforations are a rare and seldom studied pathology. The present retrospective study analyses a group of 23 patients, over a 10 year period (Jan 1st 2000 - Dec 31st 2009) with this pathology. The most frequent etiology was iatrogenic (52.17 % after ERCP and 17.39% after upper gastrointestinal endoscopy). Other rare

etiologies included were tumoral perforations, penetrating wounds, and ingestion of foreign bodies. The lesions vary from millimetric perforations to total necrosis of the wall of a duodenal segment and are often associated with other complex lesions. The overall mortality was 52.17%, a little lower for the post ERCP injuries (40%). Usually the iatrogenic lesions are diagnosed earlier (ex. 54.54% of the post ERCP lesions undergo surgery during the first 24 h), probably increasing the chance of surviving. 43.47% of cases undergo surgery in the condition of severe sepsis, with multiple organ failure, thus aggravating the prognosis. Sometimes the patient required multiple interventions (with a maximum of 8 in our group). In 26% of the cases the primary intervention was just paraduodenal and/or retroperitoneal drainage, suture of the duodenum (6 cases - 26%), usually under the protection of a gastro-enteroanastomosis (4 cases - 17.39%), suture of the duodenum around a decompression tube (26%), sometimes suture of the duodenum with a jejunal serous patch or duodeno-jejunal anastomosis. The bile drainage and the jejunostomy were associated sometimes. The procedures in this pathology have a significant morbidity, with a high rate of reinterventions (30.4%).

4059. Osifo, O. D., et al. (2012). "Epidemiology and pattern of paediatric and adolescent trauma deaths in a level 1 trauma centre in Benin city, Nigeria." Injury **43**(11): 1861-1864.

BACKGROUND: Trauma is a common cause of death amongst children/adolescents, and data on its epidemiology and pattern are crucial for policy formulation. The aim of this study was to determine the epidemiology and pattern of paediatric/adolescent trauma death in a Nigerian referral trauma centre., METHODS: The clinical and autopsy data of all paediatric/adolescent trauma death at the University of Benin Teaching Hospital between 1999 and 2010 were analysed in a retrospective study., RESULTS: Of 905 trauma-related deaths, 78 (9%) involved children/adolescents who comprised 49 males and 29 females, with a male/female ratio 1.7:1 and a mean age of 9.2 +/- 5 years (range <1-18 years). The Injury-Arrival time varied from 1h to 4 days (mean 18 h). Thirteen (17%) cases were dead on arrival (DOA), and majority of the deaths occurred within the first week on admission. Road traffic accident (RTA), accounting for 61 (78%) cases, was the leading cause of trauma death. Other causes included burns, eight (10%); gunshot injury, five (6%); and stab and sport injuries, two (3%) cases each. Head injury which occurred in 44 (56%) cases was the commonest cause of death, followed by haemorrhagic shock in 25 (32%), hypovolaemic shock in five (6%), septic shock in three (4%) and spinal cord injury in one (1%)., CONCLUSION: Head injury following RTA was the major cause of paediatric/adolescent trauma deaths. Increased road safety campaign, appropriate injury control policies, legislations, enforcement, development of high-quality trauma system, and emergency medical services are advocated.

4060. Osman, F. A. O., et al. (2022). "Isolated temporal infarct due traumatic vertebral artery dissecting pseudo-aneurysm: a rare case report." Radiology Case Reports **17**(10): 3574-3577.

The authors describe a rare case of traumatic vertebral artery dissecting pseudo-aneurysm with temporal lobe infarct in the pre-foramina segment of the left vertebral artery following knife injury of the left anterolateral neck area. A 40 years old man was admitted to the emergency department after a penetrating injury in the left anterolateral neck. On contrast-enhanced CT and Doppler ultrasonography in the neck, a dissecting pseudo-aneurysm of the vertebral artery was revealed. On day 2, MRI scanning revealed an ischemic infarct in the temporal lobe, which can be attributed to vertebral artery injury. The case was treated conservatively and the patient was discharged on the fourth hospital day. Owing to the position of the artery, traumatic vertebral artery dissections are uncommon, and they are linked with a high mortality rate due to aneurismal rupture and embolic impact of the dissections, culminating in stroke in young people. Our findings demonstrate the necessity of imaging in head and neck traumatic injuries to detect vertebral artery injuries far sooner in order to prevent complications.

4061. Osorio, J. P., et al. (2011). "Carotid-cavernous fistulae: Clinical and angiographic results in patients treated by the Neuro-radiology Group at a third-level University Hospital in Medellín, Colombia, 1995-2007." Iatreia **24**(2): 146-156.

Introduction: Carotid-cavernous fistulae are frequently found in Medellín, Colombia and their surgical treatment associates with a high rate of complications due to the peculiarities of this anatomic zone. Endovascular therapy has become the first option in patients with these lesions. Objective: to describe the main demographic, clinical and angiographic features of a group of patients with carotid-cavernous fistulae, the therapeutic approach used in them, and the results obtained from the clinical and angiographic standpoints. Patients and methods: We reviewed the clinical charts of 51 patients treated by the Neuro-radiology Group at Hospital Universitario San Vicente de Paúl, in Medellín,

Colombia, between 1995 and 2007. The following information was taken into account: demographic variables, etiology, initial and final clinical situation, therapeutic procedures, and angiographic results. Results: A total of 51 patients were found, three of which had bilateral lesions. Two patients had spontaneous resolution of their fistulae and in one more it resolved with carotid massage. Endovascular treatment was therefore carried out in only 48 patients. Average age was 35 years, and 74.5% of the patients were males. Fistulae were traumatic in 47 patients (92.2%) and spontaneous in four (7.8%). Out of the 47 traumatic fistulae, 33 (70.2%) were due to closed cranio-encephalic trauma. In 12 they were produced by firearm wounds and in two they were due to wounds with sharp instruments. In decreasing order of frequency clinical manifestations were: chemosis, proptosis, murmur, pain, decreased visual acuity and intracranial bleeding. Concerning the type of fistula (Barrow classification), they were type A in 86.0%, type B in 9.8%, type C in 1.9% and type D in 1.9%. In 32 patients (62.7%) carotid artery permeability was restored while in 19 (37.3%) occlusion was necessary. The most frequently used endovascular procedure was the balloon (34 cases) both for occlusion of the fistulous site and to carry out the trapping. Coils were used in 14 patients, stents in three and NCBA (N-butylcyanoacrylate) in four. More than one procedure was carried out in several patients. Arterial access was used in 44 cases (91.7%) and venous access in the remaining four (8.3%). Direct access by ophthalmic artery catheterization was used in two cases. Occlusion was achieved in 48 fistulae (94.1%) and a decrease in the flow in three (5.9%). Clinical follow-up, with a median of two months, revealed that 46 patients (90.2%) had complete resolution of their symptoms, four had partial resolution and one had worsening. Conclusion: This series, the largest so far published in Colombia on this subject, demonstrates the clinical and angiographic effectiveness of endovascular treatment of patients with carotid-cavernous fistulae.

4062. Ospina-Delgado, D., et al. (2018). "Characterization of 95 patients with traumatic brain injury due to gunshot wounds at a referral center in Cali, Colombia." Caracterizacion de 95 pacientes adultos con trauma craneoencefalico debido a herida por proyectil de arma de fuego en un centro de referencia en Cali, Colombia. **29**(5): 217-224.

OBJECTIVE: This study aims to describe cases of traumatic brain injury due to gunshot wounds in civilian population over 18 years of age, treated at a referral hospital in Cali, Colombia and compare the clinical outcomes at discharge., METHODS: An observational, descriptive cross-sectional study was conducted by retrospectively collecting clinical data related to adult patients that presented traumatic brain injury due to civil gunshot-wounds and that consulted to the emergency room at Fundacion Valle del Lili Hospital in Cali, Colombia between January 2010 and February of 2016. A univariate analysis was performed to determine factors associated with death and adverse clinical outcomes., RESULTS: A total of 95 patients older than 18 years, with traumatic brain injury by gunshot were included in the civil context. The 91.6% were male. The main context was interpersonal violence with 54.7%. The most common method of transportation was by ambulance (79%). The Glasgow score at admission was 3-8 in 64.2% of cases; 9-12 in 6.32% and 13-15 in 28.4%. On admission, head CT scan was performed in 82 (86.3%) patients within the first hour, finding a Marshall-Score between I-III in 60.9%, of IV in 17.8% of cases and a score between V-VI and in 4.1%. The trajectory was non-transfixing penetrating in 43.2%, transfixing in 27.3% and tangential in 9.5%. Mortality was 45.3% in total, 39% died within the first 24hours., CONCLUSIONS: A major compromise on admission determines an overall poorer prognosis and a high likelihood of death in the first 24-hours.

4063. Ossoinig, K. C., et al. (1975). "Echographic detection and localization of BB shots in the eye and orbit." Bibliotheca ophthalmologica : supplementa ad ophthalmologica(83): 109-118.

BB shots and other spherical foreign bodies produce long chains of rapidly successive echo spikes which gradually decrease in height. These patterns are specific for this type of foreign bodies and allow their reliable detection and accurate localization. A-scan echography has become a very useful addition to X-ray examination in order to determine whether such foreign bodies are intra- or extraocular. Echography also helps to localize such foreign bodies during surgery and to evaluate the posterior segment of the eye in the presence of opaque ocular media (hemorrhages, cataract). Although it is sometimes possible to demonstrate specific B-scan patterns of spherical foreign bodies, A-scan echography is the method of choice since it is faster, more reliable and more accurate.

4064. O'Sullivan, R. M., et al. (1991). "Carotid and vertebral artery trauma: clinical and angiographic features." Australasian radiology **35**(1): 47-55.

Injury to the carotid or vertebral artery is an important clinical entity that requires angiography for definitive diagnosis and evaluation. The common carotid artery may be injured by penetrating trauma while the internal carotid artery is usually damaged by either trivial or blunt trauma. With trivial trauma extracranial internal carotid artery dissection should be considered if there is unilateral headache, Horner's syndrome or delayed transient ischaemic attack, and intracranial dissection if a profound neurological defect occurs immediately following trauma. Injury to the internal carotid artery following blunt trauma includes dissection of the extracranial internal carotid artery, carotid-cavernous fistula and pseudoaneurysm formation. These should be considered in a patient with delayed neurological deficit, mandibular or skull fracture, a constellation of orbital signs or diffuse subarachnoid haemorrhage, respectively. Vertebral artery injury is less frequent. Dissection typically follows abrupt cervical rotation and occurs at C1-2, whereas penetrating trauma may involve either the proximal or distal vertebral artery and occlusion, arteriovenous fistula or pseudoaneurysm may be found. Endovascular techniques may be used in either the carotid or vertebral artery to close fistulae or occlude an extensively damaged vessel.

4065. Ott, K., et al. (1976). "Retained intracranial metallic foreign bodies. Report of two cases." Journal of neurosurgery **44**(1): 80-83.

The authors discuss two examples of extensive migration of retained metallic foreign bodies. The potential for further neurological injury from migration, formation of neurotoxic breakdown products, and the danger of infection are factors to be assessed when considering the removal of retained intracranial metallic foreign bodies.

4066. Oudega, M., et al. (1999). "Long-term effects of methylprednisolone following transection of adult rat spinal cord." The European journal of neuroscience **11**(7): 2453-2464.

Clinically, high-dose treatment with the glucocorticosteroid, methylprednisolone (MP), within 8 h after spinal cord injury, has been shown to improve neurological recovery. The current standard of care is to administer MP as a bolus of 30 mg/kg followed by a 23-h infusion of 5.4 mg/kg/h to spinal cord injured patients. To better understand the role of MP in neuroprotection, we have studied how MP administration affects macrophage accumulation, tissue loss, and axonal dieback at 1, 2, 4 and 8 weeks after a complete transection of the eighth thoracic spinal cord in the adult rat. A 30 mg/kg dose of MP was administered intravenously at 5 min, and 2 and 4 h after injury. The number of ED1 (antibody against microglia/macrophages) -positive cells was quantified in a 500-micrometer-wide strip of tissue directly adjacent and parallel to the transection. At all time points, MP treatment led to a significant decrease in the number of ED1-positive cells in both rostral and caudal stumps. Over the 2-month post-transection period, the average MP-induced reduction in the number of ED1-positive cells was 82% in the rostral cord stump and 66% in the caudal stump. Using a computerized image analysis system, it was observed that MP treatment resulted in a significant reduction in tissue loss in both cord stumps at 2, 4 and 8 week post-injury. Over the 2-month post-lesion period, the average MP-induced reduction in tissue loss in the caudal cord stump was higher than that in the rostral stump; 48 versus 37%, respectively. Immunostaining for neurofilaments and growth-associated protein-43 (GAP-43) revealed the presence of numerous axons near and in the lesion site. Anterograde neuronal tracing with biotinylated dextran amine showed that, in MP-treated animals, dieback of vestibulospinal fibres, but not of corticospinal fibres, was significantly diminished at all time points studied. In addition, with MP administration, 1 and 2 weeks after injury, an increase in the number of vestibulospinal fibres was found at 1 and 2 mm from the transection, suggesting transient regenerative sprouting of these fibres. The results demonstrate that treatment with MP shortly after spinal cord transection in the adult rat led to a long-term reduction of ED1-positive cells and spinal tissue loss, reduced dieback of vestibulospinal fibres, and a transient sprouting of vestibulospinal fibres near the lesion at 1 and 2 weeks post-lesion. The possible relationships between the inflammatory changes, spinal tissue sparing, and axonal survival and sprouting are complex and need to be further explored.

4067. Oudrhiri, M. Y., et al. (2017). "The Transcranial Stab Wound and the Life-Saving Zygomatic Arch Clinical Report." The Journal of craniofacial surgery **28**(1): 218-219.

A 58-year-old man presented to the neurosurgical emergencies for a transzygomatic transcranial stab wound with a retained broken knife. The patient was neurologically intact. After radiographic evaluation the knife was found to be penetrating the temporal lobe, neighboring the intracavernous portion of the carotid artery. The patient was successfully managed in a conservative way. No abnormalities were seen at 12 months of follow-up. Dealing with

penetrating head injuries is a usual condition in neurosurgical practice. Some situations are though really challenging, especially when the offending object is still in place, with a close connection to vital structures. This clinical reports an unusual penetrating head injury, highlighting the importance of careful radiographic evaluation and trying to discuss clear management options.

4068. Ovchininski, N. N. and T. P. Voronina (1945). "[Bacterial flora of the cerebrospinal fluid in gunshot wounds of the cranium]." Zhurnal mikrobiologii, epidemiologii i immunobiologii(7-8): 13-18.

4069. Overholt, E. M., et al. (1992). "Penetrating trauma of the jugular foramen." The Annals of otology, rhinology, and laryngology **101**(5): 452-454.

4070. Owusu-Brackett, N., et al. (2012). "Incidence and outcome of intracranial hematoma expansion in children after moderate and severe TBI." Journal of neurotrauma **29**(10): A87.

Introduction Computed tomography (CT) is integral in the early diagnosis and management of TBI. Follow-up head CT imaging is common in the management of acute intracranial hematomas after closed head injury. This study aims to quantify the temporal profile and outcome of intracranial hematoma expansion in children after TBI. Methods Patients were screened from a prospective cohort database of longterm TBI at a large level 1 pediatric trauma center. All patients were ages 0 to 13 years with a moderate or severe TBI resulting in either an epidural (EDH), subdural (SDH), intraparenchymal hematoma (IPH) and/or cortical contusion (CC). Patients with spontaneous hemorrhages, penetrating injury, non-accidental trauma or craniotomy prior to a second CT were excluded. All patients had an initial head CT scan within 12 hours of injury and at least one repeat CT scan within 72 hours from injury. An attending pediatric neuroradiologist reviewed each CT scan for lesion type, the volume of each hematoma was then determined using the ABC/2 method and compared to the baseline measurement. Hematoma progression was considered significant if the volume percent change from baseline was greater than 33%. Results 58 children met inclusion criteria, from which 181 hematomas were identified, Overall, 55/118 (46%) of hematomas increased to the threshold significance value of > 33% from baseline. There was a minor difference in the percentage of hematoma types which increased > 33% with cortical contusions increasing the most frequently and epidural hematomas the least, CC 24/42 (57%), IPH 11/23 (47%), SDH 13/37 (44%), EDH 7/16 (35%). We next examined whether the presence of hypotension or hypoxia (within 8 hours of injury) or skull fracture increased the risk for hematoma expansion. Combining all hematoma types, there was no association between hypotension, hypoxia or skull fracture with increase in hematoma size. However, Fisher's Exact Test showed a significant association between skull fracture and increase in the size of cortical contusion hematomas ($p = 0.004$). There are 31cortical contusion patients with a skull fracture, 71% of those patients had a > 33% increase in size within 72 hours. To examine the effect of hematoma expansion on functional outcome, we examined candidate predictors and 12-18 month neurologic outcome using the Glasgow Outcome Scale Extended-Pediatrics (GOSEP). Candidate predictors were field GCS, hypotension, hypoxia and > 33% increase in hematoma size. Both forwards and backwards Stepwise methods showed that hypotension ($p = 0.004$) and > 33% increase in hematoma size ($p = 0.03$) were significant predictors for outcome. Conclusions In this study of children with moderate and severe TBI we found a surprisingly high incidence of hematoma expansion after TBI. Our findings are summarized by the following: 1) cranial hematomas increased in size > 33% in 35-57% of lesions examined, 2) hypoxia and hypotension within 8 hours of injury did not appear to increase the risk for hematoma expansion 3) cortical contusions associated with skull fracture had the highest risk for expansion and 4) hypotension and > 33% increase in hematoma size are significant predictors for neurologic outcome. These findings need to be supported in larger samples, however this study adds to the evidence based practice to support safe and judicious use of head CT scans in children after TBI.

4071. Oxley, D. W. (1977). "An unusual tear-gas gun fatality." Journal of forensic sciences **22**(3): 606-609.

A case of death involving a tear-gas pen gun, firing .45 ACP metallic ammunition, is presented, in which the recoil generated by the cartridge converted the weapon into a missile, penetrating the brain of the shooter. The injury potential to shooter and shooting victim is briefly discussed, and the added hazard to the shooter illustrated by this case is noted.

4072. Oya, S. (2019). "[The Skin Findings Associated with Neurotrauma]." Brain and nerve = Shinkei kenkyu no shinpo **71**(4): 309-315.

Head trauma is a common condition, but often, serious pathological conditions associated with it are hidden. Skin findings in child abuse cases, such as skull base fracture, battle signs, raccoon eye, open head injury, penetrating wounds, traumatic aneurysm of the superficial temporal artery, traumatic carotid cavernous sinus fistula, and fat embolism have been presented in this paper. It is necessary to observe and record skin findings at the time of consultation and to listen to the detailed medical history that resulted in such an injury. It is important to comprehensively diagnose skin findings through medical history, and image inspection.

4073. Ozay, R., et al. (2017). "Trans-nasal-trans-sphenoidal brain injury by a fencing foil: an unusual case report and brief literature review." The Journal of sports medicine and physical fitness **57**(11): 1494-1498.

In this report, the authors present an unusual case of a 10-year-old child who suffered a severe headache and rhinorrhea that occurred as a result of fencing foil sports injury via trans-nasal-trans-sphenoidal (TNTS) pathway. Following trauma, the child had shown neurological symptoms such a pupil dilatation, change in consciousness and mild hemiparesia. Imaging demonstrated destruction of bone structures including posterior wall of sphenoid sinus and antero-superior part of sella turcica, and also a contusion at right thalamic region. For treatment of rhinorrhea lumbar drainage system (LDS) had planted in order to relieve cerebrospinal fluid (CSF) leakage. After the treatment, the patient had fully recovered without any need of further surgical intervention. CSF leakage had prevented and neurological symptoms were completely treated. This case represents the first report of brain injury via TNTS pathway in a sports practice. Diagnosis, clinic follow-up and treatment options of this rare accidental sports injury are discussed.

4074. Özdemir, A. and E. Orhan (2018). "An unusual transoral penetrating injury by scissors in a child and principles of management." Journal of Clinical and Analytical Medicine **9**(2): 155-157.

Injuries caused by the penetration of foreign bodies into the hard and soft tissue are called penetrating injuries. Penetrating injuries on the head and neck region are often the result of deliberate injuries performed by another person. A 4-year-old girl was admitted to the emergency room with penetrating injury due to the insertion of scissors to the right cheek. In her physical examination, it was observed that a sharp object of approximately 7cm (tip of scissors) had penetrated towards the base of the skull from the right cheek of the patient. No neurological deficits were detected. After antibiotic therapy and tetanus prophylaxis, the patient was operated on, and the penetrant object was removed. No neurological damage was detected in the postoperative 1-year follow-up.

4075. Ozdemir, M. and A. Unlu (2009). "Gunshot injuries due to celebratory gun shootings." Turkish neurosurgery **19**(1): 73-76.

UNLABELLED: Traditional shooting with guns often occurs and leads to unwanted gunshot injuries in areas where celebrations are held. Such injuries have been classified as celebratory gun shooting injury in the international disease classification system., CASE: An 8-year-old female patient presented with respiratory arrest. The heartbeats normalized upon cardiopulmonary resuscitation. On physical examination, the only pathological finding was a skin defect measuring 1 x 1 cm on the midline and located 2 cm in front of the coronal suture. Cranial CT revealed a bone defect of 0.5 cm in the area 2 cm in front of the coronal suture on the midline, tetraventricular and extensive subarachnoid hemorrhage and parenchymal hematoma in the frontal area. It was initially thought to be a gunshot injury; however, on cranial CT, no bullet fragments or bullet exit hole was observed. A cervicothoracal direct graph was obtained and an image that might have been compatible with a bullet core was detected at Th 2-3 vertebra level., CONCLUSION: Although gunshot injuries are generally well- known, this may not be a very familiar topic for neurosurgeons. The primary aim of this report is to emphasize that a bullet round randomly fired into the air ascends in reverse direction to gravity and after reaching a zero point, it returns to the ground at a high velocity that facilitates its penetration into the skull according to a principal physics law.

4076. Ozen, S., et al. (2013). "Psychiatry cases alleged as malpractice that were evaluated by the 3rd speciality board of council of turkish forensic medicine; An archival research between the years 2005-2010." Klinik Psikofarmakoloji Bulteni **23**: S200-S201.

Objective: Malpractice lawsuits are increasing in our country as well as around the world recently. Malpractice lawsuits in our country in the field of psychiatry are less than other medical branches. In a study (Pakis et al. 2008) evaluating 525 malpractice cases, which resulted in death; there were only two psychiatry cases (0.4%). Insufficient patient safety, early discharge of patients, misdiagnosis, lack of consultation, the side effects and also drug abuse due to high-dose drug usage are the common causes of malpractice complaints in abroad. There are few studies in the field of psychiatric malpractice in Turkey. Therefore in this study our aim is to evaluate the results of medico-legal malpractice cases in the field of psychiatry. Methods: This study was conducted in Istanbul, the archive records of evaluated malpractice cases by the 3rdSpeciality Board of Council of Turkish Forensic Medicine between the years 2005-2010 were reviewed and 27 cases related Psychiatry were included. Results: Eight of the grievances occurred in dispensaries and military hospitals, 7 in psychiatric hospitals, 6 in emergency services and the others were in different places. 23 of the defendants were psychiatrists and 4 of them were medical doctors from other clinics. 9 of the defendants were complained together with medical doctors from other clinics or health care workers. 16 of the defendants were male, 11 of them were female. 3th Speciality Board of Institute of Forensic Medicine's decisions about the cases were as below; in 14 of the cases there were no malpractice, in 9 of the cases there was malpractice, 3 of them couldn't be evaluated and in one of the cases must be evaluated by the court because of missing file. 16 of the victims were male and 11 of them were female. The average age of the cases was 35.1, (between 19 and 66 years old) 22 of the victims were dead, 5 of them were alive and well and one of them was disabled because of sequel of encephalitis. The autopsy was performed for 16 of dead victims and not performed for the rest of them. The boards decisions about the cause of death were as below: 7 of them couldn't be determined, 3 of them were because of pneumonia, 2 of them were due to hanging, and the others were different causes like sepsis, brain damage due to gun shot injury, gastric perforation and hemorrhage due to taking a corrosive substance, myocardial infarction, cardiac arrest due to taking haloperidol, cardiovascular disease resulting pulmonary edema, cerebral hemorrhage, blunt head-abdominal and thoracic trauma, penetrating thoracic injury, general body trauma due to jump from a height. Conclusion: Most of the victims were young adults. Most of the complaints about Psychiatric malpractice were cases with death. Therefore psychiatrists have to do a detailed evaluation, be careful and intentive about requested consultations from emergency services or other clinics, exclude the organic etiology and also be aware of the risk of suicide.

4077. Ozen, S., et al. (2013). "Psychiatry cases alleged as malpractice that were evaluated by the 3rd Speciality Board of Council of Turkish Forensic Medicine; an archival research between the years 2005-2010." Bulletin of Clinical Psychopharmacology **23**: S201.

Objective: Malpractice lawsuits are increasing in our country as well as around the world recently. Malpractice lawsuits in our country in the field of psychiatry are less than other medical branches. In a study (Pakis et al. 2008) evaluating 525 malpractice cases, which resulted in death; there were only two psychiatry cases (0.4%). Insufficient patient safety, early discharge of patients, misdiagnosis, lack of consultation, the side effects and also drug abuse due to high-dose drug usage are the common causes of malpractice complaints in abroad. There are few studies in the field of psychiatric malpractice in Turkey. Therefore in this study our aim is to evaluate the results of medico-legal malpractice cases in the field of psychiatry. Methods: This study was conducted in Istanbul, the archive records of evaluated malpractice cases by the 3rd Speciality Board of Council of Turkish Forensic Medicine between the years 2005-2010 were reviewed and 27 cases related Psychiatry were included. Results: Eight of the grievances occurred in dispensaries and military hospitals, 7 in psychiatric hospitals, 6 in emergency services and the others were in different places. 23 of the defendants were psychiatrists and 4 of them were medical doctors from other clinics. 9 of the defendants were complained together with medical doctors from other clinics or health care workers. 16 of the defendants were male, 11 of them were female. 3th Speciality Board of Institute of Forensic Medicine’s decisions about the cases were as below; in 14 of the cases there were no malpractice, in 9 of the cases there was malpractice, 3 of them couldn’t be evaluated and in one of the cases must be evaluated by the court because of missing file. 16 of the victims were male and 11 of them were female. The average age of the cases was 35.1, (between 19 and 66 years old) 22 of the victims were dead, 5 of them were alive and well and one of them was disabled because of sequel of encephalitis. The autopsy was performed for 16 of dead victims and not performed for the rest of them. The boards decisions about the cause of death were as below: 7 of them couldn’t be determined, 3 of them were because of pneumonia, 2 of them were due to hanging, and the others were different causes like sepsis, brain damage due to gun shot injury, gastric perforation and hemorrhage

due to taking a corrosive substance, myocardial infarction, cardiac arrest due to taking haloperidol, cardiovascular disease resulting pulmonary edema, cerebral hemorrhage, blunt head-abdominal and thoracic trauma, penetrating thoracic injury, general body trauma due to jump from a height. Conclusion: Most of the victims were young adults. Most of the complaints about Psychiatric malpractice were cases with death. Therefore psychiatrists have to do a detailed evaluation, be careful and intentive about requested consultations from emergency services or other clinics, exclude the organic etiology and also be aware of the risk of suicide.

4078. Ozer, S., et al. (2010). "Craniocerebral injury resulting from pencil penetration." European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery **267**(1): 155-157.

Penetrating craniofacial trauma in pediatric age group is quite rare. A case is reported that presented with a pencil penetration injury entering from the anterior maxillary sinus through the orbital medial wall, and ethmoidal cells and septum, reaching the contralateral gyrus rectus of the frontal lobe. All the vital structures were preserved. The patient was first treated with manual extraction of the pencil, without any immediate complications; however, rhinorrhea followed the procedure 4 h later. Early endoscopic surgical intervention was performed and the rhinorrhea was successfully treated in this case. This report discusses radiological and surgical characteristics of this unusual penetrating craniofacial trauma.

4079. Őzgenel, G. Y. and M. Özcan (2004). "Two-stage reconstruction of a massive gun-shot wound of the midface with a free radial forearm flap and a parietal osteofasciocutaneous flap." European Journal of Plastic Surgery **27**(4): 200-203.

Treatment of midface gunshot injuries and their reconstruction remains one of the difficult problems of reconstructive surgery. Several flaps have been described for the reconstruction of total lip and nasal defects. We present a case of a gunshot wound to the midface in which a two-stage procedure was performed. In the first stage, a free radial forearm flap was successfully transferred for the reconstruction of the total nose. In the second stage, total upper lip reconstruction was achieved using a parietal osteofasciocutaneous flap pedicled to the parietotemporal fascia based on the superficialis temporal artery. At a mean follow-up period of 18 months, near-normal functional and cosmetic results were obtained. © Springer-Verlag 2004.

4080. Ozkan Arat, Y., et al. (2015). "Cerebrovascular complications of transorbital penetrating intracranial injuries." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES **21**(4): 271-278.

BACKGROUND: Cerebrovascular trauma secondary to transorbital intracranial penetrating injury (TIPVI) is rare. Relatively benign initial presentation may mask the underlying life-threatening vascular injury in transorbital intracranial penetrations. The aim of this study was to evaluate clinical features and endovascular treatment of TIPVI., METHODS: Six patients with angiographic documentation of TIPVI in subacute/chronic phase were reviewed retrospectively. Five were treated endovascularly; however endovascular treatment was aborted in one and conservative management was pursued., RESULTS: Except for one case presenting with vision loss and mild stroke, no significant neurologic deficit was present. Vascular lesions included two cases of carotid-cavernous fistulas, three traumatic aneurysms of cavernous carotid, anterior and middle cerebral arteries and a unique case of coalescing cavernous aneurysms following a through-and-through injury in which the aneurysms united within the thrombosed cavernous sinus on follow up. Fistulas were treated with covered stents, aneurysms with parent artery occlusion or flow diverters. All patients had uneventful recoveries., CONCLUSION: TIPVI may present in a delayed fashion after a seemingly benign presentation. A high index of suspicion is critical to rule out TIPVI with vascular imaging. Transcatheter angiographic techniques allow for both diagnosis and treatment of TIPVI with favorable results.

4081. Ozkan, O., et al. (2004). "Simultaneous reconstruction of large maxillary and mandibular defects with a fibular osteocutaneous flap combined with an anterolateral thigh flap." Journal of reconstructive microsurgery **20**(6): 451-455.

This article reports the simultaneous reconstruction of maxillary and mandibular defects caused by a close-range gunshot blast to the face with one fibular osteocutaneous flap combined with an anteroateral fasciocutaneous flap. A fibular osteocutaneous flap was used for both mandibular and maxillary defects, using multiple osteotomies and discarding a central bony segment and an oral floor defect. An anterolateral thigh flap was used to cover a three-

dimensional defect of both the intraoral mucosal region, as well as external skin and soft tissue defects, including some on the upper and lower lips. The results demonstrated that the method was a good choice in the reconstruction of large composite facial defects, both aesthetically and functionally.

4082. Ozkan, O., et al. (2018). "Face allotransplantation for various types of facial disfigurements: A series of five cases." Microsurgery **38**(8): 834-843.

BACKGROUND: The aim of this report is to present our long-term experiences with a series of 5 face-transplanted patients in terms of surgical aspects and postoperative outcomes, and to describe possible salvage strategies in case of difficulties., METHODS: Five patients, 4 receiving full-face transplantation and 1 undergoing partial transplantation at our institution were included. The patients were aged between 19 and 54 years. Two had extensive burn scars to the face, and 3 had suffered gunshot injuries. The post-transplant induction immunosuppressive regimen included ATG combined with tacrolimus, mycophenolate mofetil, and prednisone, while maintenance was provided by the last 3. We focused on patient summaries including their etiologies, preoperative preparations, surgical techniques, immunosuppressive regimen, postoperative courses, revisional surgeries, together with challenges including acute rejection episodes, and immunosuppressive drug complications., RESULTS: No re-surgery due to vascular compromise was required in any case. One of the 5 patients was eventually lost due to complicated infectious and metabolic events at the end of post-transplantation month 11. The other 4 patients were still alive, with a mean follow-up time of 53 months and had satisfactory functional transplants and cosmetic appearance., CONCLUSIONS: Face transplantation still involves challenges and many issues including compliance and psychological maturity of patients, the risk of opportunistic infections and malignancies still need to be resolved for it to be accepted as a safe procedure. Surgical rescue procedures considering ideal timing should be kept in mind strictly as one of the most important issues in case of unexpected events. Copyright © 2017 Wiley Periodicals, Inc.

4083. Ozkan, U., et al. (2002). "Analysis of 107 civilian craniocerebral gunshot wounds." Neurosurgical review **25**(4): 231-236.

In this study, we present a retrospective analysis of 107 cases due to civilian craniocerebral gunshot wounds that were treated by the medical faculty of Dicle University during a period of 7 years (January 1993 to January 2000). Twenty patients died at the hospital, and the deaths were determined to result from direct effects of brain damage. Coma was the best prognostic guideline. Diffuse brain damage and ventricular injury, particularly infections, were associated with poor outcome.

4084. Ozkan, U., et al. (2006). "Spontaneous migration of a bullet into the brain." Clinical neurology and neurosurgery **108**(6): 573-575.

We report the case of a 20-year-old man with a gunshot injury as an example of spontaneous migration of a metallic foreign body within the brain. Computed tomography (CT) showed the bullet in the left temporoparietal region. At 10 days follow-up, CT revealed that the bullet had migrated posteriorly, due to the effect of gravity, lodging in the occipital lobe. Although there are a few literature reports of spontaneous migration of a bullet within the brain, this case was unique as the patient was fully conscious without any neurological deficit.

4085. Ozoilo, K. N., et al. (2012). "The conundrum of polytrauma on the jos plateau." West African journal of medicine **31**(1): 52-57.

BACKGROUND: The leading cause of morbidity and mortality from the end of the first year of life to the forty fifth is trauma. This is true worldwide but especially so in our environment. In no other situation are the complexities of the management of trauma more manifest than in the context of polytrauma. For this we undertake to study the problem of polytrauma in Jos., AIMS AND OBJECTIVES: To determine the frequency and pattern of occurrence of poly trauma in Jos university teaching hospital., PATIENTS AND METHODS: Consecutive patients presenting with polytrauma to the casualty department were prospectively studied. Data regarding demographics and a detailed description of injuries were entered into a proforma and collated over a one-year period., RESULTS: A total of 131 patients were studied. There were 103 males and 28 females giving a male to female ratio of 3.7:1. The ages ranged from 2 to 61 years with a mean of 28.4 +/- 12.4 years. Road traffic accident was the most common aetiology in 113 (86.3%) patients, while

falls 7 (5.3%), gunshots 5 (3.8%) and assaults 2 (1.6%) were observed. The most frequently encountered injuries were head, extremity and chest in 71.8%, 68.5% and 29.2% respectively. The combinations most frequently observed were head\extremity (43.5%), head\chest (17.6%) and chest\extremity (10.7%) injuries. Complications were observed in 20.6% while death occurred in 7.6%., CONCLUSION: Polytrauma occurs with sufficient frequency to warrant serious attention. As majority follow RTA, there is a need to intensify measures aimed at improving road safety. There is also a need to establish pre-hospital care\ambulance services. It is suggested that improved orthopaedic and neurosurgical care will lead to improved polytrauma care and most importantly, the establishment of dedicated trauma teams in tertiary institutions is proposed as a prelude to the establishment of regional trauma centers.

4086. Özsoy, S. and H. Tugcu (2016). "The keyhole lesion." Romanian Journal of Legal Medicine **24**(4): 257-260.

Determining the entrance and exit wounds in gunshot injuries is important for forensics. Although the gunshot wounds have a round or oval image, there might also be atypical entrance wounds as well. When the firearm bullet hits the cranium with an acute angle or in a tangential manner, there might occur fractures in the bevelled-out hole on the outer table; and the defect called “keyhole lesion”, which is rare, might occur. In this paper, the autopsy findings of a case with a gunshot wound that had atypical entrance wound in the shape of “keyhole lesion” have been presented. The bone flaps extracted with craniectomy are stored either in the body of the patients (by placing in the stomach or below the quadriceps) or in deep freezers. Especially in cases that have bone defects due to gunshot wounds, the bone flap must be stored after being photographed in detail in order to prevent the findings from being lost. In cases that have bone defects due to gunshot wounds, the distinction of the entrance and exit wounds may be performed after the examination of the bones.

4087. Pabon, M. M., et al. (2016). "Brain Region-Specific Histopathological Effects of Varying Trajectories of Controlled Cortical Impact Injury Model of Traumatic Brain Injury." CNS neuroscience & therapeutics **22**(3): 200-211.

AIMS: Traumatic brain injury (TBI) occurs when the head is impacted by an external force causing either a closed or penetrating head injury through a direct or accelerating impact. In laboratory research, most of the TBI animal models focus on a specific region to cause brain injury, but traumatic injuries in patients do not always impact the same brain regions. The aim of this study was to examine the histopathological effects of different angles of mechanical injury by manipulating the trajectory of the controlled cortical impact injury (CCI) model in adult Sprague-Dawley rats., METHODS: The CCI model was manipulated as follows: conventional targeting of the frontal cortex, farthest right angle targeting the frontal cortex, closest right angle targeting the frontal cortex, olfactory bulb injury, and cerebellar injury. Three days after TBI, brains were harvested to analyze cortical and hippocampal cell loss, neuroinflammatory response, and neurogenesis via immunohistochemistry., RESULTS: Results revealed cell death in the M1 region of the cortex across all groups, and in the CA3 area from olfactory bulb injury group. This observed cell death involved upregulation of inflammation as evidenced by rampant MHCII overexpression in cortex, but largely spared Ki-67/nestin neurogenesis in the hippocampus during this acute phase of TBI., CONCLUSION: These results indicate a trajectory-dependent injury characterized by exacerbation of inflammation and different levels of impaired cell proliferation and neurogenesis. Such multiple brain areas showing varying levels of cell death after region-specific CCI model may closely mimic the clinical manifestations of TBI.

4088. Pabuscu, Y., et al. (2003). "A different approach to missile induced head injuries." Computerized medical imaging and graphics : the official journal of the Computerized Medical Imaging Society **27**(5): 397-409.

Missile induced head injuries can be influenced by the anatomical location of the injury, i.e. type of tissue and by the ballistic properties such as the design of the weapon and the mass, shape and construction of the projectile, as well as its velocity characteristics and trajectory angle. In the diagnostic work up of the patients with missile induced head injuries, every available modality can be used. It is important, however, to recognize that CT scan is the primary and most efficacious diagnostic tool in such patients. In this article we have identified risk factors for both morbidity and mortality in patients with missile induced head injury with excluding the patients who had also extracranial serious trauma and systemic disease.

4089. Padalino, P., et al. (2006). "[Analysis of quality in a first level trauma center in Milan, Italy]." Analisi di qualita di un trauma center di I livello nella citta di Milano. **77**(2): 97-106.

BACKGROUND: In Italy there isn't a State Trauma System. Many attempts have been done to increase the quality of trauma care in prehospital and hospital phases, but only by local resources. In Mila (Italy)o Emergency Medical System is organized by Regional rules and five Hospitals warrant high level of care for trauma patients. There isn't an official registry for trauma. Creating a Trauma Registry is the prerogative to analyse the quality of assistance and to propose new solutions., OBJECTIVES: To analyse major trauma patients admitted to Ospedale Maggiore Policlinico IRCCS; to evaluate diagnostic and therapeutic protocols in order to identify preventable deaths., PATIENTS: We have observed trauma patients admitted to Ospedale Maggiore from January to December 2004. We collected demographic data, informations about the traumatic event and prehospital rescue, emergency room examination, diagnostic exams, surgical operations and results of treatment. We selected patients admitted among 6917 trauma patients observed in this period. We have calculated RTS, ISS and TRISS. Patients were followed during their staying at the hospital to record length of staying, lenght of ICU and mortality rate. We collected the autopsy of the all death patients., RESULTS: We selected 299 patients, 207 males and 92 females. Mean age was 42.4 +/- 19.5 for males (range 15 - 99) and 57.7 +/- 22.5 for female (range 7 - 101). Motorvehicle and road incident were the main cause of trauma (55.5%). A penetrating injury was observed only in 5% of cases. Mean RTS was 7.5 +/- 1. ISS and TRISS were (mean +/- SD) 13 +/- 9 and 94.9% +/- 11.5, respectively. Patients with ISS = 16 were 109 (36.4%). Forty five patients (15%) required a surgical treatment during the first 48 hours. Total length of staying was 8.9 +/- 11.2 (mean +/- SD) days (median of 5.5 days) and the length of ICU was (mean +/- SD) 11.7 +/- 10.3 days (median 9 days). 12 patients died (mortality rate 4.08%), 11 at Policlinico (2 in the emergency room, 3 in the operative room, 5 in ICU. One patient died in surgical ward), 1 at Ospedale Niguarda. Autopsy was available for 8 patients. In 2 cases the cause of death was established by clinical examination and in 1 case police are still investigating for poisons or other letal drugs. The main cause of death was the cerebral injury. Only for 1 patient it was impossibile to determine the cause of death so he was considered a potentially preventable death. His clinical RTS in the emergency room was 12 (7,4808 in the statistical analysis) and no severe lesions were observed during primary and secondary survey., CONCLUSIONS: Our data are typical of an urban area of a western country. Penetrating injury are very rare, 5% of incidence. Diagnostic and therapeutic protocols are similar to countries where a Trauma Center is active. The 4% of overall mortality rate is similar to Trauma Centers in USA. This result is better than other hospitals in Milan. The high number of ATLS providers in the trauma team could be one of causes of good results. Quality audit can't consider only RTS, ISS and TRISS. Scores are very practical and useful but they aren't enough. We must analyse every single case of death and Trauma Registry is the first tool to evaluate trauma care in a modern EMS.

4090. Padar, S. C. (1975). "Air gun pellet embolizing the intracranial internal carotid artery." Journal of neurosurgery **43**(2): 222-224.

4091. Padosch, S. A., et al. (2006). "Two simultaneous suicidal gunshots to the head with robbed police guns." Forensic science international **158**(2-3): 224-228.

The suicidal infliction of two gunshot wounds to the head represents a critical issue for medicolegal investigation. In principle, simultaneous infliction with two firearms or third parties' involvement, i.e. two consecutive gunshots, have to be considered. We report for the first time on a case of suicidal infliction of two simultaneous gunshots to the head (oral, temporal) with Action 4 expanding ammunition. A male had robbed two service guns and committed suicide thereafter under the influence of high-dose alcohol and cocaine. Interestingly, Action 4 ammunition had been used, leading to an uncommon gunshot wound morphology and extensive backspatter. At the scene, these findings caused confusion; moreover, the number of gunshot wounds was unclear, until autopsy revealed two gunshot wounds to the head, which had obviously been inflicted simultaneously. Expanding ammunition like QD-PEP and Action 4, used by several German federal state police forces, can cause an atypical gunshot wound morphology, most probably due to its peculiar deformation behaviour. Investigators should be careful when interpreting gunshot wound morphology at the scene after usage of such expanding ammunition. With regard to reconstruction in cases of two gunshot wounds to the head and two guns at the scene, two simultaneous gunshots should be taken into consideration.

4092. Padosch, S. A., et al. (2004). "[Medicolegal aspects of witnessed suicide due to gunshot to the head. Part 1: Circumstances and psychopathology]." Rechtsmedizinische Aspekte des Suizides durch Kopfschuss vor Zeugen. Teil I: Umstande und psychopathologische Befunde. **214**(3-4): 65-76.

In the USA the frequency of witnessed suicide, i.e. suicide committed in the presence of at least one further individual, is reported to range between 5 and 15%. As up to now no detailed analysis of this special issue has been given in the medicolegal literature, this article presents and discusses a number of cases including 8 males and 1 female (age 19-58 years, mean 41.2 years) who had all committed suicide by inflicting a gunshot to the head. In 3 cases post-mortem blood alcohol concentrations of 1.73, 1.88 and 2.23 g/kg respectively were observed. Toxicological tests produced negative results. 5 cases had a medical history of psychiatric disorder with endogenous depression in 3, chronic alcohol abuse and drug abuse with concomitant psychosis in one case each. As far as the motives were known, domestic arguments were of prevailing importance. With one exception the suicides were committed at home. In 6 cases one witness was present, in 2 cases 2 individuals and in one case 22 persons witnessed the suicide. The reported cases are discussed in comparison with the psychiatric-psychological classification according to McDowell et al. with the aim to provide a solid and comprehensive medicolegal method to distinguish between homicide and suicide. Furthermore aspects of psychiatric sequelae and psychological support of the witnesses, which are also of importance for the forensic pathologist called to the scene, are discussed.

4093. Padosch, S. A., et al. (2003). "Planned complex suicide by self-poisoning and a manipulated blank revolver: remarkable findings due to multiple gunshot wounds and self-made wooden projectiles." Journal of forensic sciences **48**(6): 1371-1378.

A remarkable case of complex suicide with poisoning and multiple self-inflicted gunshot wounds to the head is reported. After ingestion of a liquid insecticide, the victim shot himself twice in the head, once in each temple. Self-manufactured wooden dowels were used as projectiles in combination with conventional blank cartridges. The dowels had been glued on top of the blank cartridges and expelled by propellant gases. Moreover, the blank revolver used had been extensively manipulated in a rarely observed manner. Several occlusive devices had been removed from the barrel and the cylinder chamber to enable the expulsion of the wooden projectiles. The investigation of the methods used and the circumstances found at the scene pointed towards a planned complex suicide. A remarkable case with unusual projectiles, i.e., wooden dowels, fired by an extensively manipulated blank gun is reported, emphasizing the importance of close collaboration between the police firearm laboratory and forensic pathology in practical casework.

4094. Padure, A., et al. (2015). "Homicide committed by a person with mental disorders." Rechtsmedizin **25**(4): 411-412.

Assessment of legal responsibility of persons who commit crimes against other human life is absolutely necessary in order to guarantee the protection of human rights and society in general. It is well known that people with mental disorders could have unpredictable reactions and crimes committed by them often exceed limits of the imagination, as it is illustrated by the following case. According to the prosecution data on February 4, 05:00, the cadaver of 56 years-old-woman was found at her own home with multiple injuries caused by a sharp object. The eyeballs were enucleated and placed in a glass of water. During the body examination the following were established: two metal knives were stuck in the orbit of the right eye and left ear duct; enucleation of the both eyeballs and removal of eyelids; stab wound at the right orbit level, penetrating into the cranial cavity with meningeal and brain damage; stab wound with the entrance orifice in the left ear duct and the exit orifice below the right auricle lobe; a cut wound of the throat with anatomical damage of all structures; 114 stab wounds penetrating the chest, the abdomen and the back with injuries of the lungs, heart, liver and small intestine; posthumous cut wound of the abdomen going to external genitals and anus with the small intestine evisceration; posthumous amputation of both hands and left foot; signs of hemorrhagic shock. It was concluded that death occurred as a result of hemorrhagic shock caused by cut wound of the throat and stab wounds of the body. The criminal investigation identified the victim's husband as perpetrator. Psychiatrists considered him being without discernment at that moment when crime took place. Crimes committed by the people with mental disorders are usually characterized by a special cruelty. Hospitalization of a patient with mental disabilities who presents a danger to himself or others, or those who have committed crimes against other people is made coercively. This enters in accordance with the instruments of international law because the individual's right to life prevails over the right of mentally ill people to selfdetermination.

4095. Pagni, C. A. and F. Zenga (2006). "Prevention and treatment of post-traumatic epilepsy." Expert review of neurotherapeutics **6**(8): 1223-1233.

Post-traumatic epilepsy is reported after 2-5% of closed head injuries but up to 50% or more following penetrating head injury. Despite several studies, no drug strategy has been able, to date, to quench the biochemical events leading to epileptogenesis. One possibility is that treatment with available antiepileptic drugs has been implemented too late, and thus, ultra-early treatment might still be able to stop the neurochemical epileptogenic cascade dead in its tracks. However, currently drug therapy should be instituted only after the first late unprovoked seizure.

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4096. Paiva, W. S., et al. (2012). "Brainstem injury by penetrating head trauma with a knife." British journal of neurosurgery **26**(5): 779-781.

The authors describe a rare case about a traumatic lesion of brain and brain stem with a knife. In this case the patient had good clinical condition, diagnosed with TBI by infectious complications. We have highlighted the unusual diagnosis, proximity of vascular structures, the technique used in the treatment and the good outcome of the injury.

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4097. Paiva, W. S., et al. (2010). Surgical treatment of a transorbital penetrating brain injury. **4:** 1103-1105.

Penetrating injury of the skull and brain are relatively uncommon events, representing about 0.4% of all head injuries. Transorbital penetrating brain injury is an unusual occurrence in emergency practice and presents with controversial management. We report the case of a 10-year-old boy who fell forward on a bamboo stick while playing with other children, causing a penetrating transorbital injury, resulting in meningitis. We performed a combined surgical approach with neurosurgeons and ophthalmogic surgeons. Upon discharge, the patient had a Glasgow Coma Scale score of 15, no motor deficit and no visual loss. We discuss the management of this case and review current literature. © 2010 Paiva et al.

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4098. Paiva, W. S., et al. (2014). "Traumatic brain injury with carotid canal penetrating wound." Arquivos de neuro-psiquiatria **72**(5): 394-395.

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4099. Paiva, W. S., et al. (2009). "Transorbital stab penetrating brain injury. Report of a case." Annali italiani di chirurgia **80**(6): 463-465.

INTRODUCTION: Penetrating injury of the skull and brain is relatively uncommon, representing about 0.4% of head injuries. In this paper the Authors describe a case of patient victim of transorbital stab with brain injury with good recovery and review the literature about cranial stab wound., CASE REPORT: A 23-year-old man was involved in an altercation which resulted in the patient sustaining wounds to the head, with penetrating in left transorbital, affecting the eye. At arrival to the first trauma center the patient was conscent and complete responsive with 15 points in Glasgow Coma Scale, and motor deficit grade III. CT scan demonstrated left periventricular brain hematoma and supraorbital fracture. A four-vessel cerebral angiogram demonstrated no abnormality. In this evolution patient presented good neurologic outcome., CONCLUSION: In patients conscents with no surgical lesion like our patient, the hospital discharge must occur after the angiogram have excluded intracranial vascular lesion.

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4100. Pal, H. K., et al. (1998). "Traumatic pseudomeningocele at cranio-vertebral junction following stab injury." Injury **29**(2): 142-143.

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4101. Palac, R. T., et al. (2003). "Reversible myocardial dysfunction after traumatic brain injury: mechanisms and implications for heart transplantation." Progress in transplantation (Aliso Viejo, Calif.) **13**(1): 42-46.

Reversible myocardial dysfunction is known to occur in patients with cerebrovascular accidents and brain death. Several mechanisms for transient myocardial dysfunction have been proposed, including increased sympathetic activity, hormone depletion, and a reduction in coronary perfusion pressure. The relative importance of each of these mechanisms remains controversial. We report the case of a 19-year-old man who suffered traumatic brain death

associated with reversible myocardial dysfunction despite elevated cardiac enzymes. Myocardial recovery occurred after correcting his hemodynamic instability and hypothermia emphasizing the importance of normalization of coronary perfusion pressure and core body temperature. The mechanisms for reversible myocardial dysfunction and their implications for heart transplantation following traumatic brain death are reviewed. A diagnostic strategy is proposed that would allow early recognition of reversible myocardial dysfunction in brain-dead patients.

4102. Palkin, N. M., et al. (1976). "[Case of dowel-pin wound of the facial skull with damage to the nasal septum and Highmore's antrum]." Sluchai ranenii litsevogo cherepa diubel'-gvozdem s povrezhdeniem nosovoi peregorodki i gaimorovoi polosti(4): 102.

4103. Pallett, J. R., et al. (2014). "A cross-sectional study of knife injuries at a London major trauma centre." Annals of the Royal College of Surgeons of England **96**(1): 23-26.

INTRODUCTION: No national recording systems for knife injuries exist in the UK. Understanding the true size and nature of the problem of knife injuries is the first stage in reducing the burden of this injury. The aim of this study was to survey every knife injury seen in a single inner city emergency department (ED) over a one-year period., METHODS: A cross-sectional observational study was performed of all patients attending with a knife injury to the ED of a London major trauma centre in 2011. Demographic characteristics, patterns of injury, morbidity and mortality data were collected., RESULTS: A total of 938 knife injuries were identified from 127,191 attendances (0.77% of all visits) with a case fatality rate of 0.53%. A quarter (24%) of the major trauma team's caseload was for knife injuries. Overall, 44% of injuries were selfreported as assaults, 49% as accidents and 8% as deliberate self-harm. The highest age specific incident rate occurred in the 16-24 year age category (263/100,000). Multiple injuries were seen in 19% of cases, of which only 81% were recorded as assaults. The mean length of stay for those admitted to hospital was 3.04 days. Intrathoracic injury was seen in 26% of cases of chest trauma and 24% of abdominal injuries had a second additional chest injury., CONCLUSIONS: Violent intentional injuries are a significant contributory factor to the workload of the major trauma team at this centre. This paper contributes to a more comprehensive understanding of the nature of these injuries seen in the ED.

4104. Palm, H. G., et al. (2011). "[Vacuum-assisted closure of head and neck wounds]." Vakuumversiegelungstherapie im Kopf-Hals-Bereich. **59**(8): 819-830.

OBJECTIVE: Since the early 1990s, vacuum-assisted closure (VAC) therapy has been used to treat acute and chronic wounds in almost all disciplines of surgery in Germany. Taking this into consideration, the use of vacuum therapy in the area of head and neck surgery was examined., METHODS: A literature review using MEDLINE (with PubMed) and EMBASE as well as a Cochrane search was performed on 15 December 2010. Search terms included "vacuum therapy", "vacuum-assisted closure", "V.A.C.", "VAC", "(topical) negative pressure (wound therapy)"., RESULTS: There were 1,502 peer-reviewed articles about "vacuum therapy" concerning all medical fields in literature. There were a total of 37 publications from the discipline of head and neck surgery (538 patients). Although benefits for the patients are consistently reported, these results are usually presented only in case reports or case series (evidence level IV and V). Positive results are mainly observed for the treatment of lifting defects in reconstructive surgery and for the treatment of acute and chronic soft tissue defects of the neck. Only little experience exists in the vacuum therapy of war wounds in the head and neck region., CONCLUSION: Due to its advantages (i.e., hygienic temporary wound care with support of the continuous decontamination, wound drainage, promotion of granulation tissue formation, and effective wound conditioning), VAC is an integral and indispensable part of modern wound treatment. Analogous to this general experience, a benefit must also be assumed for head and neck wounds. High-quality and reliable studies on the use of VAC must be performed to verify this observation and the future reimbursement of in- and outpatient wound VAC treatment.

4105. Palmer, J., et al. (2017). "Successful management of a gun shot wound to the mandibular condyle by removal of the condylar head with no hard tissue reconstruction - Lessons for blunt trauma management?" British Journal of Oral and Maxillofacial Surgery **55**(10): e129.

Introduction: The decision to operatively fix the mandibular condyle in closed blunt trauma is frequently discussed within the management of complex craniofacial reconstruction. Gunshot injuries to the condylar region are rare due to the site and size of the TMJ. Reconstruction of the resected condyle would be conceptually required to restore both the length of the posterior mandible and the articular surface. We present a case where the entire mandibular condyle was removed, and following intermaxillary fixation required no further management. Case report: A 23-year-old male presented following a low energy gunshot wound to his left preauricular region. The patient was unable to open his mouth and CT scans demonstrated a destroyed left mandibular condyle and neck of condyle with a retained metallic fragment. At surgery the metal casing and bone fragments were removed via a preauricular approach. Access was gained to the superficial infratemporal fossa by means of an eminectomy. Hewas placed inIMFand at fourteen days post operatively was found to have 42mm inter-incisal mouth opening and a normal dental occlusion. Discussion: This patient has achieved a functional, painfree occlusion with good mouth opening despite a missing condyle and neck. There is likely to have been considerable functional compensation of the neuromuscular apparatus in order to achieve this, but the fact remains that he has achieved a surprising result. This case teaches us the principles of gunshot injuries of the TMJ, but in addition reminds us that anatomical reconstruction of the TMJ is not always required.

4106. Palomo, J. A. (1971). "[Traumatic thrombosis of the internal carotid artery]." Trombosis traumatica de la arteria carotida interna. **17**(2 Suppl): 375-389.

4107. Pan, R. and J. Wang (2001). "Cranial penetration injury caused by a reinforcing steel bar." Chinese journal of traumatology = Zhonghua chuang shang za zhi **4**(3): 185-186.

One case of cranial penetration injury was reported caused by a reinforcing steel bar. The patient was well cured and discharged. After six years of follow-up, the patient had good functional recovery.

4108. Panagopoulos, D., et al. (2011). "Cranial gunshot injury in a child." Open Neurosurgery Journal **4**: 16-17.

We present a cases of a cranial gunshot injury in a 8-year-old girl. Brain computed tomography demonstrated a depressed skull fracture with an underlying cerebral contusion. The patient was operated upon and debridement of the wound was performed. A craniectomy was then performed around the skull fracture, the dura was opened and the subdural hematoma with the cerebral contusion were removed. Four months later a cranioplasty was performed. On followup examination one year later the patient was in excellent condition. © Panagopoulos et al.

4109. Panagopoulos, D., et al. (2014). "Cranial gunshot injury in a child." Open Neurosurgery Journal **4**(1): 16-17.

We present a cases of a cranial gunshot injury in a 8-year-old girl. Brain computed tomography demonstrated a depressed skull fracture with an underlying cerebral contusion. The patient was operated upon and debridement of the wound was performed. A craniectomy was then performed around the skull fracture, the dura was opened and the subdural hematoma with the cerebral contusion were removed. Four months later a cranioplasty was performed. On followup examination one year later the patient was in excellent condition.

4110. Panata, L., et al. (2017). "A crossbow suicide." Forensic science international **281**: e19-e23.

The crossbow is an ancient ranged weapon originally conceived for war and hunting. Although nowadays its use in warfare has been surpassed by firearms, it continues to be used in hunting, sports and recreation. The authors present the case of a 40-year-old man who suffered from severe depression. When his condition further deteriorated, doctors ordered a forced hospitalization but, just a few hours before the measure became effective, the man committed suicide using a crossbow. The autopsy and police investigation showed possession of the crossbow darts which the man used to shoot himself in the head. The forensic pathologist found the dart stuck in the skull: the entry wound was in the suprahyoid region while the arrow tip emerged in the left parietal region meaning the arrow crossed the tongue, the middle fossa, the brain and the cranial wall. All the wounds presented a three-pointed star shape consistent with the three sharp blades of the dart. An extensive blood infiltration affected the subdural and subarachnoid space, particularly where the dart had passed. The severe brain injury, extensive subdural and subarachnoid bleeding and brain swelling following the trauma caused the death. Even though the use of the crossbow is only permitted in sporting/hunting

contexts, the reported case highlights the sharp contrast between its potential for harm and the easy access to this kind of weapon, even for those affected by mental illness.

4111. Panda, N. and S. Sridhar (2003). "Acute laryngotracheal trauma: Assessment & management." Journal International Medical Sciences Academy **16**(4): 230-232.

4112. Pande, K., et al. (1998). "Transient brain injury from penetration of a halo pin." Spinal cord **36**(10): 732-733.

This case report describes a patient who had a halo device for traction applied to obtain correction of scoliotic deformity between a two-stage operative procedure. The patient developed a neurological deficit suggestive of brain injury following retorquing of a halo pin. This was confirmed by an MRI scan of the brain. The patient made a full recovery of the neurological deficit following replacement of the pin.

4113. Pandey, S., et al. (2018). "Perforating Brain Injury By a Rusty Steel Bar." The Journal of craniofacial surgery **29**(4): e372-e375.

A perforating head injury is a type of an injury wherein the projectile passes entirely through the cranium leaving both entrance and exit wounds. It is considered less prevalent than other kinds of head trauma such as closed or penetrating head injuries carry a worse prognosis among other varieties of head injuries. Having unique mechanism and pathophysiology it is considered a significant challenge for the practicing neurosurgeon mandating high precaution and novel approach to minimize further damage. Here, we presented a case of a 5-year-old boy who suffered from perforating brain injury by a fallen rusty steel bar.

4114. Pandya, J., et al. (2017). "Temporal and regional changes in brain mitochondrial bioenergetics following penetrating ballistic-like brain injury in rats." Journal of neurotrauma **34**(13): A22.

Mitochondria play a pivotal role in the secondary pathophysiological sequelae following traumatic brain injury (TBI) and thus are leading targets for therapeutic interventions. The current study is designed to characterize the temporal and regional post-injury responses of mitochondrial energy crisis up to 14 days following penetrating ballisticlike brain injury (PBBI) in rats. Adult male rats were subjected to either 10% unilateral PBBI or Sham craniotomy (n = 6/group). At 30 min, 3 h, 6 h, 24 h, 3 d, 7 d and 14 d post-PBBI, mitochondria were isolated from the ipsilateral hemisphere of two brain regions: the injury core, i.e. frontal cortex + striatum (FC+ST) and a region distant from the injury core, i.e. hippocampus (HIP). Mitochondrial bioenergetics parameters were measured using a high-throughput procedure of the Seahorse Flux Analyzer. The time-course of FC+ST mitochondria showed a biphasic energy dysfunction response, indicated by a decline in ATP synthesis and maximum respiratory capacity. The first phase of energy crisis started immediately at 30 min (-42%; $p < 0.05$ vs. Sham) and attained baseline levels between 3 h to 6 h (nonsignificant vs. Sham), followed by a second phase of more robust energy crisis observed between 24 h to 14 d post-injury (-55% to-90%; $p < 0.05$ vs. Sham). In contrast, the HIP mitochondria showed a significantly delayed decline in mitochondrial bioenergetics parameters at 7 d (-74%; $p < 0.05$ vs. Sham) and 14 d (-51%; $p < 0.05$ vs. Sham) post-PBBI. Collectively, PBBI produced temporal and regionspecific alterations in mitochondrial bioenergetics that are unique to the penetrating, temporary cavity mechanism. More importantly, the results underscore an extended therapeutic window (between 3 h to 24 h post-injury) for mitochondria targeted intervention following PBBI.

4115. Pandya, J., et al. (2016). "Identification of preferred substrates of mitochondrial energy metabolism following penetrating ballistic-like brain injury." Journal of neurotrauma **33**: A118.

Mitochondria constitute a central role in brain energy metabolism, and play a pivotal role in the development of secondary pathophysiology and subsequent neuronal cell death following traumatic brain injury (TBI). Under normal circumstances, brain consumes glucose as the preferred energy source for adenosine triphosphate (ATP) production over ketones. However following TBI, the ATP synthesis rates of glucose intermediate metabolites (i.e. pyruvate, glutamate and succinate) and ketones (i.e. bhydroxybutyrate) have not been individually compared. We hypothesize that TBI leads to an overall decline or metabolic shift in the utilization of these substrates for the ATP production. Adult male rats were subjected to either 10% unilateral penetrating ballistic-like brain injury (PBBI) or Sham craniotomy (n = 5

per group). At 24 hours post-injury, mitochondria were isolated from pooled brain regions (frontal cortex and striatum) of the ipsilateral hemisphere. MitochondrialATP synthesiswas measured usingClark-type oxygen electrode in the presence ofmetabolic substrates pyruvate +malate (PM), glutamate + malate (GM), succinate (Succ) and b-hydroxybutyrate + malate (BHBM). As compared to Sham group, the PBBI group showed a reduction in ATP synthesis with PM (-43%, $p < 0.05$); GM (-42%, non-significant); Succ (-50%, $p < 0.05$) and BHBM (-44%, $p < 0.05$). Next, we compared the ATP synthesis rates of the four substrates within the experimental group. In the Sham group, the BHBMshowed significantly less ATP synthesis than the other substrates (PM = GM = Succ > BHBM, $p < 0.05$). In the PBBI group, the ATP synthesis of PM, Succ and BHBM were significantly distinct amongst each other (PM > Succ > BHBM, $p < 0.05$). Additionally, the ATP synthesis of PM and GM were identical, and were the highest amongst the four substrates tested. Collectively, PBBI leads to an overall reduction and metabolic shift in the intermediate substrates utilization for the ATP production. These results provide a strong basis for the use of neutraceuticals as “alternative biofuels” for higher energy production following brain trauma.

4116. Pandya, J., et al. (2022). "IMPAIRMENT OF MITOCHONDRIA TARGETED POSTINJURY MECHANISMS IN THE RAT MODEL OF PENETRATING TBI." Journal of neurotrauma **39**(11-12): A42.

Mitochondrial dysfunction is a commonality among various severity of traumatic brain injury (TBI) that leads to secondary injury progression. Abnormal mitochondrial function following TBI includes impaired energy, Ca2+ and redox homeostasis. Oxidative stress further causes irreversible oxidative modifications of biomembrane components, alters membrane integrity and triggers apoptosis. The current study evaluates the mitochondria targeted post-injury mechanisms following penetrating TBI (PTBI). Anesthetized adult male rats were subjected to either 10% unilateral PTBI or uninjured Sham craniectomy (n = 6/group). Animals were euthanized at 24h post-PTBI, and mitochondria isolated from the injury core and perilesional frontal cortex and striatum regions. At 24hr post-injury, a significantly higher free radicals production, elevated lipid and protein oxidative markers were observed following PTBI vs. Sham. Together, mitochondrial antioxidants such as glutathione, peroxiredoxins-3, thioredoxins, NADPH, superoxide dismutase expression/levels were significantly decreased following PTBI. The PTBI mitochondria displayed significant loss of Ca2+ homeostasis, early opening of mitochondrial permeability transition pore and increased Ca2+ induced mitochondrial swelling. Mitochondrial membrane integrity markers such as VDAC and cytochrome c expression were significantly decreased following PTBI. This may further exacerbate apoptotic cell death as evidenced by decreased anti-apoptotic protein BCL-2, and increased apoptotic GAPDH protein expression following PTBI. Overall, the PTBI group showed increased oxidative stress, decreased antioxidants, decreased Ca2+ load capacity at 24h post-injury. The significant loss of mitochondrial membrane integrity and elevated apoptosis indicators may contribute to non-salvageable acute-phase effects following PTBI. Collectively, the current results suggest that, mitochondria targeted neuroprotective intervention is crucial for preserving brain functions during acute-phase of PTBI.

4117. Pandya, J. D., et al. (2018). "Time-course evaluation of oxidative stress parameters following penetrating TBI." Journal of neurotrauma **35**(16): A212.

Mitochondria play a pivotal role in maintaining brain energy and redox homeostasis and represent one of the leading factors contributing to the cell death following traumatic brain injury (TBI). Our time-course analysis of brain mitochondrial bioenergetics study following penetrating ballistic-like brain injury (PBBI) revealed that mitochondrial bioenergetics impairment manifests early during the acute period up to 14d post-injury. To understand the vital role of redox homeostasis during acute severe penetrating TBI, we evaluated the temporal changes of brain mitochondrial oxidative stress parameters in the PBBI model. Anesthetized adult male rats were subjected to either 10% unilateral PBBI or sham craniotomy (n = 3-6/group x 7 injury time-points). Animals were euthanized at 30min 3h 6h 24h 3d 7d and 14d post-PBBI, and brain samples i.e. homogenates, mitochondria and cytosol fractions were collected from the ipsilateral hemisphere of the injury core, i.e. frontal cortex + striatum regions. The oxidative stress measures such as protein oxidation adducts (i.e. 3-nitrotyrosine and protein carbonyl levels) and anti-oxidant capacity (i.e. total glutathione (GSH) and peroxiredoxin (PRX3) contents) were quantified using Western-blot and microplate-based analytical methods. Overall, the PBBI group showed increased oxidative stress and decreased antioxidant capacities between 30min to 14d post-PBBI period vs. sham. The mitochondrial 3-nitrotyrosine content was increased significantly (25- 73%; $p < 0.05$ vs. sham) from 30min to 3d post-injury; whereas no change was reported at 6h and 7d post-injury. The PBBI homogenates had significantly elevated (10-58%; $p < 0.05$ vs. sham) protein carbonyl level from 30min to 7d time-points. Results of antioxidant measures showed a significant injury-induced reduction in GSH content (15-58%, $p <$

0.05 vs. sham) in all fractions from 30min to 7d post-PBBI. Furthermore, the PRX3 contents were significantly decreased (16-52%; $p < 0.05$ vs. sham) from 24h to 14d post-PBBI period. This ongoing study has identified the overlapping trends of altered redox homeostasis with energy metabolism as we reported earlier. Collectively, the temporal profile of elevated oxidative stress responses may be unique to the penetrating injury mechanism following brain trauma. In the acute post-injury period, the mitochondria targeted anti-oxidants therapeutics are recommended for management of redox homeostasis following severe penetrating TBI.

4118. Pandya, J. D., et al. (2021). "Time-Course Evaluation of Brain Regional Mitochondrial Bioenergetics in a Pre-Clinical Model of Severe Penetrating Traumatic Brain Injury." Journal of neurotrauma **38**(16): 2323-2334.

Mitochondrial dysfunction is a pivotal target for neuroprotection strategies for traumatic brain injury (TBI). However, comprehensive time-course evaluations of mitochondrial dysfunction are lacking in the pre-clinical penetrating TBI (PTBI) model. The current study was designed to characterize temporal responses of mitochondrial dysfunction from 30 min to 2 weeks post-injury after PTBI. Anesthetized adult male rats were subjected to either PTBI or sham craniectomy (n = 6 animals per group x 7 time points). Animals were euthanized at 30 min, 3 h, 6 h, 24 h, 3 days, 7 days, and 14 days post-PTBI, and mitochondria were isolated from the ipsilateral hemisphere of brain regions near the injury core (i.e., frontal cortex [FC] and striatum [ST]) and a more distant region from the injury core (i.e., hippocampus [HIP]). Mitochondrial bioenergetics parameters were measured in real time using the high-throughput procedures of the Seahorse Flux Analyzer (Agilent Technologies, Santa Clara, CA). The post-injury time course of FC + ST showed a biphasic mitochondrial bioenergetics dysfunction response, indicative of reduced adenosine triphosphate synthesis rate and maximal respiratory capacity after PTBI. An initial phase of energy crisis was detected at 30 min (-42%; $p < 0.05$ vs. sham), which resolved to baseline levels between 3 and 6 h (non-significant vs. sham). This was followed by a second and more robust phase of bioenergetics dysregulation detected at 24 h that remained unresolved out to 14 days post-injury (-55% to -90%; $p < 0.05$ vs. sham). In contrast, HIP mitochondria showed a delayed onset of mitochondrial dysfunction at 7 days (-74%; $p < 0.05$ vs. sham) that remained evident out to 14 days (-51%; $p < 0.05$ vs. sham) post-PTBI. Collectively, PTBI-induced mitochondrial dysfunction responses were time and region specific, evident differentially at the injury core and distant region of PTBI. The current results provide the basis that mitochondrial dysfunction may be targeted differentially based on region specificity post-PTBI. Even more important, these results suggest that therapeutic interventions targeting mitochondrial dysfunction may require extended dosing regimens to achieve clinical efficacy after TBI.

4119. Pandya, J. D., et al. (2019). "Comprehensive profile of acute mitochondrial dysfunction in a preclinical model of severe penetrating TBI." Frontiers in neurology **10**(JUN).

Mitochondria constitute a central role in brain energy metabolism, and play a pivotal role in the development of secondary pathophysiology and subsequent neuronal cell death following traumatic brain injury (TBI). Under normal circumstances, the brain consumes glucose as the preferred energy source for adenosine triphosphate (ATP) production over ketones. To understand the comprehensive picture of substrate-specific mitochondrial bioenergetics responses following TBI, adult male rats were subjected to either 10% unilateral penetrating ballistic-like brain injury (PBBI) or sham craniectomy (n = 5 animals per group). At 24 h post-injury, mitochondria were isolated from pooled brain regions (frontal cortex and striatum) of the ipsilateral hemisphere. Mitochondrial bioenergetics parameters were measured ex vivo in the presence of four sets of metabolic substrates: Pyruvate+malate (PM), glutamate+malate (GM), succinate (Succ), and β-hydroxybutyrate+malate (BHBM). Additionally, mitochondrial matrix dehydrogenase activities [i.e., pyruvate dehydrogenase complex (PDHC), alpha-ketoglutarate dehydrogenase complex (α-KGDHC), and glutamate dehydrogenase (GDH)] and mitochondrial membrane-bound dehydrogenase activities [i.e., electron transport chain (ETC) Complex I, II, and IV] were compared between PBBI and sham groups. Furthermore, mitochondrial coenzyme contents, including NAD(t) and FAD(t), were quantitatively measured in both groups. Collectively, PBBI led to an overall significant decline in the ATP synthesis rates (43-50%; $*P < 0.05$ vs. sham) when measured using each of the four sets of substrates. The PDHC and GDH activities were significantly reduced in the PBBI group (42-53%; $*p < 0.05$ vs. sham), whereas no significant differences were noted in α-KGDHC activity between groups. Both Complex I and Complex IV activities were significantly reduced following PBBI (47-81%; $*p < 0.05$ vs. sham), whereas, Complex II activity was comparable between groups. The NAD(t) and FAD(t) contents were significantly decreased in the PBBI group (27-35%; $*p < 0.05$ vs. sham). The decreased ATP synthesis rates may be due to the significant reductions in brain mitochondrial

dehydrogenase activities and coenzyme contents observed acutely following PBBI. These results provide a basis for the use of "alternative biofuels" for achieving higher ATP production following severe penetrating brain trauma.

4120. Panourias, I. G., et al. (2006). "Penetrating craniocerebral injury caused by a pneumatic nail gun: an unsuccessful attempt of suicide." Clinical neurology and neurosurgery **108**(5): 490-492.

Nail guns are powerful tools commonly used in the building industry. As a result of their improper use, many accidents of bodily injury, including death, have already been reported over the last 50 years; their use in suicide attempts, however, is rare. In this paper, an unusual case of unsuccessful suicidal craniocerebral penetrating injury committed with a pneumatic nail gun by a 23-year-old man is presented. The particular findings that suggest a suicidal attempt are also discussed.

4121. Panteleichuk, A., et al. (2020). "Composite chitosan/polyethylene oxide film for duraplasty in traumatic brain injury model in rats." Cell and Organ Transplantology **8**(1).

The duraplasty is a standard procedure during neurosurgery for injuries and diseases of the brain. The hermetic closure of the dura mater is not always possible with the application of autologous tissues. Synthetic, allogeneic and xenogenic implants, which are currently used, have disadvantages, so the search for the material that would best meet the requirements for a dura mater scaffold continues. The purpose is to study the physical and chemical properties of the composite chitosan/polyethylene oxide (PEO) film and determine the effectiveness of its application for duraplasty in the experiment in vivo; to analyze its ability to biodegradation; to evaluate the effect of chitosan/PEO scaffold on the regeneration of dura matter. Materials and methods. The experiment used 10 white rats aged 12 months with a penetrating traumatic brain injury model. Postoperative material was examined by macroscopy, optical microscopy and infrared spectroscopy. Results. According to the analysis of infrared absorption, spectral markers of scar tissue, regenerating and intact dura mater were determined. Oscillation spectroscopy data indicate degradation of the chitosan film and repair of normal dura mater. Histology data also indicate biological degradation of the chitosan film and its replacement by newly formed normal connective tissue. Conclusion. The data of morphological and spectroscopic studies show the ability of chitosan/PEO film to biodegradation in vivo with followed replacement not by scar but by normal connective tissue.

4122. Panteleichuk, A. B., et al. (2021). "Quantitative Evaluation of the Regenerated Dura Mater in a Decompressive Skull Trepanation Model in Rats." International Journal of Morphology **39**(6): 1731-1736.

Regeneration of the dura mater following duraplasty using a collagen film, a chitosan film, or a combination of both with gelatin, was studied in a craniotomy and penetrating brain injury model in rats. Collagen autofluorescence in the regenerated dura mater was evaluated using confocal microscopy with excitation at λem = 488 nm and λem = 543 nm. An increase in regeneration of the extracellular matrix of connective tissue and an increase in matrix fluorescence were detected at 6 weeks after duraplasty. The major contributors to dura mater regeneration were collagen films, chitosan plus gelatin-based films, and, to a much lesser extent, chitosan-based films. By using autofluorescence densitometry of extracellular matrix, the authors were able to quantify the degree of connective tissue regeneration in the dura mater following duraplasty.

4123. Papa, A., et al. (2021). "Neurogenic pulmonary edema in trauma: A case report and systematic review." Critical care medicine **49**(1 SUPPL 1): 663.

INTRODUCTION: Neurogenic Pulmonary Edema (NPE) is a rare syndrome characterized by acute pulmonary edema following a central nervous system (CNS) injury with the absence of a primary cardiogenic or pulmonary insult. There are multiple causes, however, the frequency, risk factors, morbidity and mortality of the disease remains widely unknown. First, we present a case report of NPE in a 22-year-old African-American male with a single gunshot wound to the head. Second, we perform a systematic review of NPE related to TBI in order to examine risk factors associated with mortality. METHODS: PRISMA guidelines were used to conduct the study. 1,399 articles specific to NPE were identified by searching Pubmed and Scopus. 128 records remained after applying exclusion criteria and 29 studies were included in quantitative analysis, identifying 45 patients total. Acquired patient data included admission vital signs, demographics, and mortality. Frequency data, t tests, and odds ratios were generated using IBM SPSS Version 26 to examine risk factors

for mortality. Non-numerical data, such as common radiographic imaging findings, physical exam findings, pharmacologic treatments used, and ventilation strategies were also reviewed for discussion. RESULTS: Overall mortality from NPE in traumatic brain injury was found to be 44.20%. Of the patients who survived, 63.6% (n=14) made a full recovery from NPE and 78.3% were discharged home. Median hospital stay was 11 days. Admission vitals, such as systolic blood pressure (mean [SD], 113.13 [20.17]) (P = .088) and heart rate (97.93 [19.89]) (P = .057) were not significant in predicting mortality. While the majority of patients were male (83.7%, n = 36), there was no associated significant risk in mortality based on sex; male (OR, 1.050; 95% CI, 0.248 - 7.913) female (OR, 0.750; 95% CI, 0.171 - 3.291). Median age was 19 years, however, age was not a significant risk factor for mortality (22.92 [12.61]) (P = .385). CONCLUSIONS: NPE caused by TBI is rare and carries a significant mortality and morbidity. To our knowledge this is the first systematic review of NPE associated with TBI. While the generated data may provide an idea of a typical presentation of NPE, there is insufficient evidence to establish risk factors associated with mortality.

4124. Papa, L., et al. (2015). "Biomarkers improve clinical outcome predictors of mortality following non-penetrating severe traumatic brain injury." Neurocritical care **22**(1): 52-64.

OBJECTIVE: This study assessed whether early levels of biomarkers measured in CSF within 24-h of severe TBI would improve the clinical prediction of 6-months mortality., METHODS: This prospective study conducted at two Level 1 Trauma Centers enrolled adults with severe TBI (GCS <=8) requiring a ventriculostomy as well as control subjects. Ventricular CSF was sampled within 24-h of injury and analyzed for seven candidate biomarkers (UCH-L1, MAP-2, SBDP150, SBDP145, SBDP120, MBP, and S100B). The International Mission on Prognosis and Analysis of Clinical Trials in TBI (IMPACT) scores (Core, Extended, and Lab) were calculated for each patient to determine risk of 6-months mortality. The IMPACT models and biomarkers were assessed alone and in combination., RESULTS: There were 152 patients enrolled, 131 TBI patients and 21 control patients. Thirty six (27 %) patients did not survive to 6 months. Biomarkers were all significantly elevated in TBI versus controls ($p < 0.001$). Peak levels of UCH-L1, SBDP145, MAP-2, and MBP were significantly higher in non-survivors ($p < 0.05$). Of the seven biomarkers measured at 12-h post-injury MAP-2 ($p = 0.004$), UCH-L1 ($p = 0.024$), and MBP ($p = 0.037$) had significant unadjusted hazard ratios. Of the seven biomarkers measured at the earliest time within 24-h, MAP-2 ($p = 0.002$), UCH-L1 ($p = 0.016$), MBP ($p = 0.021$), and SBDP145 (0.029) had the most significant elevations. When the IMPACT Extended Model was combined with the biomarkers, MAP-2 contributed most significantly to the survival models with sensitivities of 97-100 %., CONCLUSIONS: These data suggest that early levels of MAP-2 in combination with clinical data provide enhanced prognostic capabilities for mortality at 6 months.

4125. Papadopoulos, M., et al. (1994). "Orbital impalement by steering wheel lock." Australian and New Zealand journal of ophthalmology **22**(4): 278-279.

4126. Papavassiliou, D. (2002). "Maxillofacial trauma." Archives of Hellenic Medicine **19**(4): 427-440.

Patients with maxillofacial trauma represent a high percentage of injured patients. Maxillofacial trauma is due mainly to traffic, and especially motorcycle, accidents, but also to interpersonal violence. In descending order of frequency, falls, workplace accidents, sports injuries, shootings and dental operations ensue as etiologic factors. In Greece, based on statistical reports from trauma centers in Athens and the provinces, traffic injuries occupy the first place and, with a small difference, interpersonal violence trauma the second place. Unfortunately, this situation is not due to the reduction of traffic accidents or the improvement of the relation between road, driver and vehicle, but to the increasing trend in interpersonal violence trauma. In other European countries, on the contrary, the frequency of traffic accidents is decreasing continuously. The majority of fractures appear in the mandible, in the condylar region, the genion and also in the middle third of the face in the nasal and zygomatic bones. As regards age distribution, in children, alveolar process fractures occupy the first place whereas in the elderly, fractures of the body of an edentulous mandible are prominent. The injured patients with maxillofacial trauma are very often in need of urgent intervention because of acute respiratory problems or massive blood loss. These situations are frequently accompanied by dangerous cervical spine and/or head injuries. After stabilization of the patient's general condition, the suturing of the skin wounds and stabilization of the fractured bones maybe carried out. X-ray examinations follows the clinical examination and simply confirms the clinical diagnosis. The final rehabilitation often includes resetting of the fractures and immobilization of the bones in the desired position. In the majority of cases this is achieved by transmandibular immobilization, possibly combined with internal osteosynthesis. The most common methods in use are osteosynthesis with mini plates or use of

flaps or hallografts which helps the surgeon to repair soft tissue deficits. These methods represent a common surgical approach.

4127. Paradot, G., et al. (2008). "[Craniocerebral gunshot wounds: a study of outcome predictors]." Les plaies craniocerebrales d'origine balistique: recherche d'arguments pronostiques. **54**(2): 79-83.

BACKGROUND AND PURPOSE: A retrospective study about craniocerebral gunshot wounds was done to better identify outcome predictors., METHODS: We reported and analyzed the clinical and radiological data of 18 patients admitted to Le Kremlin-Bicetre institute for a craniocerebral gunshot wound between January 2000 and December 2005. The Glasgow Outcome Scale (GOS) was used to analyze patient outcome., RESULTS: There were 17 men and one woman, mean age 43 years (range 17-84). Fifteen patients died, two had a GOS equal to 2 and one GOS equal to 3. There were 16 suicides and two murders. All patients with areactive bilateral mydriasis and all patients with Glasgow Coma Scale (GCS) less than seven died except one. The 10 patients with intraventricular hemorrhage died. The bullet crossed the midline for 13 patients and all of them died. None of the patients underwent emergency surgery for the treatment of craniocerebral gunshot wounds because of low Glasgow Coma Scale., CONCLUSIONS: This study shows some interesting prognosis patterns: bilateral areactive mydriasis, GCS less or equal to 7 and bullet trajectory (if crossing the midline) are the most important factors predicting a fatal outcome.

4128. Paradot, G., et al. (2007). "Study of craniocerebral gunshot wounds outcome predictors: Forensic science interests." Journal de Medecine Legale Droit Medical **50**(6-7): 321-327.

We retrospectively reported and analyzed the clinical and radiological data of 18 patients admitted to Kremlin Bicetre institute for a craniocerebral gunshot wound between January 2000 and December 2005. There were 17 men and 1 woman, with a mean age of 43 (17 to 84 years old). There were 16 suicides and 2 murders. None of the patients underwent surgery in emergency for the treatment of craniocerebral gunshot wounds because of a low Glasgow Coma Scale. Bilateral areactive mydriasis, GCS ≤ 7, and bullet trajectory (if crossing the midline) are the most important factors predicting a fatal outcome.

4129. Pardini, M., et al. (2020). "Left rostrolateral prefrontal cortex lesions reduce suicidal ideation in penetrating traumatic brain injury." CNS spectrums **25**(1): 24-31.

OBJECTIVES: The objective of this study is to evaluate the relationship between suicidal ideation (SI), structural brain damage, and cognitive deficits in patients with penetrating traumatic brain injury (pTBI)., METHODS: Vietnam War veterans (n = 142) with pTBI to the prefrontal cortex (PFC) underwent combination of neuropsychological and psychiatric examinations and non-contrast CT brain scan. Patients were divided into SI positive (SI+) and SI negative (SI-) groups according to the SI item of the Beck Depression Inventory., RESULTS: Lesions to the left rostrolateral PFC (rlPFC) were associated with a lower risk of SI independent of depression and global functioning. Left rlPFC lesion also reduced abstract reasoning skills, which mediated the lesion effects on suicide ideation., CONCLUSIONS: The left rlPFC plays a crucial role in SI independently of depression and global functioning.

4130. Pardini, M., et al. (2011). "Prefrontal cortex lesions and MAO-A modulate aggression in penetrating traumatic brain injury." Neurology **76**(12): 1038-1045.

OBJECTIVE: This study investigates the interaction between brain lesion location and monoamine oxidase A (MAO-A) in the genesis of aggression in patients with penetrating traumatic brain injury (PTBI)., METHODS: We enrolled 155 patients with PTBI and 42 controls drawn from the Vietnam Head Injury Study registry. Patients with PTBI were divided according to lesion localization (prefrontal cortex [PFC] vs non-PFC) and were genotyped for the MAO-A polymorphism linked to low and high transcriptional activity. Aggression was assessed with the aggression/agitation subscale of the Neuropsychiatric Inventory (NPI-a)., RESULTS: Patients with the highest levels of aggression preferentially presented lesions in PFC territories. A significant interaction between MAO-A transcriptional activity and lesion localization on aggression was revealed. In the control group, carriers of the low-activity allele demonstrated higher aggression than high-activity allele carriers. In the PFC lesion group, no significant differences in aggression were observed between carriers of the 2 MAO-A alleles, whereas in the non-PFC lesion group higher aggression was observed in the high-activity allele than in the low-activity allele carriers. Higher NPI-a scores were linked to more severe

childhood psychological traumatic experiences and posttraumatic stress disorder symptomatology in the control and non-PFC lesion groups but not in the PFC lesion group., CONCLUSIONS: Lesion location and MAO-A genotype interact in mediating aggression in PTBI. Importantly, PFC integrity is necessary for modulation of aggressive behaviors by genetic susceptibilities and traumatic experiences. Potentially, lesion localization and MAO-A genotype data could be combined to develop risk-stratification algorithms and individualized treatments for aggression in PTBI.

4131. Pardini, M., et al. (2014). "Aggression, DRD1 polymorphism, and lesion location in penetrating traumatic brain injury." CNS spectrums **19**(5): 382-390.

OBJECTIVE: This study evaluated whether structural brain lesions modulate the relationship between pathological aggression and the dopaminergic system in traumatic brain injury (TBI). While converging evidence suggests that different areas of the prefrontal cortex modulate dopaminergic activity, to date no evidence exists of a modulation of endogenous dopaminergic tone by lesion localization in penetrating TBI (pTBI)., METHODS: This study included 141 male Caucasian veterans who suffered penetrating pTBI during their service in Vietnam and 29 healthy male Caucasian Vietnam veterans. Participants were genotyped for 3 functional single nucleotide polymorphisms (SNPs): dopamine receptor D1 (DRD1) rs686, dopamine receptor D2 (DRD2) rs4648317, and catechol-O-methyltransferase (COMT) Val158Met. Patients underwent brain CT scans and were divided into medial prefrontal cortex, lateral prefrontal cortex, and posterior cortex lesion groups. Long-term aggression levels were evaluated with the agitation/aggression subscale of the Neuropsychiatric Inventory., RESULTS: Our data showed that carriers of more transcriptionally active DRD1 alleles compared to noncarriers demonstrated greater aggression levels due to medial prefrontal cortex lesions but reduced aggression levels due to lateral prefrontal cortex lesions independently of DRD2 rs4648317 or COMT Val158Met genotypes., CONCLUSIONS: Our results suggest that the relationship between pTBI-related aggression and the dopaminergic system is modulated by lesion location. Potentially lesion location could represent an easy-to-use, widely available, para-clinical marker to help in the development of an individualized therapeutic approach to pTBI-related pathological aggression.

4132. Pardini, M., et al. (2012). "Fatty-acid amide hydrolase polymorphisms and post-traumatic stress disorder after penetrating brain injury." Translational psychiatry **2**: e75.

The past few years have seen an increase in the clinical awareness of post-traumatic stress disorder (PTSD), one of the most disabling and least understood behavioral disorders. Although the biological bases of PTSD are poorly understood, fatty-acid amide hydrolase (FAAH) activity has been linked with arousability and aversive-memories extinction, that is, two key features of PTSD. In this study, we investigated the association between the FAAH genetic polymorphisms and PTSD development and maintenance. We assessed PTSD frequency in a group of male Vietnam war veterans who suffered combat-related penetrating traumatic brain injury, that is, a relatively homogeneous population regarding the nature of the events that led to PTSD. We showed that rs2295633, a single-nucleotide polymorphism of FAAH, was significantly associated with PTSD diagnosis in subjects without lesions in the ventromedial prefrontal cortex. Moreover, the presence of the C allele was associated with more severe re-experiencing of trauma and more negative reported childhood experiences. In conclusion, our data suggest that FAAH has an important role in PTSD through modulation of aversive memories and point to both a novel therapeutic target and a possible risk marker for this condition.

4133. Pardini, M., et al. (2010). "Ventromedial prefrontal cortex modulates fatigue after penetrating traumatic brain injury." Neurology **74**(9): 749-754.

BACKGROUND: Fatigue is a common and disabling symptom in neurologic disorders including traumatic penetrating brain injury (PBI). Despite fatigue's prevalence and impact on quality of life, its pathophysiology is not understood. Studies on effort perception in healthy subjects, animal behavioral paradigms, and recent evidence in different clinical populations suggest that ventromedial prefrontal cortex could play a significant role in fatigue pathophysiology in neurologic conditions., METHODS: We enrolled 97 PBI patients and 37 control subjects drawn from the Vietnam Head Injury Study registry. Fatigue was assessed with a self-report questionnaire and a clinician-rated instrument; lesion location and volume were evaluated on CT scans. PBI patients were divided in 3 groups according to lesion location: a nonfrontal lesion group, a ventromedial prefrontal cortex lesion (vmPFC) group, and a dorso/lateral

prefrontal cortex (d/lPFC) group. Fatigue scores were compared among the 3 PBI groups and the healthy controls., RESULTS: Individuals with vmPFC lesions were significantly more fatigued than individuals with d/lPFC lesions, individuals with nonfrontal lesions, and healthy controls, while these 3 latter groups were equally fatigued. VmPFC volume was correlated with fatigue scores, showing that the larger the lesion volume, the higher the fatigue scores., CONCLUSIONS: We demonstrated that ventromedial prefrontal cortex lesion (vmPFC) plays a critical role in penetrating brain injury-related fatigue, providing a rationale to link fatigue to different vmPFC functions such as effort and reward perception. The identification of the anatomic and cognitive basis of fatigue can contribute to developing pathophysiology-based treatments for this disabling symptom.

4134. Pareja, J. M., et al. (2019). "Combined blood-based biomarker panel of major subphenotypes of pediatric traumatic brain injury and neurodevelopmental outcomes." Journal of neurotrauma **36**(13): A139-A140.

Objectives: This study correlates three major pTBI pathological mechanistic subphenotypes: contusion, cerebral hemorrhage and diffuse axonal injury (DAI) to blood-based biomarkers and neurocognitive outcomes. Methods: Subjects 0-18 years admitted to the hospital with TBI were enrolled in this study. Serial serum/plasma for 16 healthy controls and 36 subjects was collected at 0, 24 and 48h post injury. Ubiquitin-C-terminal hydrolase (UCHL-1); glial fibrillary acidic protein (GFAP), neurofilament-L (NF-L) and Tau were measured. The Pediatric Evaluation of Disability Inventory (PEDI-CAT), Glasgow Outcome Scale-Extended (GOS-E Peds), Health and Behavioral Inventory (HBI) and Pediatric Quality of Life Inventory (PedsQL) were collected at 2 weeks, 6 months, and 12 months post injury. Summary: GFAP, UCHL1, Tau, and NFL could potentially be used together to predict the presence of DAI, contusion, and/or cerebral hemorrhage when serum samples are obtained within 0-48 h post injury, ($p < 0.005$; ROC AUC of 0.879 for GFAP, 0.794 for NFL, 0.926 for TAU and 0.928 for UCHL-1). Furthermore this panel may support the prediction of mortality ($p < 0.005$; ROC AUC of 0.810 for GFAP, 0.902 for NFL, 0.973 for TAU and 0.875 for UCHL-1). GOS-E outcomes from 6-12 months post injury were calculated and correlated with the previous biomarker panel ($P < 0.05$; ROC AUC of 0.682 for GFAP, 0.764 for NFL, 0.810 for TAU and 0.815 for UCHL-1). Conclusion: This preliminary data indicates the possible ability of a biomarker panel correlated to outcome measures to provide further insight to clinicians regarding injury severity and prognosis for pTBI.

4135. Paret, G., et al. (1998). "Gunshot wounds in brains of children: prognostic variables in mortality, course, and outcome." Journal of neurotrauma **15**(11): 967-972.

A retrospective study of 51 children presenting with craniocerebral gunshot lesions was carried out to identify predictors of outcome. The patients ranged in age from 2 months to 17 years, with a mean of 14.5 years. The outcome was good in 20 patients, and seven and four were moderately and severely disabled, respectively. Twenty patients died. Statistical analysis showed prognostic significance of the admission Glasgow Coma Score (GCS), computerized tomographic findings of intraventricular hemorrhage and midline shift, and metabolic abnormalities, including hypokalemia and hyperglycemia. These prognostic factors may have implications regarding counseling of families, utilization of resources, and organ transplantation.

4136. Paret, G., et al. (1996). "Pediatric craniocerebral wounds from plastic bullets: prognostic implications, course, and outcome." The Journal of trauma **41**(5): 859-863.

OBJECTIVE: To review our experience with craniocerebral injuries caused by plastic bullets, and to delineate prognostic factors for outcome., DESIGN: Retrospective case series of 29 patients presenting with plastic bullet-induced craniocerebral lesions., SETTING: Pediatric intensive care department of a tertiary care center., MEASUREMENTS AND MAIN RESULTS: Outcome was poor in 10 patients, good in 11, and two and six patients were moderately and severely disabled, respectively. Statistical analysis showed prognostic significance of the admission Glasgow Coma Scale score, computed tomographic findings of intraventricular hemorrhage and midline shift, and metabolic studies including hypokalemia and hyperglycemia., CONCLUSIONS: Plastic bullet-induced craniocerebral injuries carry a lower morbidity and mortality rate compared with other gunshot wounds. However, plastic bullets do incur a significant risk of injury. Their use should be carefully regulated.

4137. Paris, J. J. and G. Signorello (1992). "The use of anencephalic organ donors: lesson of Baby Theresa Ann." Clinical ethics report **6**(3): 3-6.

4138. Parish, J. M., et al. (2020). "Delayed Traumatic Tension Pneumocephalus: A Case Report." The Journal of emergency medicine **59**(6): e217-e220.

BACKGROUND: Traumatic tension pneumocephalus is a rare complication after craniofacial fractures that can cause devastating neurologic deficits if not managed promptly and effectively., CASE REPORT: A 38-year-old man with no past medical history presented to the Emergency Department (ED) after a motor vehicle crash. He was noted to have an open frontal scalp laceration. Computed tomography (CT) revealed a right frontal subdural hematoma and right medial frontal contusion. There was also a frontal bone fracture extending through the frontal sinus with mild underlying pneumocephalus. He was monitored for cerebrospinal fluid (CSF) leak and was subsequently discharged on postinjury day 9. He re-presented to the ED 14 days post injury with lethargy, confusion, headache, and swelling around his scalp laceration. A CT scan was obtained that revealed a large-volume intraparenchymal pneumocephalus (pneumocerebri) with mass effect and midline shift. The patient was started on 100% oxygen and admitted to the intensive care unit. He was taken to the operating room for evacuation of the pneumocerebri, repair of dural defect, placement of a vascularized pericranial graft, and placement of a lumbar drain. His lumbar drain was removed on postoperative day 3 and he was discharged home neurologically intact on postoperative day 6. At 1 month follow-up he had no evidence of CSF leak and was neurologically intact. WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?: This case is presented to increase awareness among emergency physicians that traumatic tension pneumocephalus, and in this case, pneumocerebri, is a rare life-threatening neurosurgical emergency in patients with severe craniofacial fractures after blunt or penetrating head trauma. Early temporizing measures in the ED, such as 100% oxygen via nonrebreather face mask, and urgent neurosurgical consultation are indicated to prevent neurologic deterioration. Copyright Published by Elsevier Inc.

4139. Park, H., et al. (2012). "Mortality and penetrating traumatic brain injury: Analysis of a 10 year cohort." Neurology **78**(1).

Objective: To study annual mortality rates and explore the link between Glasgow Coma Scale (GCS), surgical intervention and mortality. Background Civilian penetrating traumatic brain injury (pTBI) remains a cause of significant mortality and often is excluded from studies of traumatic brain injury. Design/Methods: Using a prospective trauma registry at a tertiary academic level I trauma center, we identified patients with penetrating injuries to the head presenting to Shock Trauma from January 1, 2000 to December 31. Those without dural penetration on computed tomography (CT) were excluded. Admission GCS, surgical intervention, and mortality were abstracted from the registry and medical record. Analysis of annual rates of surgical intervention and mortality were performed using Pearson's correlation coefficient. GCS was analyzed using a mild (13-15), moderate (9-12), and severe (3-8) scheme. An additional analysis of GCS was used with GCS=3 as a separate category. All analyses also factored in dead on arrival (DOA) patients. Results: 508 patients met inclusion criteria. 337 patients died (66.34%). 115 patients were deemed DOA. 104 patient underwent surgical intervention (20.47%). Annual mortality and surgery rates did not vary with any significance. Analysis of GCS using a mild, moderate, and severe scheme showed mortality rates of 3.67%, 21.74%, and 87.23% respectively. GCS showed a strong linear association to mortality (r∧2=0.90). Separating out those with a GCS of 3 from the severe group strengthened the association (r∧2=0.97). Among those with GCS of 3, a correlation between surgery and mortality was suggested (r∧2=0.59). Conclusions: Mortality rates for penetrating brain injury have not significantly changed over the past decade. GCS is strongly associated with mortality. A correlation between rates of surgery and mortality has been suggested among those with severe GCS and further study is required to determine which patients would benefit most.

4140. Park, H., et al. (2012). "Penetrating traumatic brain injury: A 10-year experience." Neurology **78**(1).

Objective: There are limited studies available to understand the natural history of penetrating traumatic brain injury (pTBI). We explored the characteristics associated with poor outcome in pTBI. Background Civilian pTBI is a cause of significant mortality and often is excluded from studies of traumatic brain injury. Design/Methods: Using a prospective trauma registry at a tertiary academic level I trauma center, we identified patients with penetrating injuries to the head presenting from January 1, 2000 to December 31, 2009. Those without dural penetration on computed tomography (CT) were excluded. Demographics, clinical features on admission, laboratory data, initial CT findings, medical and surgical interventions, and mortality were abstracted from the registry and medical record. The primary

outcome was 30-day mortality. Descriptive statistics were computed and associations with outcome were determined using t-test and Wilcoxon rank sum. A p-value below 0.05 was considered statistically significant. Results: Among 508 patients with pTBI, 336 patients (66.1%) died by 30 days. 115 patients were considered dead on arrival. Predictors of 30-day mortality included older age (p=0.003), male gender (p<0.001), GCS (p<0.001), transfer status (p<0.001), pupil reactivity (p<0.001), gunshot wound as the mechanism of injury (p<0.001), and self-inflicted injury (p<0.001). Laboratories associated with increased mortality included INR (p<0.001) and lactate (p<0.001). Radiographic characteristics associated with 30 day mortality included perforating trajectory (p<0.001), bilateral trajectory (p<0.001), ventricular involvement (p<0.001), presence of any hemorrhage (p<0.001), intraventricular hemorrhage (p<0.001), obliteration of basal cisterns (p<0.001), and multiple penetrating injuries (p=0.02). ICP monitoring and surgical intervention were associated with improved outcome (p<0.001). Conclusions: This is one of the largest series of patients of civilian pTBI reported to date. Several clinical, laboratory and radiological features of pTBI can identify those patients at highest risk for poor outcome. Surgical intervention and ICP monitoring were associated with improved outcome.

4141. Park, M., et al. (2005). "Penetrating civilian craniocerebral gunshot wounds: A protocol of delayed surgery. Comments." Neurosurgery **57**(2): 298-299.

4142. Park, S., et al. (2021). "P47.08 A Phase II, Single-arm, Multicenter, Efficacy of 80 mg Osimertinib in Patients With Leptomeningeal Metastases Associated With EGFR Mutated NSCLC." Journal of Thoracic Oncology **16**(10): S1099.

Introduction: Leptomeningeal metastases (LM) are severe, an aggressive complication of cancer, characterized by tumor cell spread to the cerebrospinal fluid (CSF) and leptomeninges. The higher incidence of LM in EGFR mutated non-small cell lung cancer (NSCLC) has been observed, especially after treated with 1st or 2nd generation EGFR TKI. The Osimertinib, the third generation irreversible EGFR TKI, has been developed to target T790M mutation. Unlike other EGFR TKIs, Osimertinib showed homogenous distribution to the brain suggesting high penetration of blood-brain barrier, and clinical efficacy in intracranial lesions has been demonstrated from the retrospective analyses. In addition, from prospective study, double dosage (160mg) of osimertinib demonstrated meaningful clinical efficacy in LM by extending progression-free (PFS) and overall survivals (OS). However, despite the approval of Osimertinib as 1st line treatment option by the FDA in EGFR mutated NSCLC, many other countries are still in use of Osimertinib as a subsequent treatment option in selected patients. This study is designed to evaluate the clinical efficacy and safety of Osimertinib in patients with LM who failed from the previous first- or second-generation EGFR TKI. Methods: This study (BLOSSOM) is a Phase II, open-label, single-arm, multicenter study to evaluate the clinical efficacy of 80mg Osimertinib in patients with LM in EGFR mutated, either exon 19 deletion or L858R, NSCLC. From the 5 sites across South Korea and first or second-generation EGFR TKI pre-treated patients will be recruited. A total of 80 patients, 40 patients with T790M positive and 40 patients with T790M negative, will be recruited and treated with 80mg of Osimertinib until disease progression or intolerable adverse event. All the patients will be required to have at least one site of LM as identified by the radiologists from the central site that can be assessed by MRI which is suitable for repeat assessment. If the patient has no T790M mutation, the extracranial lesion must be stable following previous EGFR TKI treatment. The primary endpoint is OS. The secondary endpoints are blind independent committee review assessed RANO-LM criteria to evaluate the LM-objective response rate, LM-duration of response, LM-disease control rate, LM- PFS and this will be assessed based on the T790M mutation status. The RECIST 1.1 response assessed by investigator, CSF cytology clearance rates, disease-related symptom, and pharmacokinetics in plasma and CSF will be evaluated. The first patient received treatment in Dec. 2020, and the expected timeline for the final analyses is Q3, 2023. This study is conducted under an applicable regulatory requirement and supervision of the institutional review board (NCT04563871). Results: ▪▪▪ Conclusion: ▪▪▪ Keywords: leptomeningeal metastases, EGFR, osimertinib

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4143. Park, S.-H., et al. (2006). "Penetrating craniofacial injuries in children with wooden and metal chopsticks." Pediatric neurosurgery **42**(3): 138-146.

Penetrating craniofacial injuries with chopsticks in children are peculiar accidents in the Oriental culture. All 10 cases previously reported were caused by wooden chopsticks that required surgical operations. However, there are no reported injuries with metal chopsticks in the past literature which should have been as common as that of wooden chopstick injuries in Asia. We evaluated the difference of injury patterns and clinical observations between wooden and metal chopstick injuries. We reviewed 6 treated children with penetrating craniofacial injuries from chopsticks: one

wooden and five metal chopsticks. One child who had penetration through the nasal cavity presented with temporary rhinorrhea, another with mild hemiparesis, and one child with temporary upward gaze limitation of the left eye. Radiological examination revealed 1 patient with epidural hemorrhage, 1 patient with minimal subdural hemorrhage, and 4 with intracerebral hemorrhage that were fortunately too small to receive surgery. We performed surgical procedure only for a child who had a wooden chopstick that had impacted into the temporal cortex. We followed up all 6 children for more than 1 year, and found that all had fully recovered to near-normal neurological status. We observed that penetrating craniofacial injuries with metal chopsticks rarely require surgical intervention and usually results in good outcome because the resultant wound is usually small without broken fragments compared to injuries with wooden chopsticks. Copyright 2006 S. Karger AG, Basel

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4144. Park, S. J. and M. Chi (2018). "Transorbital Penetrating Intracranial Injury by a Battery." The Journal of craniofacial surgery **29**(1): e61-e64.

The authors report a patient of transorbital penetrating intracranial injury by a battery. A 59-year-old man presented with a foreign body in the left orbital region after an explosion during waste combustion. Physical examination revealed his left eyelid had been punctured and the eyeball ruptured by what appeared to be a battery, which was lodged in the left orbit. The patient was neurologically intact. Facial computed tomography showed a ca. 6.2 x 1.7 cm sized metallic foreign body, probably an electric battery, penetrating through the left orbit and orbital roof and terminating in the left anterior cranial fossa. Clinical presentation, treatment course, and follow-up are discussed.

4145. Park, S. K., et al. (2012). "Traumatic true aneurysm of the superficial temporal artery." Aesthetic plastic surgery **36**(4): 934-937.

BACKGROUND: Aneurysms of the superficial temporal artery (STA) usually are pseudoaneurysms and occur after blunt or penetrating trauma to the head or after surgery in the temporal region. However, true aneurysms of the STA are very rare. This report describes the case of a true aneurysm of the STA that appeared after trauma and discusses several relevant studies about the development and mechanism of this aneurysm., METHODS: A 57-year-old woman was referred to the neurosurgery department due to a slowly growing mass on her left parietal scalp. She reported a history of trauma to the head 3 months before the consultation. However, examination showed the scar located far from pulsatile mass. Imaging studies showed a fusiform aneurysmal dilation of the parietal branch of the STA. The frontal branch likely was occluded due to the previous injury., RESULTS: Surgical removal was performed, and the proximal STA was ligated. Histologic examination showed all three layers of the arterial wall to be intact and only luminal dilation. No sign of atherosclerosis or inflammation was detected., CONCLUSION: The aneurysm in this case was a true aneurysm. The mechanism underlying the spontaneous development of this true aneurysm is not fully understood, although it is possible that insensible minor blunt trauma weakened the arterial wall or reduced the elasticity of the artery. Increased blood flow of the parietal branch due to occlusion of the frontal branch can facilitate aneurysmal dilation. It is speculated that the real incidence of traumatic true STA aneurysms has been underreported. Thus, the authors recommend histologic examination in all traumatic aneurysm cases., LEVEL OF EVIDENCE V: This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

4146. Parker, M. and S. D. Shemie (2002). "Pro/con ethics debate: should mechanical ventilation be continued to allow for progression to brain death so that organs can be donated?" Critical care (London, England) **6**(5): 399-402.

Organ transplants continue to redefine medical frontiers. Unfortunately, current demand for organs far surpasses availability, waiting lists are long and many people die before the organ they desperately need becomes available. One proposed way to increase organ availability is to admit patients to the ICU with severe neurological injuries, for a trial of therapy. If the injury is irretrievable, discussions would then focus on extending ventilation for potential brain death/organ donation if a prior wish to donate is known or if the substitute decision maker consents. The following debate discusses the ethical dilemmas of waiting for brain death.

4147. Parkinson, J. (1982). "The ballistics of craniocerebral gunshot wounds." Journal of neurosurgical nursing **14**(5): 232-238.

The wounding capability of missiles is produced by the tremendous energy absorbed by the tissue. This energy can effect significant injury to structures distant from the wound tract as well as the destruction of neural tissue within the tract. Retained bullets and fragments are hazards both in their removal by increasing neural damage and in their retention by migration or as an inflammatory locus. Careful observation and clear description of the wounds prior to the disruption of surgical procedures and careful handling of possible evidence are the medical professionals' responsibilities in addition to the care of the victim. The mortality and morbidity of gunshot wounds to the head are very high. At present there seems to be little hope of either improving the prognosis of head wounds or of limiting the availability of firearms.

4148. Parmar, G. S., et al. (2019). "Stenciling-Based "Prick and Print" Technique for Harvesting Shaped Corneal Grafts for Management of Peripheral Corneal Perforations." Cornea **38**(1): 105-109.

PURPOSE: To evaluate a new surgical technique ("prick and print") for harvesting shaped donor corneal grafts in cases with perforated peripheral ulcerative keratitis (PUK)., METHODS: We conducted a retrospective case series at a tertiary center. Medical records of 13 patients with perforated PUK, who underwent tectonic eccentric keratoplasty using the stenciling-based prick and print technique during the past 1 year, were reviewed. All patients (15 eyes of 13 patients) received grafts of varying sizes and shapes (14 crescentic and 1 biconvex). Factors evaluated were tectonic integrity, graft apposition, and complications, if any. Surgical success was defined as maintenance of corneal integrity and healing of PUK., RESULTS: Mean age of patients was 40.6 +/- 19.4 years. Mean follow-up was 10 months. We achieved surgical success in 80% (12/15 eyes) of cases. Two eyes had graft infection, and regrafting (large circular graft) was performed for both. One eye developed new-site PUK, which was managed medically, and the graft remained viable tectonically. After surgery, 9 eyes achieved a best-corrected visual acuity of logarithm of the minimum angle of resolution +0.3 or better. No cases had graft rejection or peripheral anterior synechiae by final follow-up., CONCLUSIONS: The stenciling-based prick and print technique for making shaped donor corneal grafts may offer a simple, easy-to-learn surgical technique that can be used to make any shape or pattern of donor corneal grafts without involving the optical center, even in extensive peripheral corneal lesions.

4149. Parrado Sanchez, L., et al. (2017). "[Pediatric traumatic brain injury due to civil gunshot wounds at a General Hospital in Cali, Colombia]." Traumatismo craneoencefalico pediatrico secundario a heridas por arma de fuego en un Hospital General en Cali, Colombia. **30**(1): 50-56.

OBJECTIVES: Traumatic brain injury (TBI) due to gunshot-wounds (GSW) is a critical situation in the pediatric population. The aim of this study is to characterize TBI in this population since there are few reports that describe it especially in Colombia where its incidence is high, also to determine which were the main mortality predictor within our population., MATERIAL AND METHODS: We conducted a retrospective cross-sectional study in which we reviewed pediatric medical records of patients that had consulted at the Fundacion Valle del Lili pediatric Emergency Room between January of 2011 and December of 2015 because of TBI due to GSW. A descriptive statistical analysis was performed., RESULTS: In our sample of 32 patients the average age was of 13.3 (SD +/- 5.4) and with 75% male patients. In our sample the Glasgow Coma Scale (GCS) at entry was less than 8 in 59.38%, a 15.6% needed craniotomy and 81.2% were admitted to the Intensive Care Unit (ICU). Death occurred in 43.75% of cases. The following mortality predictors were obtained: GCS at entry, pupillary exam and light reflexes, ISS, Marshal Score, absence of basal cisterns and presence of subarachnoid hemorrhage in CT scan, and APACHE II., CONCLUSIONS: TBI due to GSW is a devastating entity, especially in the pediatric population, they are responsible of high mortality and disability rates. There were no significant findings regarding infection rates and the use of surgery as a preventive method, therefore there's a chance it might not be indicated.

4150. Parroni, E., et al. (2002). "Suicide with two guns represents a special type of combined suicide." The American journal of forensic medicine and pathology **23**(4): 329-333.

Suicide by simultaneous gunshots with two firearms is rare. The case of a 90-year-old man who killed himself with two 6.35 mm pistols fired at the temples at the same time is presented. The victim was found dead on the terrace of his home; two guns and two cartridges were present near the corpse. Cases of suicides with two guns published in the literature are compared, and the Italian cases are illustrated briefly. The authors describe the circumstances and autopsy findings that permitted the assertion that it was a case of suicide and to exclude an homicide and show, by figures, the

three-dimensional reconstruction of cranial shooting injuries. The use of two guns is considered a representation of a special type of "combined suicide" or "planned complex suicide."

4151. Paschall, A. and A. H. Ross (2017). "Bone mineral density and wounding capacity of handguns: implications for estimation of caliber." International journal of legal medicine **131**(1): 161-166.

Methodologies that improve estimation of caliber from cranial bone defects are necessary to meet the ever increasing admissibility standards. The relationship between caliber, wound diameter, and bone mineral density (BMD) was examined. The formation of the permanent cavity is influenced by bullet yaw, velocity, distance, and tissue properties. The hypothesis was that including BMD, wound diameter could be explained by differences in caliber. The sample consists of 68 autopsy sections and 101 specimens from Phelps (1898). A subsample of 18 was scanned using dual energy x-ray absorptiometry (DEXA) for BMD measurement to test whether an increase in BMD affects wound diameter. Pearson product-moment correlations of the subsample indicate the strongest correlation is between BMD and minimum diameter (r = 0.7101), followed by a correlation between minimum diameter and caliber (r = 0.6854). Despite the previous use of thickness as a proxy for BMD, no correlation was found between BMD and thickness (r = 0.0143). A multivariate analysis of variance (MANOVA) detected a significant influence of BMD and minimum diameter on caliber size (Prob > F = 0.0003). The logistic regression shows that caliber can be estimated from minimum diameter. Using the subsample, the results show that the inclusion of BMD strengthens the model for estimating caliber from entrance gunshot defects.

4152. Pascual, J. M., et al. (2009). "Penetrating ballistic-like frontal brain injury caused by a metallic rod." Acta neurochirurgica **151**(6): 689-691.

Penetrating non-missile intracranial injuries caused by metallic foreign bodies are very rare among the civilian population. We present a unique instance of a severe, high-energy, penetrating orbitocranial injury caused by a solid metallic rod that corresponded to the spray valve lever handle of a kitchen sink pre-rinse spray tap, which was fractured and projected at high speed for an unknown reason. To our knowledge, this is the first report of a high-energy, penetrating brain injury caused by such an object. After careful radiological evaluation of the shape and position of the foreign object, a combined right frontal craniotomy and supraorbital osteotomy was performed in order to achieve safe removal of the metal bar. Successful surgical treatment of an orbitocranial injury caused by a similar object has not previously been reported.

4153. Pascual-Castroviejo, I., et al. (2006). "Diplegia due to transcranial knife-blade injury in a 20-month-old child." Journal of child neurology **21**(4): 340-341.

Transcranial stab wounds are uncommon among both adults and adolescents and rarely occur in children, particularly when caused by another child. A 20-month-old girl was injured by a 3-year-old cousin, who introduced a knife blade into the brain through the left parietal region. The trajectory of the wound penetrated at least 5 cm, crossed the falx cerebri, and involved both motor cortical areas. The clinical sequela was a severe symmetric spastic diplegia.

4154. Pashby, T. J. (1979). "Eye injuries in Canadian hockey. Phase III: Older players now most at risk." Canadian Medical Association journal **121**(5): 643-644.

4155. Pashinian, G. A., et al. (1992). "[The pathomorphological characteristics of the vascular plexuses and ependyma of the cerebral ventricles in human craniocerebral trauma]." Patomorfologicheskie osobennosti sosudistykh spletenii i ependimy zheludochkov golovnogo mozga cheloveka pri cherepno-mozgovoi travme. **35**(4): 9-12.

The morphology of the studied substrates was analyzed in lethal craniocerebral injuries of various origins and in various periods after it was suffered. The data on the pattern and time course of pathomorphologic shifts and functions extend the general notions on the role of the liquor circulation system in the pathogenesis of craniocerebral injury. These results may serve as additional expert criteria of the mechanisms of brain injury.

4156. Pashinian, G. A., et al. (2003). "[Evaluation of disorders in the liquor circulation in craniocerebral trauma]." Otsenka porazheniia sistemy likvoroobrashcheniia pri cherepno-mozgovoi travme. **46**(5): 24-27.

The modern methods of complex examinations of the brain in craniocerebral trauma are addressed and the possibilities of the topographic-and-anatomic substantiation in the forensic-medical (expert) evaluation of traumatic lesions of liquor-circulation structural elements are elucidated in the paper. Morphometry data characterizing the dislocation manifestations are presented with respect to the dislocation intensity and severity.

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4157. Pashinian, G. A., et al. (1997). "[The clinico-morphological characteristics and expert assessment of intracranial parenchymatous hemorrhages in craniocerebral trauma]." Kliniko-morfologicheskaia kharakteristika i ekspertnaia otsenka vnutrimozgovykh parenkhimatoznykh krovoizliianii pri cherepno-mozgovoi travme. **40**(3): 3-6.

The authors analyze the clinical and morphological manifestations of brain hemorrhages occurring in craniocerebral injuries in various periods after the trauma. Specific features in the diagnosis of various types of hemispheric and stem hemorrhages, quantitative parameters (involvement indexes), and the fundamentals of expert evaluation are presented, based on the comprehensive topographic and anatomical, pathomorphological, morphometric, statistical, and other studies.

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4158. Pasticci, M. B., et al. (2007). "Transitory severe CNS adverse effects after accidental efavirenz overdose during post-exposure HIV prophylaxis." Journal of chemotherapy (Florence, Italy) **19**(1): 110.

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4159. Pataraia, E. (2016). "Language localization by magnetoencephalography." Clinical Neurophysiology **127**(3): e22.

Identification of the brain regions mediating language has always been the most urgently sought after due to its practical applications: advanced knowledge of the language-specific zones can facilitate surgical planning and reduce the morbidity associated with resection of eloquent cortex. Currently the Wada-test is considered the gold standard for preoperative language lateralization, while direct cortical stimulations are necessary to provide information on the exact intra-hemispheric language localization. The disadvantage of both of these methods lies in the invasiveness of each procedure. Magnetoencephalography (MEG) takes advantage of the fact that neuromagnetic signals penetrate the skull and scalp without distortion. The magnetic source image (MSI) is created when the MEG data is superimposed on a magnetic resonance image (MRI). MEG performs noninvasive functional imaging by recording the magnetic flux on the head surface associated with electrical currents in activated sets of neurons. MEG is now the imaging modality of choice where a precise and high degree of localization is required and can be used for localization of areas involved with receptive language function, its organization and reorganization under different conditions, i. e. brain injury. MEG can be used to complement structural and metabolic imaging techniques.

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4160. Pate, J. W. and M. Casini (1980). "Penetrating wounds of the neck: explore or not?" The American surgeon **46**(1): 38-43.

While routine formal exploration for all neck wounds penetrating the platysma remains a safe policy, our experience indicates that it is not necessarily the best policy in large, well-staffed teaching hospitals with extensive trauma services. Careful and repeated physical examinations and observations supplemented by simple radiograph examinations allowed selection of a large group of patients who were satisfactorily treated by simple wound closure and clinical observations. Aggressive emergency room management and adequate exposure and repair of vascular injuries prevented cerebral damage so common in previous reports.

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4161. Patel, A. A., et al. (2014). "Laser treatment of trismus after gunshot wound to face: A case report." PM and R **6**(9): S232.

Case Description: A 39-year-old woman with no significant past medical history presented to a level 1 trauma center after sustaining a gunshot wound to the face resulting in a right mandibular ramus, left mandibular body, right maxillary sinus and right inferior orbital wall fractures. Patient was stabilized by oral and maxillofacial surgery and underwent maxillo-mandibular fixation of unstable fracture segments with wire placement. After 6 weeks, wire was removed with continual limitation of mouth opening resulting in trismus. Patient had approximately 5-6mm opening

with manual exercises completed twice weekly with oral surgery. Due to extensive damage from initial injury, patient was scheduled for maxillary prosthesis. Patient was sent to Physical Medicine & Rehabilitation for further management of trismus. Lowlevel laser treatment (LLLT) was used for 80 seconds extraorally in five locations (submandibular, masseter, and anterior cervical strap muscles; soft tissue of posterior neck; temporomandibular joint) causing the most restriction. Setting: Level I trauma center and academic hospital. Results or Clinical Course: After 6 weeks of treatment, patient was observed to have 1-2mm/week improvement in opening size. Patient advanced to approximately 12-14mm within 6 weeks after starting laser treatment. The patient is set to have maxillary dental prosthesis in the near future. Discussion: This is the first reported case, to our knowledge, of using laser to treat trismus secondary to a gunshot wound. Trismus may develop after facial trauma such as irradiation and oral surgery. In prior studies, LLLT targeting only the insertion points of the masseter muscle has yielded mixed results. It is conceivable that the unique etiology of our patient's trismus contributed to the effectiveness of treatment-perhaps the minimal relaxation of multiple muscles achieved by LLLT summated to yield a clinically significant improvement in jaw opening, while LLLT may not achieve adequate relaxation when targeting a single trismic locus. Other modalities adjuvant to physical therapy including ultrasound, corticosteroids and botulinum toxin will be reviewed. Conclusions: LLLT can be an effective adjuvant treatment for trauma-related trismus when combined with physical therapy.

4162. Patel, J., et al. (2020). "Vascular trauma in the head and neck and endovascular neurointerventional management." Journal of Clinical Imaging Science **10**(1).

Traumatic vascular injuries of the head and neck can pose life-threatening emergencies, and therefore, the detection and accurate characterization of these injuries by the radiologist is essential. Computed tomographic angiography (CTA) is commonly performed as part of the initial imaging work-up of patients who have sustained blunt or penetrating craniocervical injuries and are suspected to have or are at risk for vascular injuries. This pictorial essay reviews the CTA and conventional angiographic imaging appearance of various vascular injuries that can occur from trauma in the head and neck and also explores the neurointerventional management of these types of injuries.

4163. Patel, K. and K. Cao (2016). "Clostridium subterminale sepsis in an immunocompetent patient without other risk factors: A case report." Chest **150**(4): 421A.

INTRODUCTION: Clostridium subterminale is an anaerobic, spore-forming, gram-positive bacteria normally found in soil. It is a rare pathogen that has only been described in 10 prior cases, with only two presenting as septicemia in immunosuppressed patients. A prominent risk factor is deep tissue injury. Other cited presentations were empyema, soft tissue infection, and meningitis after craniocerebral arrow injury. We present a case of Clostridium subterminale in an immunocompetent patient without penetrating injury. CASE PRESENTATION: 52 year old male with diabetes, chronic kidney disease, pulmonary emboli, and diastolic dysfunction was found down at home and brought in by EMS. On arrival, patient was intubated in severe shock with high anion gap metabolic acidosis (AG 26), hyperglycemia (1720), and acute renal failure (Cr 8.0). Physical exam was remarkable for mild abrasions on his knees and cool skin. Chest x-ray was unremarkable, pan cultures were ordered and patient started on vancomycin and zosyn. Despite four pressors, our patient decompensated with ventricular tachycardic arrest, but was revived. Bedside echo revealed EF 40-45%. Given worsening status and chest imaging with ARDS, antibiotics broadened. Dialysis was initiated for anuric kidney failure and worsening acidosis. On hospital day (HD) 3, patient developed DIC and shock liver. Large bullae appeared on bilateral lower extremities where previous abrasions were noted by HD4. Our patient continued to decompensate and patient's family decided to focus on comfort measures only. Patient passed by HD 5 and two days later cultures revealed Clostridium subterminale. DISCUSSION: C. subterminale is rarely virulent and does not typically present as an isolated pathogen. There are only 10 cases in the literature, of which most are after penetrating or deep tissue injuries and only 2 cases of bacteremia in immunosuppressed patients. However, our patient was immunocompetent without risk factors. A possible source of infection was the mild abrasions on his lower extremities. CONCLUSIONS: This is the first case of C. subterminale septicemia that we know of, to present in an immunocompetent host without clear risk factors. Despite adequate antimicrobial therapy patient continued to decompensate. It is important that clinicians are aware of this pathogen and further delineation of risk factors are needed.

4164. Patel, K., et al. (2016). "Management of orbital fractures using intraoperative navigational surgery. A prospective case series." Journal of oral and maxillofacial surgery **74**(9): e28-e29.

Objectives: Reconstruction of orbital trauma is one of the most challenging areas of facial trauma surgery. To ensure optimal results with limited morbidity it is essential that orbital surgery be performed with the highest level of accuracy to ensure optimal functional and aesthetic outcomes. Computer navigation systems for reconstruction of the facial skeleton have received increased attention in recent years. This study describes repair of complex orbital fractures using a treatment protocol of computer planning with preoperative scanning, intraoperative navigation and intraoperative CT scanning to ensure optimal placement of orbital implants. Our hypothesis was that this technique improves outcomes in complex orbital fractures with decreased requirements for revisional surgery. Methods: Over an 18-month period a review of 48 consecutive orbital trauma cases was completed in a prospective manner using our protocol. An IRB approval was obtained from the review committee for the study at North Memorial Medical center which is a Level I trauma Center. Data were collected on patient characteristics; fracture severity, diplopia and globe position, complications, and need for revision surgery and most importantly repositioning of the implant after placement. Results: Our results showed that the average age of all the patients was at 39.75 years (Range 12-88 yrs.). Male to female ratio was noted to be 3:1. Themajority of fractures were related to assault (37.5%), followed by motor vehicle collisions (29.12%), and then followed by falls (11%) and gunshotwounds at 6.25%. The average time to get a patient from the time of injury to the operating room was 8 days to allow for a reduction of swelling. Single orbital injuries were noted in about 37.5% of cases, while the most common injury associated with an orbital fracture was a ZMC fracture (60%). The orbital floor was involved almost 91% of the times, with the medial wall also being involved in 50% of cases. Lateral wall involvement and medial wall involvement were fairly similar at 16.67% and 14.58% respectively. Single wall defects were noted in about 49.7% of cases, twowalled defects noted in 37.5% of cases, three-walled defects noted in 10.4% of cases and all four-wall involvement was noted in approximately 4% of cases. The median number of walls fractured in any case was 1.7. Intraoperatively, the implant was repositioned in 6.25% of the patients. Major complication rates were at 14.6% however none of the patients required any repositioning of the implant. The complications included a pseudoaneurysm of the ophthalmic artery due to a gunshot injury that was coiled, nasolacrimal duct injury, entropion and enopthalamos due to fat atrophy in four cases. No patients required repositioning of the orbital implant postoperatively. Conclusions: Intraoperative navigational surgery can improve the quality and outcomes of orbital reconstruction. This study is the first to qualitatively assess orbital surgery outcomes using intraoperative navigation at a single institution in a prospective manner. Based on significant improved outcomes in postoperative diplopia and orbital volume, as well as the decreased need for revision surgery, we demonstrate improved outcomes in complex orbital reconstruction and recommend its use for complex orbital fracture repair.

4165. Patel, K. G., et al. (2016). "Persistent pneumocephalus after gun shot wound to the head." PM and R **8**(9): S275.

Case/Program Description: A 53-year-old man suffered a gun shot wound (GSW) to the head, resulting in a significant complex injury to the head and face, including a left frontotemporal subdural hematoma and pneumocephalus after injury. The patient underwent a bifrontal craniotomy with reconstruction of the skull base for notable cerebrospinal fluid (CSF) leak. After surgery, the patient became more lethargic and was found to have tension pneumocephalus, which was treated with endovascular drain (EVD) placement. Otolaryngology (ENT) performed nasal endoscopy, but found no evidence of CSF leak, and the EVD was discontinued. Two weeks later, a follow up CT scan showed persistent large volume pneumocephalus. Plastics and ENT were again consulted, but did not find evidence for CSF leak. The patient was then started on 100% oxygen for 8 days for treatment of his pneumocephalus. A follow-up CT at both 11 days and 1 month after treatment showed resolution of the pneumocephalus. Setting: Long Term Acute Care Rehabilitation Facility. Results: Resolution of pneumocephalus. Discussion: Pneumocephalus is a known sequelae of GSW to the head, and also common after craniotomy. For small pneumocephalus, the air spontaneously resorbs, but in our case, large pneumocephalus was present more than a month after craniotomy. Symptoms of large pneumocephalus, when present, range from headache and lethargy to brain herniation and death. Such persistence of large pneumocephalus often suggests a CSF tract. However, once this is excluded, the effective treatment is 100% oxygen, which lowers the concentration of nitrogen in the blood allowing for a concentration gradient to develop by which the 80% nitrogen in the pneumocephalus can slowly diffuse away. Conclusions: Pneumocephalus is a complication of both craniotomy and GSW to the head. For cases of large volume or persistent pneumocephalus, CSF tract should be excluded, followed by treatment with 100% oxygen.

4166. Patel, M. B. (2013). "Editorial critique." Journal of trauma and acute care surgery **75**(1): 14.

4167. Patel, N. N., et al. (2002). "Penetrating injury of the cheek requiring skull base exploration." The Journal of laryngology and otology **116**(7): 548-550.

We report a case of a very unusual penetrating injury of the middle third of the face. The patient was involved in a road traffic accident, and the indicator control lever became impaled in his right cheek. There was contralateral orbital damage resulting in loss of sight. The cribriform plate was breached and a pneumoencephalocele ensued. We discuss the modern management of such injuries including injury assessment. We emphasize the importance of crash scene information gathering and analysis of injury mechanisms. Facial injury zonal classification and imaging are reviewed in the context of the case. We discuss the reasons that led us to treat this patient via the subcranial approach.

4168. Patel, P. M., et al. (2004). "Cranial blade: retained for three years." British journal of neurosurgery **18**(1): 74-75.

4169. Patel, R. J. and J. M. Sosman (2012). "My teeth won't let me eat." Journal of General Internal Medicine **27**: S456.

LEARNING OBJECTIVE 1: To recognize the differential diagnosis for a patient presenting with trismus. LEARNING OBJECTIVE 2: To distinguish disease manifestations and review management of a patient with Tetanus. CASE: A 78 year-old female presented to the ED by EMS after being found on the floor of her home by neighbors. She was found unresponsive with possible seizure-like activity. An oral airway was initially placed, but removed after improvement in her mental status. The patient lived in unsanitary conditionswith a dirt floor and each roomfilled with hoarded items. In the ED, the patient complained “my teeth won't let me eat.” She was hungry but stopped eating due to fear of choking. She also complained of weakness and sacral pain due to a fall. Her VS: BP 138/48, HR 84, RR 22, T 37.8 C. Her exam revealed episodes of interrupted speech due to clenching her jaw which lasted only a few seconds. She had no other neurologic deficits. She had no visible wounds, however her feet and toe-nails were caked with dirt. Her labs revealed WBC 12.0 K/uL, CK 2369 (N 0-175), troponin 0.29 (N 0-0.05), Ca 9.1, BUN 60, Cr 1.6. EKG showed anterolateral T wave flattening and the CXR had RML infiltrates. Initial therapy included a heparin drip for possible NSTEMI and IV Ceftriaxone for aspiration pneumonia. The differential diagnosis included Tetanus, so she was begun on IV Metronidazole and Tetanus IG which required several hours to obtain sufficient doses from other health care facilities. Subsequent tests revealed a normal TTE and EEG negative for seizure-like activity. The patient's symptoms quickly progressed with frequent episodes of trismus along with apnea and hypoxemia. She also developed spastic contractions of her upper extremities, muscle rigidity, and 1st and 2nd degree AV block with 5 second pauses. The patient was given muscle relaxants, and 3000 units of IM Tetanus IG. She refused intubation or CPR. She developed progressive apnea and bradycardia despite atropine and died within 48 hours. Her blood cultures revealed no growth. DISCUSSION: Tetanus is a disorder caused by the toxin producing anaerobe Clostridium tetani. Now rare in the developed world, the CDC estimates an annual incidence of 1 per 10 million people in the US, and 2.3 per 10 million in those ages>65. The bacterium is ubiquitous in soil and remains a threat to all unvaccinated people. Infection occurs through penetrating injury with a foreign body, or within devitalized tissue. In 10% of cases, no cause is identified. C. tetani spores produce tetanospasmin that irreversibly binds to receptors of anterior horn cells. This results in autonomic instability, increased muscle tone, and severe spasms. Tetanus is a clinical diagnosis with 50% of cases presenting with trismus, a forceful spasm of the masseter muscle. Differential diagnosis includes Strychnine poisoning, drug-induced dystonias, neuroleptic malignant syndrome, and Stiff-person Syndrome. Treatment includes wound care and antibiotics to halt toxin production, neutralizing unbound toxin with Tetanus IG, sedatives to control spasms, and intubation with paralysis for weeks. Though the majority of patients survive with optimal management, mortality is as high as 50% in those who are treated conservatively. Unfortunately, our patient had not received health care or vaccinations for over two decades. This case underscores the importance of continued tetanus vaccination even during a time of advanced medical care.

4170. Patel, S. J., et al. (2021). "Sociodemographic Factors and Outcomes by Intent of Firearm Injury." Pediatrics **147**(4).

BACKGROUND AND OBJECTIVES: Firearm injuries are a leading and preventable cause of morbidity and mortality among youth. We sought to explore differences in sociodemographic factors and youth firearm injury outcomes by injury intent (unintentional, assault, and self-harm)., METHODS: We conducted a repeated cross-sectional analysis of emergency department (ED) visits among youth aged 21 and younger presenting to an ED with a firearm injury between 2009 and 2016 using the Nationwide Emergency Department Sample. We performed multivariable logistic regression to measure the strength of association between (1) patient-level factors, (2) visit-level characteristics, and (3) clinical

outcomes and intent of firearm injury., RESULTS: We identified 178 299 weighted visits for firearm injuries. The mean age was 17.9 (95% confidence interval 17.8-18.0) years; 89.0% of patients were male, 43.0% were publicly insured, 28.8% were admitted, and 6.0% died. Approximately one-third of the injuries were categorized as unintentional (39.4%), another third as assault (37.7%), and a small proportion as self-harm (1.7%). Unintentional firearm injuries were associated with younger age, rural hospital location, Southern region, ED discharge, and extremity injury. Self-harm firearm injuries were associated with older age, higher socioeconomic status, rural hospital location, transfer or death, and brain, back, or spinal cord injury. Firearm injuries by assault were associated with lower socioeconomic status, urban hospital location, and requiring admission., CONCLUSIONS: We identified distinct risk profiles for youth with unintentional, self-harm-, and assault-related firearm injuries. Sociodemographic factors related to intent may be useful in guiding policy and informing tailored interventions for the prevention of firearm injuries in at-risk youth.

4171. Patel, S. N., et al. (2012). "Diagnostic value of clinical examination and radiographic imaging in identification of intraocular foreign bodies in open globe injury." European journal of ophthalmology **22**(2): 259-268.

PURPOSE: To evaluate the diagnostic accuracy of clinical eye examination and radiographic imaging in the identification of intraocular foreign bodies (IOFBs) in open-globe traumatic injuries., METHODS: This was a retrospective chart review of open-globe traumatic injuries with IOFBs presenting to University Hospital (UH) at New Jersey Medical School between 1998 and 2008., RESULTS: A total of 527 patients with traumatic open globe injuries presented to UH, Newark, New Jersey, USA, between 1998 and 2008. Of these, 74 patients had surgically confirmed IOFBs. Mean age of patients with traumatic open globe injury and an IOFB was 33 years (range, 8-69 years); mean follow-up was 17.6 months (range, 1 day-90 months). Foreign bodies were identified as glass (13), metal (58), wood (1), plastic (0), and other (2). There were 24 anterior segment (AS) IOFBs, 45 posterior segment (PS) IOFBs, and 5 noted in both segments. Clinical eye examination at presentation identified an IOFB in 34 (45.6%) of 74 patients. B-scan echography revealed an IOFB in 14 (51.9%) of 27 cases. Computed tomography scan of the orbits identified IOFBs in 56 (94.9%) of 59 cases. Clinical eye examination was performed in all (100%) patients. B-scan was performed only when posterior segment pathology was suspected. Computed tomography scan was performed when an IOFB or orbital fracture was suspected., CONCLUSIONS: Computed tomography scan was the most reliable method for identifying IOFBs in patients presenting with open globe injuries in comparison to clinical eye examination and B-scan echography. This result was consistent regardless of IOFB location within the globe.

4172. Patel, T. P., et al. (2018). "Optic Nerve Avulsion After Finger-Poke Injury." Journal of neuro-ophthalmology : the official journal of the North American Neuro-Ophthalmology Society **38**(1): 57-59.

We present a case of optic nerve avulsion as a result of finger-poke injury to the eye. Spectral domain optical coherence tomography demonstrated a plunging cup indicative of the avulsion, a finding not previously described. Optic nerve avulsion is a form of anterior indirect traumatic optic neuropathy evoked by a sudden severe rotation at the junction of the optic nerve and globe induced, in this case, by penetration of the finger into the nasal orbit.

4173. Paterson, T. A., et al. (2014). "Not such a long shot: Mortality, discharge function and organ donation in penetraining brain injury." Neurocritical care **21**(1): S145.

Introduction Penetrating brain injury (PBI) is traditionally associated with high mortality. Despite the grave prognosis, it remains poorly described. The goal of this study was to observe outcomes and trends in PBI. Methods A retrospective review was performed of PBI over 5 years. The primary outcome was mortality. Secondary outcomes included organ donation and discharge GCS. Results There were 307 patients with PBI. Overall mortality was 62.9% (45 brain and 144 cardiac deaths). 36.6% of PBI presented with systolic blood pressure (SBP)< 90mmHg. 72.3% presented with a Glascow Coma Score (GCS)< 8 and 23.1% with a GCS from 13-15. Lateralizing signs were present in 12% and dilated pupils in 62.7%. Overall organ donation rate was 16%. Within the first 24 hours, mortality was 85.5%. As compared to survivors, of patients who died; 85% presented with GCS of 3(vs. 19.3%, p< 0.001), 92% with abnormal pupils (vs. 28.9%,p< 0.001), and 75.1% with SBP< 90mmHg(vs. 3.5%,p< 0.001). 53.6% of PBI survived to ICU compared to 39.4% who ultimately died in ICU. Among 61 survivors to ICU, organ donation rate was 53.6%. Amongst 113 survivors, 19.3% had a GCS of 3 on presentation. Functional outcomes were excellent in survivors; 69.9% had discharge GCS of 13-15, 93.8% had a discharge motor GCS of 6. 3.5% of the survivors were hypotensive in the Emergency Department(ED). Of

survivors, 3.5% had cardiac arrest in the ED and 3.5% arrested pre-admission. Pupillary abnormalities were often seen in survivors, with lateralizing signs in 19.6% and dilated pupils in 15%. Conclusions Despite a historically high case-fatality rate, many patients with PBI survive with good functional outcome. While attempts can be made at prognosticating survival on admission, decreased admission GCS and cardiac arrest were seen in survivors. Overall organ donation rate was low, but in those who survive the initial post-injury period, donation rates were substantial.

4174. Patibandla, M. R., et al. (2011). "Traumatic calvarial stone: a rare case report and review of the literature." Neurology India **59**(6): 938-940.

4175. Patil, Y., et al. (2011). "Apocrine hidrocystoma masquerading as a posttraumatic cerebrospinal fluid leak: case report and literature review." Archives of otolaryngology--head & neck surgery **137**(10): 1031-1034.

4176. Patir, R., et al. (1995). "Post-traumatic brain abscess: experience of 36 patients." British journal of neurosurgery **9**(1): 29-35.

Thirty-six patients with post-traumatic brain abscess were managed over 18 years. They constituted 9.3% of all brain abscesses encountered during the same period. The head injury was associated with an external compound fracture in 20, internal compounding in three and was closed in 13 patients. The mean interval between the time of injury to presentation with an abscess was 113 days. This did not differ significantly in patients with closed and compound head injury, and amongst patients who had wound sepsis and with clean wounds after the injury. The occurrence of focal neurological deficit was more frequent in patients with a closed injury ($p < 0.05$). Twenty patients underwent primary excision of the abscess with recurrence of the abscess in one patient. Of the 14 patients in whom the abscess was initially aspirated, eight patients required a subsequent excision. Excision was required in 18 patients (94.7%) with external compound injury, five (50%) of those with closed injury and in all patients with internally compound injuries. Two patients had 'coned' and died before they could be operated upon. The operative mortality in the absence of signs of herniation preoperatively was 12.5% in patient with compound injury and none among patients with closed head injury.

4177. Patnaik, A. and S. S. Mishra (2013). "Self-inflicted penetrating injury to head with complete preservation of consciousness in a psychotic patient." Journal of neurosciences in rural practice **4**(3): 371-373.

4178. Patra, B. N. (2022). "Traumatic Brain Injury." Indian Journal of Psychiatry **64**(SUPPL 3): S637.

Traumatic brain injury (TBI) is an alteration in brain function or other evidence in brain pathology caused by an external force such as head struck by an object, foreign body penetrating the brain, or force from blast or explosion. TBI is one of the major causes of morbidity and mortality in developing countries.1 TBI can be classified as primary and secondary brain injury. Acute management of TBI includes hospitalization, intensive care management, and surgery.

4179. Patten, J. T. (1975). "Penetrating transorbital foreign body with ocular preservation." Annals of ophthalmology **7**(5): 651-654.

Large penetrating transorbital foreign bodies may initially appear to be of a devastating character to the ocular tissues. However, several reports of such large foreign bodies have proved to spare the eye. A case report of a large wooden foreign body with transorbital penetration into the right frontal lobe is reported. The globe remained intact and was only displaced, with a final visual acuity of 20/40. However, complete ophthalmoplegia and ptosis persisted. A low pressure hydrocephalus ensued following intracranial debridement.

4180. Paucic-Kirincic, E., et al. (1997). "Transorbital penetrating brain injury caused by a toy arrow: a case report." Pediatric rehabilitation **1**(3): 191-193.

A case of a 9-year-old boy with a transorbital toy-arrow injury to the brain is presented. At admission he was in coma (Glasgow Coma Scale of 6) with right hemiparesis and had a completely prolapsed left eye. Computerized tomography revealed intracranial haemorrhage and fracture of the orbital wall, which were treated conservatively. His left eye was enucleated due to massive injury. At the 6-month check-up the boy still show neurological signs of latent right hemiparesis. Disturbances, mostly cognitive, were noted on his psychological tests. A survey of the literature reveals no report of this nature in the paediatric age group. The necessity of continuous monitoring of new environmental risks as they occur, and the requirement for the prevention of recreational brain injuries in children, is stressed.

4181. Paul, A. M. and T. Grundmann (2010). "[Intraorbital wooden foreign body undetected on CT]." Computertomographisch nicht beschriebener intraorbitaler holzerner Fremdkorper. **58**(12): 1237-1240.

We present the case of an orbital fracture and a wooden foreign body found during surgery. The patient had undergone a pre-operative computed tomography scan but the foreign body had not been seen on these images. We discuss the difficulties in demonstrating wooden objects on CT and describe indicators in patient history, examination findings and radiological signs that might suggest the presence of a wooden object. We emphasise the necessity to explore any orbital injury if there are clinical signs suggesting an intraorbital foreign body.

4182. Paul, J. T. (2000). "Souvenir from war." Archives of neurology **57**(7): 1073.

4183. Paula, A., et al. (2021). "Traumatic extracranial internal carotid arteryaneurysm as a cause of ischemic stroke." European Stroke Journal **6**(1 SUPPL): 497.

Background and Aims: Extracranial internal carotid artery (EICA) aneurysms are rare and frequently asymptomatic. However, they may manifest with neurological symptoms due to ischemic stroke, transient ischemic attack or Horner's syndrome. Atherosclerosis is the main cause, but other causes include infections, congenital conditions and trauma.We describe a case report of an ischemic stroke caused by a traumatic EICA aneurysm. Methods: Clinical course and imaging are described. Results: A 30-year-old male, who had suffered abdominal and cervical trauma caused by gunshot projectiles 6 years ago, presented with acute onset neglect, left homonymous hemianopia, right oculocephalic deviation, left central facial palsy and left hemiparesis. Brain CT scan revealed infarction of the right middle cerebral artery territory. CT angiography showed right M1 segment occlusion and an extracranial aneurysm of the right ICA. He underwent endovascular treatment with partial recanalization (TICI2c). Carotid ultrasound also revealed the aneurysm and identified a hypoechoic heterogeneous and fibrous structure compatible with intra-aneurysm thrombus. Later, he presented clinical and imaging worsening which led to a decompressive craniectomy. At discharge, the patient maintained important motor deficits. Antiplatelet therapy was started and the aneurysm will be reevaluated. Surgical treatment is being considered. Conclusions: We report a traumatic EICA aneurysm as a rare cause of ischemic stroke. It highlights the importance of keeping follow-up of these patients to prevent serious complications.

4184. Păun, M. A., et al. (2020). "Complex facial trauma caused by self-shooting: A case report." Romanian Journal of Legal Medicine **28**(1): 63-67.

Trauma caused by firearms is complex, often fatal, especially when addressing certain anatomical regions such as the face and neck. The causes range from attempted murder to attempted suicide or accident. Their differentiation is important both legally and due to the fact that they can trans-late certain psychiatric sufferings of the patient that will have to be considered in the subsequent management. This kind of trauma is often characterized by significant loss of soft tissue and bone, which, for the survivors, will mean numerous reconstructive interventions in a multidisciplinary approach, lasting recovery and difficult social reintegration. The severity of these wounds is mainly related to the type of weapon used, the firing distance and the mass and velocity of the bullet. We will present the successful management regarding the treatment and rehabilitation of a patient with complex trauma caused by auto-shooting at the face level.

4185. Pavan-Langston, D. (1973). "Potential use of ocular-insert therapy in dry eyes." International ophthalmology clinics **13**(1): 231-238.

4186. Pavelites, J. J., et al. (2010). "Death by black powder revolver: a case report." Forensic science, medicine, and pathology **6**(4): 298-303.

Deaths resulting from the use of black powder handguns are relatively uncommon compared to other firearms. We report the case of a 48 year-old woman who sustained a lethal gunshot wound to the face from a black powder revolver. Autopsy revealed extensive soot and powder deposition around the entrance wound between the right eye and nose with perforation of the skull and brain. The exit wound also contained evidence of soot. Discussion of this characteristic pattern of discharge deposition from black powder weapons is presented.

4187. Pavelites, J. J., et al. (2011). "An unusual case of lead snowstorm caused by fragmentation of buckshot." The American journal of forensic medicine and pathology **32**(3): 223-226.

This article reports the unusual radiographic findings of 2 cases of a shotgun shooting incident involving the homicide of a plant manager and the subsequent suicide of the assailant. Radiologic examination of wounds produced by the no. 00 copper-plated buckshot used in the incident revealed images with striking similarity to the lead snowstorm appearance generally associated with high-velocity, soft-point rifle bullets.

4188. Pavlidis, P., et al. (2016). "Traumatic Brain Injury Due to Screwdriver Assaults: Literature Review and Case Report." The American journal of forensic medicine and pathology **37**(4): 291-298.

Penetrating head injuries due to the use of screwdrivers as wounding agents in acts of interpersonal violence seldom occur. The aim of this article is to update and summarize the relevant literature on penetrating craniocerebral screwdriver stab wounds and to report a new case of screwdriver assault. A number of studies were reviewed to investigate the incidence, distribution, common findings, mechanism of injury, differential diagnostic criteria, complications, treatment, and prognosis of craniocerebral screwdriver stab injuries. It was observed that the degree of traumatic severity depends on the cross-sectional area of the screwdriver and the anatomical region of injury. Craniocerebral screwdriver injuries are mainly cases of interpersonal violence and the mortality rate is approximately 47.6%. In 23.8% of the incidents, the trauma is overlooked on admission because of the small entry wound and, thus, the severity of the injury is not initially appreciated.

4189. Pavlidis, P., et al. (2018). "Is the Garden Gun (Flobert 9 mm) Capable of Inducing Fatal Injury?: Literature Review and Comparative Presentation of Two Cases." The American journal of forensic medicine and pathology **39**(1): 18-22.

This article presents both a fatal suicide incident by Flobert 9 mm-type smoothbore weapon with a single-shot projectile and a nonfatal case of a suicide attempt by the same weapon type with a dispersion cartridge from the authors' forensic record. A retrospective study was conducted examining 84 cases involving cases of headshots inflicted by all kinds of weapons deriving from the broader region of Eastern Macedonia and Thrace (Northern Greece) between 2000 and 2015, among which only 1 involved lethal wounding by a Flobert 9 mm (1.19%). Only a single case report of a fatality with such a weapon has been described throughout international literature. A comparative study also follows between the 3 incidents. The authors argue that a prerequisite for the lethal outcome of the shooting is the absolute contact of the weapon to the head as well as its placement at an anatomical point where the bone resistance is relatively lower, so that the intracranial entry of the projectile is possible. It is also more harmful if the cartridge contains a single-shot projectile rather than multiple projectiles of smaller diameter.

4190. Pavlova, O. Y., et al. (2020). "Computed tomography in concomitant gunshot injury of facial skeleton." Russian Electronic Journal of Radiology **10**(2): 223-237.

Purpose. Demonstration of computed tomography (CT) possibilities in a patient with combined damage to the facial and brain parts of the skull due to a gunshot wound. Materials and methods. A male patient, 36 years old, was admitted to the hospital in May 2016 after an accident. The diagnosis was combined gunshot injury, penetrating shot wounds of the skull, brain, facial skeleton with damage to the orbits, upper and lower jaws. Upon admission to the hospital, primary surgical treatment of facial wounds and tracheostomy were performed, reposition of the lower jaw fragments with metallic osteosinthesis, enucleation of the right globe. In May 2018 the patient was hospitalized at the

maxillofacial surgery clinic №4 at the Sechenov University in order to conduct reconstructive surgical treatment of the facial skeleton. At the Russian-Japanese imaging center, Clinical University Hospital №1, the patient underwent multispiral computed tomography (MSCT) to assess the damage to bone and soft tissue structures of the face and determine the tactics of surgical treatment. MSCT was performed on a Toshiba Aquilion ONE 640-slice computer tomograph (Japan), with a slice thickness of 0.5 mm, in a spiral mode, with capture of the facial and brain parts of the skull, in the mode of bone and soft tissue reconstruction. The study was supplemented by multi-planar and three-dimensional reconstructions. Results. According to the results of MSCT, multiple post-traumatic defects and deformations of the facial skeleton were revealed. In the area of the facial skeleton, both orbits, the left eyeball and the brain, multiple foreign bodies were determined. Using MSCT data, virtual planning was carried out to determine the volume of reconstructive treatment and the choice of autografts. The first step was surgical repair of the upper jaw with an autograft from the scapula. The second stage was the reconstruction of the lower jaw with an autograft from the fibula. As a result of surgical treatment, the anatomical and topographic relationship of the bone structures of the facial skeleton was restored. The patient's condition at discharge was satisfactory. In the future, it is planned to carry out reconstructive operations in the area of the facial skeleton in order to fill the deficit of face soft tissues and restore the aesthetic appearance of the patient. Conclusion. This clinical observation demonstrates the importance of high-quality and timely diagnosis of patients with gunshot injuries of the facial skeleton both at the stage of the initial examination and the preoperative stage, and during monitoring in postoperative stages. Performing MSCT in this category of patients helps to obtain complete information about the condition of the bone and soft tissue structures of the facial skeleton, brain, reveal all the associated injuries, as well as plan the course and volume of surgery..

4191. Pavon, J. J., et al. (2019). "In situ Study Unravels Bio-Nanomechanical Behavior in a Magnetic Bacterial Nano-cellulose (MBNC) Hydrogel for Neuro-Endovascular Reconstruction." Macromolecular bioscience **19**(2): e1800225.

Surgical clipping and endovascular coiling are well recognized as conventional treatments of Penetrating Brain Injury aneurysms. These clinical approaches show partial success, but often result in thrombus formation and the rupture of aneurysm near arterial walls. The authors address these challenging brain traumas with a unique combination of a highly biocompatible biopolymer hydrogel rendered magnetic in a flexible and resilient membrane coating integrated to a scaffold stent platform at the aneurysm neck orifice, which enhances the revascularization modality. This work focuses on the in situ diagnosis of nano-mechanical behavior of bacterial nanocellulose (BNC) membranes in an aqueous environment used as tissue reconstruction substrates for cerebral aneurysmal neck defects. Nano-mechanical evaluation, performed using instrumented nano-indentation, shows with very low normal loads between 0.01 to 0.5 mN, in the presence of deionized water. Mechanical testing and characterization reveals that the nano-scale response of BNC behaves similar to blood vessel walls with a very low Young's modulus, E (0.0025 to 0.04 GPa), and an evident creep effect (26.01 +/- 3.85 nm s-1). These results confirm a novel multi-functional membrane using BNC and rendered magnetic with local adhesion of iron-oxide magnetic nanoparticles.

4192. Pawar, S. S., et al. (2015). "Reconstructive and rehabilitation challenges following a cranio-orbital gunshot wound." Ear, nose, & throat journal **94**(1): E21-26.

We present a case of a 26-year-old man who sustained a close-range gunshot wound to the head. His injuries included significant left orbital injury resulting in a ruptured, blind eye and severely comminuted fractures of the left orbital roof, superior and inferior orbital rims, and orbital floor. Associated injuries included left frontal lobe injury, anterior and posterior table fractures of the left frontal sinus, and a comminuted left zygomaticomaxillary complex fracture. We employed an interdisciplinary surgical approach with collaboration among the Otolaryngology, Neurosurgery, and Oculoplastic Surgery services performed in two stages. Management of such extensive craniofacial injuries can be challenging and requires a coordinated, interdisciplinary approach.

4193. Pawsey, S. C., et al. (2020). "Suicide by Close-Range Gunshot Wound to the Bridge of the Nose." Journal of forensic sciences **65**(3): 984-986.

Suicidal gunshot wounds to the nasal bridge are rare, particularly at close range (defined as muzzle of the weapon not touching the skin surface, but near enough to deposit soot and stippling). Previously reported suicidal gunshot wounds to the nose have been through the left nostril (Forensic Sci Int 1995;71(1):25-31; J Forensic Radiol Imag

2013;1(2):63-7). The death of a 26-year-old man with a close-range gunshot wound to the bridge of the nose was deemed suicide due to history, scene, and autopsy findings. These findings included previous suicidal ideation, texted and written notes, the decedent's cross-legged position seated on the floor, the trajectory of the bullet through his head and into the ceiling fan and roof above him, and acute alcohol intoxication. This decedent may have been intending a hard contact forehead location but inadvertently fired the gun into the bridge of his nose while bending forward, prior to contact.

4194. Peabody, J. L. (1992). "Reflections on the Loma Linda University experience." Clinical ethics report **6**(3): 1-2.

4195. Pearce, C. W. and P. G. Young (2014). "On the pressure response in the brain due to short duration blunt impacts." PloS one **9**(12): e114292.

When the head is subject to non-penetrating (blunt) impact, contusion-type injuries are commonly identified beneath the impact site (the coup) and, in some instances, at the opposite pole (the contre-coup). This pattern of injury has long eluded satisfactory explanation and blunt head injury mechanisms in general remain poorly understood. There are only a small number of studies in the open literature investigating the head's response to short duration impacts, which can occur in collisions with light projectiles. As such, the head impact literature to date has focussed almost exclusively on impact scenarios which lead to a quasi-static pressure response in the brain. In order to investigate the response of the head to a wide range of impact durations, parametric numerical studies were performed on a highly bio-fidelic finite element model of the human head created from in vivo magnetic resonance imaging (MRI) scan data with non-linear tissue material properties. We demonstrate that short duration head impacts can lead to potentially deleterious transients of positive and negative intra-cranial pressure over an order of magnitude larger than those observed in the quasi-static regime despite reduced impact force and energy. The onset of this phenomenon is shown to be effectively predicted by the ratio of impact duration to the period of oscillation of the first ovalling mode of the system. These findings point to dramatically different pressure distributions in the brain and hence different patterns of injury depending on projectile mass, and provide a potential explanation for dual coup/contre-coup injuries observed clinically.

4196. Peariso, K., et al. (2018). "Presenting characteristics and outcomes in moderate to severe pediatric traumatic brain injury: Blunt versus penetrating trauma." Annals of neurology **84**: S328.

Objective: While adult TBI studies suggest penetrating TBIs have worse outcomes, the spectrum and intent of penetrating TBI in the pediatric population is inherently different. The primary objective of this study is to compare the clinical presentation and outcome of pediatric patients with moderate and severe TBI resulting from blunt trauma versus those with penetrating trauma. Methods: We performed a retrospective review of pediatric patients with moderate and severe TBI including both blunt and penetrating mechanisms. Patients 0-18 years, excluding non-accidental traumas, presenting to Cincinnati Children's Hospital and the University of Cincinnati Medical Centers were included. Outcomes were mortality, Pediatric Functional Independence Measures (wee-FIM), and the Glasgow Outcome Scale-Extended (GOS-E) pediatric scores at 12-18 months post-injury. Results: Records from 60 patients were reviewed. Patients with hypotension, coagulopathy and non-reactive pupils on presentation had higher mortality, and this was not different between the two groups. Initial GCS scores negatively correlated, while Rotterdam scores positively correlated with GOS-E pediatric scores in both groups. Penetrating TBI had a higher mortality rate than blunt TBI in this cohort. However, the survivors of penetrating TBI had higher wee-FIM scores on admission to inpatient rehab. There was no significant difference between ICU length of stay or inpatient rehabilitation length of stay. Conclusions: This study suggests that presenting features predictive of poor outcome in adult TBI are potentially applicable in early prognostication in pediatric TBI. The data also show increased mortality in pediatric penetrating TBI, but the survivors have better functional status on admission for rehabilitation.

4197. Pearl, P. L., et al. (2013). "Results of phase II levetiracetam trial following acute head injury in children at risk for posttraumatic epilepsy." Epilepsia **54**(9): e135-137.

Posttraumatic seizures develop in up to 20% of children following severe traumatic brain injury (TBI). Children ages 6-17 years with one or more risk factors for the development of posttraumatic epilepsy, including presence of

intracranial hemorrhage, depressed skull fracture, penetrating injury, or occurrence of posttraumatic seizure were recruited into this phase II study. Treatment subjects received levetiracetam 55 mg/kg/day, b.i.d., for 30 days, starting within 8 h postinjury. The recruitment goal was 20 treated patients. Twenty patients who presented within 8-24 h post-TBI and otherwise met eligibility criteria were recruited for observation. Follow-up was for 2 years. Forty-five patients screened within 8 h of head injury met eligibility criteria and 20 were recruited into the treatment arm. The most common risk factor present for pediatric inclusion following TBI was an immediate seizure. Medication compliance was 95%. No patients died; 19 of 20 treatment patients were retained and one observation patient was lost to follow-up. The most common severe adverse events in treatment subjects were headache, fatigue, drowsiness, and irritability. There was no higher incidence of infection, mood changes, or behavior problems among treatment subjects compared to observation subjects. Only 1 (2.5%) of 40 subjects developed posttraumatic epilepsy (defined as seizures >7 days after trauma). This study demonstrates the feasibility of a pediatric posttraumatic epilepsy prevention study in an at-risk traumatic brain injury population. Levetiracetam was safe and well tolerated in this population. This study sets the stage for implementation of a prospective study to prevent posttraumatic epilepsy in an at-risk population.

4198. Pearl, R. M., et al. (1988). "An approach to mandibular reconstruction." Annals of plastic surgery **21**(5): 401-417.

Mandibular reconstruction requires the restitution of both form and function. Proper preoperative planning, vascularized bone grafts, rigid fixation, flexibility of donor site choices, and restoration of labial, buccal, and lingual sulci lead to optimal reconstruction. We have used this approach in 38 patients; bony survival resulted in 37 and primary union in 35. A main limiting factor exists with individuals who have lost extensive amounts of soft tissue and muscle at the time of tumor resection or trauma. Only by attention to details in the preoperative, intraoperative, and postoperative phases can the best functional and aesthetic results be achieved.

4199. Pearson, I. Y. (1993). "The potential organ donor." The Medical journal of Australia **158**(1): 45-47.

The source of most organs for transplantation is the brain-dead cadaveric donor. The realistic potential donor is one for whom mechanical ventilation and other support, to the point of brain death, is provided in the best interests of that patient, and not solely for the purpose of organ donation. Brain death secondary to spontaneous intracranial haemorrhage now exceeds traumatic head injury as a source of organ donors in Australia. There are now few medical exclusions to organ donation. Age limits rise constantly. No patient should be excluded without referral to the transplant coordinator. Adequate medical support of the potential donor is no more than should be provided to the severely brain-injured patient. Haemodynamic and other organ support are as logically appropriate as ventilation and must be continued until confirmation of brain death. Support should cease only if organ donation will not occur. Australian State laws define brain death as irreversible cessation of all function of the brain of the person, but do not dictate the methods of confirmation. The prospect of organ donation should not be raised until brain death is confirmed. The over-riding principle is that the family always has the right to be asked. There is no other way for the family's and patient's wishes about organ donation to be known and respected. It is vital that the person who will ask be experienced, competent and committed. A dedicated medical, nursing and allied health team providing care of the family throughout the period is essential.

4200. Pease, M., et al. (2013). "Diagnosis and surgical management of traumatic cerebrospinal fluid oculorrhea: case report and systematic review of the literature." Journal of neurological surgery reports **74**(1): 57-66.

Background Oculorrhea, or cerebrospinal fluid leakage developing from a cranio-orbital fistula, is a rare development following traumatic injury. Case Report A 22-year-old man involved in a motor vehicle accident developed a blowout fracture of the left orbital roof penetrating the frontal lobe, inducing oculorrhea. He underwent a supraorbital craniotomy for removal of the bony fragment and skull base reconstruction using a pericranial flap. Methods A systematic review of the database was performed to identify all prior cases of traumatic oculorrhea. Results Twenty-two reported cases met inclusion criteria for subsequent analysis. Oculorrhea developed due to blunt and penetrating head injury in 14 (64%) and 8 patients (36%), respectively. The most common mechanisms were car accidents, stab wounds, falls, and gunshot wounds. Ocular signs and symptoms-including visual loss, ophthalmoplegia, and pupillary dysfunction-were commonly associated findings. Initial conservative management was successful in four patients. Thirteen patients underwent initial surgical intervention, and three additional patients required operative intervention following failed

conservative treatment. Conclusion Although oculorrhea rarely develops following severe orbital trauma, suspicion should nevertheless be maintained to facilitate more prompt diagnosis and management. The decision for conservative versus surgical management often depends on the severity of the fracture and dural injury.

4201. Pechernikova, T. P., et al. (1993). "[The forensic psychiatric expertise of victims who received craniocerebral trauma in a criminal situation]." Sudebno-psikhiatricheskaia ekspertiza poterpevshikh, poluchivshikh cherepno-mozgovuiu travmu v kriminal'noi situatsii. **36**(3): 33-36.

Thirty victims of criminal situations with craniocerebral injuries were examined. Clinical picture and time course of changes in the mental disorders, that are the most important for practical forensic medical expert evaluation, were analyzed, and approaches to the choice of the correct expert conclusion in assessment of the severity of injuries and of the victims' abilities discussed.

4202. Peduzzi, J., et al. (2011). "Functional improvement in tbi using syngeneic olfactory mucosa stem cells in inbred rat." Journal of neurotrauma **28**(6): A124-A125.

INTRODUCTION: The safest and most effective treatment for traumatic brain injury (TBI) may be autologous stem cells delivered into the cerebrospinal fluid (CSF). CSF-injected stem cells home to the injured area which would be critical in diffuse axonal injury that damages several areas. These CSF-injected stem cells penetrate the brain and induce recovery. Olfactory mucosa (OM) stem cells can be obtained from the nose and their normal fate is neurons, making them safer to use. METHODS: Adult inbred Lewis rats (345-395g) received a sham surgery or severe TBI using the Marmarou model (450g weight dropped 2 meters). Two weeks later, 3 groups (6/group) received CSF injections of saline or iron-oxide-labeled OM stem cells. Blinded functional testing (1-7 weeks post-injury) included the Beam Balance, Inclined Plane, 8-Arm Radial Maze and Barnes Table tests. RESULTS/DISCUSSION: In the Beam Balance at one week posttreatment, the stem cell-injected injured group was similar to the sham group while significantly different from the vehicle-injected injured group ($p=0.017$). At later times, performance was similar. For the Inclined Plane, Radial Arm Maze and Barnes Table tests, the stem cell-injected injured group performed similarly to the sham group and consistently performed better than the saline-injected injured group at 3 and 4 weeks after treatment. In the Radial Arm Maze, this difference reached significance level at week 4 after treatment ($p=0.041$). In Barnes Table test, the sham was significantly different from the vehicle- treated injured group at week 4 after injury ($p=0.047$). CONCLUSIONS: OM stem cells caused no adverse effects and resulted in functional improvement when evaluated in experimental TBI producing diffuse axonal injury. Clinical translation is facilitated by the fact that OM stem cells can be obtained and delivered in a minimally- invasive manner.

4203. Peduzzi, J. D., et al. (1999). "The expression of TAPA (CD81) correlates with the reactive response of astrocytes in the developing rat CNS." Experimental neurology **160**(2): 460-468.

During the development of the brain, astrocytes acquire the ability to become reactive and form a scar. This change in the astrocytes occurs at approximately the same time that there is a decrease in the regenerative capacity of the CNS. Previous work from our laboratory had revealed that TAPA (Target of Anti-Proliferative Antibody, also known as CD81) is associated with reactive gliosis and the glial scar. TAPA is a member of the tetraspan family of proteins that appears to be associated with the regulation of cellular behavior. In order to define the role of TAPA in relation to the developmentally regulated CNS response to injury, we examined the levels of TAPA and GFAP immunoreactivity in rat pups that received a penetrating cerebral cortical injury. All of the animals injured at postnatal day 9 (PND 9), PND 18, or as adults, exhibited reactive gliosis scar formation when they were sacrificed 10 days after the cortical injury. Of the nine animals injured at PND 2, only three displayed reactive gliosis and scar formation. The remaining six rat pups had either a modest gliotic response or no detectable gliosis. The level of TAPA at the site of injury mimicked the reactive gliosis as defined by GFAP immunoreactivity. In all of the rats with a glial scar, there was a dramatic upregulation of TAPA that is spatially restricted to the reactive astrocytes. These results suggest that the upregulation of TAPA is an integral component of glial scar formation.

4204. Peek-Asa, C., et al. (2001). "Early predictors of mortality in penetrating compared with closed brain injury." Brain injury **15**(9): 801-810.

INTRODUCTION: Although brain injury incidence rates have been decreasing, the proportion of these injuries which are penetrating has been increasing. This study compares mortality amongst persons with penetrating and closed brain injuries and explores the relationship of early predictors of mortality., METHODS: The study included 795 moderately or severely brain injured individuals identified through the UCLA Brain Injury Research Centre. Logistic regression was used to predict mortality by GCS level and brain injury type, controlling for age, gender, and presence of multiple trauma., RESULTS: Of the 795 individuals, 110 had penetrating and 685 had closed brain injury. Case fatality rates were higher for penetrating than closed injuries for all GCS, gender, age, and cause of injury categories. When controlling for GCS level at admission, age, gender, and multiple trauma, those with penetrating injuries were 6.6 (95% CI = 3.9-11.1) times more likely to die., CONCLUSIONS: As the pool of information about survival and recovery from penetrating injuries grows, decisions regarding clinical care and prevention activities can be more appropriately focused.

4205. Peiffer, K. M. Z. (2007). "Brain death and organ procurement." The American journal of nursing **107**(3): 58-68.

Patients with severe brain injuries (as can result from trauma, subarachnoid hemorrhage, or brain tumor) are monitored closely by nursing staff. It's often the nurse who first recognizes clinical signs of decompensation and begins the process of determining whether the patient is a potential organ donor. When a person is declared brain dead, it's the nurse who maintains hemodynamic stability so that donor organs remain viable. It's therefore crucial for nurses to know how brain death is determined in adults and how potential organ donors are identified, and to know the major physiologic changes that occur upon brain death, as well as essential nursing interventions.

4206. Pekala, P., et al. (2014). "An assessment of the usefulness of a coconut as a model of the human skull for forensic identification of a homicide weapon." Archiwum medycyny sadowej i kryminologii **64**(4): 199-211.

The authors made an attempt to verify if a coconut can be used as a model of human skull to determine the homicide weapon. During our experiment 27 strike attempts were performed with the use of 9 different tools. Among them there were authentic murder weapons and instruments which had been used in similar experiments conducted on human skulls in 1955. Depending on the size of an area in contact with a coconut, weapons caused dents corresponding to the shape of a weapon, irregular fractures or long linear cracks. Our results have shown that coconut can be used as an inexpensive screening model of human skull, but only to determine fractures made by tools with small striking surface.

4207. Pekny, M., et al. (1999). "Abnormal reaction to central nervous system injury in mice lacking glial fibrillary acidic protein and vimentin." The Journal of cell biology **145**(3): 503-514.

In response to injury of the central nervous system, astrocytes become reactive and express high levels of the intermediate filament (IF) proteins glial fibrillary acidic protein (GFAP), vimentin, and nestin. We have shown that astrocytes in mice deficient for both GFAP and vimentin (GFAP-/-vim-/-) cannot form IFs even when nestin is expressed and are thus devoid of IFs in their reactive state. Here, we have studied the reaction to injury in the central nervous system in GFAP-/-, vimentin-/-, or GFAP-/-vim-/- mice. Glial scar formation appeared normal after spinal cord or brain lesions in GFAP-/- or vimentin-/- mice, but was impaired in GFAP-/-vim-/- mice that developed less dense scars frequently accompanied by bleeding. These results show that GFAP and vimentin are required for proper glial scar formation in the injured central nervous system and that some degree of functional overlap exists between these IF proteins.

4208. Pelc, R. and B. Szporek (1996). "[Use of computerized tomography for localization of a foreign body impacted into the cranium]." Wykorzystanie tomografii komputerowej do lokalizacji ciala obcego wtloczonego w obreb twarzoczaski. **49**(1-6): 59-65.

A case is presented of impaction of a metal bar into the cranium i an 8-year-old child. The significant importance for the therapeutic management was radiological examination, especially CT of the head. It made easier the determination of the foreign body locality in relation to the anterior cranial fossa and could allow to do the assessment of the resolution of air accumulation in the frontal lobe.

4209. Peleg, K., et al. (2010). "Poorer outcomes for mass casualty events victims: is it evidence based?" The Journal of trauma **69**(3): 653-659.

BACKGROUND: The sudden influx of patients during mass casualty events (MCEs) may compromise the quality of care provided and possibly impact on the medical outcomes of these patients. To test this assumption, a comparison must be made between injuries sustained in MCE and non-MCE events caused by the same mechanism. The mechanism of injury selected for this study was gunshot wounds, which occur in both types of event., METHODS: A retrospective study was carried out using the Israel's National Trauma Registry data on patients hospitalized between November 1, 2000, and December 31, 2005, as a result of high-energy gunshot trauma. Descriptive statistics and bivariate analysis were used to characterize injury patterns, and multivariate analysis was used to determine factors influencing inpatient mortality., RESULTS: Of 462 patients with gunshot wounds, 120 cases (26.38%) were defined as MCE and 342 (73.62%) as non-MCE. Both populations had ~30% of severely injured patients (Injury Severity Score 16+). MCE patients had undergone significantly fewer operational procedures. No differences between MCE and non-MCE were found in intensive care units utilization. The likelihood of death as a result of MCE was 2.75 (CI 1.09-7.02) times higher than non-MCE. Factors influencing this difference are the number of injured regions and injuries to the brain, chest, and abdomen., CONCLUSIONS: MCE patients have a significantly higher mortality than non-MCE patients, not manifesting substantial differences in the severity of injuries. The absence of difference in intensive care units utilization may be related to the effectiveness of existing protocols for dealing with MCEs.

4210. Peleg, M. and Y. Sawatari (2010). "Management of gunshot wounds to the mandible." The Journal of craniofacial surgery **21**(4): 1252-1256.

The gunshot wound to the mandible is a unique traumatic injury. The resultant injury from the gunshot wound is diverse because of the variability of the projectile, motion, velocity, and tissue characteristics. When a high-velocity projectile strikes the mandible, often times the wound will consist of a severely comminuted mandible surrounded by nonvital soft tissues and the implantation of multiple foreign bodies. This represents a challenge for the treating surgeon. The anatomy and function of the mandible make it such that the care of the gunshot wound requires a combination of trauma and reconstructive surgeries. There are varying techniques advocated for the management of gunshot wound to the face. However, for the comminuted mandible fracture sustained from a gunshot wound, an approach involving the fabrication of an occlusal splint, intermaxillary fixation, aggressive debridement of hard and soft tissues, and immediate reconstruction with a titanium plate is a comprehensive approach that can restore the appropriate function and contour of the patient. At the Division of Oral and Maxillofacial Surgery, University of Miami, this approach to the comminuted mandible fracture secondary to the gunshot wound has led to the effective management of this specific subset of injury. The complication rate is comparable with the current literature and provides an advantage as a 1-stage management to restore appropriate function and cosmesis to the patient.

4211. Pellat, J., et al. (1991). "Aphemia after a penetrating brain wound: a case study." Brain and language **40**(4): 459-470.

The speech of a patient with aphemia (pure anarthria) resulting from a penetrating brain wound was studied using linguistic and acoustic observations as well as electromyographic recordings from four labial muscles. The results are discussed in relation to phonetic disintegration's syndrome and apraxia of speech which, respectively, enhance linguistic disorders and motor programming disturbance.

4212. Pellizzer, E. P., et al. (2017). "Removable Partial Denture After Gunshot Injury: Five Year Follow-Up." The Journal of craniofacial surgery **28**(4): e381-e383.

The aim of this study was to report a patient of rehabilitation with removable partial denture retained by implants in-patient who suffered injury after firearm shooting. A 19-year-old man presented to the hospital of the Val Paraiso city after being hit by a bullet in the right on the face, affecting the teeth 12 to 16. The surgery to remove the shards of teeth, and bullet was performed. Surgical team opted for installation of implants without bone grafts; however, due to extensive loss of alveolar bone, only 3 tilted implants (2 Ø3.75 x 8.5 mm and 1 Ø3.75 x 10 mm) were installed. After recovery, the patient was referred to the Aracatuba Dental School-UNESP for the rehabilitation on the affected region. The difficulty of rehabilitation with conventional fixed prostheses was verified during the prosthetic phase. This way, it was opted for rehabilitation with removable partial dentures associated with dental implant. Two

attachment system ERA (ERA, Sterngold) were positioned in the bar to make the removable partial denture. After 5 years of follow-up, the authors can conclude that the use of removable partial denture retained by implants is effective for functional and aesthetic rehabilitation, favoring socialization and self-esteem of the patient.

4213. Pendleton, C., et al. (2012). "Harvey Cushing's contributions to motor mapping: 1902-1912." Cortex; a journal devoted to the study of the nervous system and behavior **48**(1): 7-14.

This review examined Dr. Harvey Cushing's cases in the surgical records of Johns Hopkins Hospital, from 1896 to 1912. 41 patients who underwent cortical stimulation for intra-operative motor mapping were selected for further analysis. We demonstrate that Cushing used cortical stimulation to define primary motor and sensory cortices in the treatment of tumors, trauma, and epilepsy, within adult and pediatric populations. In addition, he performed stimulation of sub-cortical white matter during 4 of these surgeries, setting the stage for contemporary use of this technique in improving post-operative outcomes. This review of Cushing's early intra-operative motor mapping illuminates his contributions, and clarifies his influence on the evolution of cortical mapping from an experimental technique to a staple of contemporary neurosurgery.

4214. Peng, C. Z. and C. Y. Wang (2016). "Elderly with gunshot injury crossing zones i to III of the neck." European Geriatric Medicine **7**(1): 102-103.

4215. Penning, L. and D. Front (1974). "Scintigraphic demonstration of a bullet track in the brain." Journal of nuclear medicine : official publication, Society of Nuclear Medicine **15**(2): 140-141.

4216. Peota, C. (2005). "Invisible wounds." Minnesota medicine **88**(1): 13-14.

4217. Pepe, P. E. and V. Kvetan (1991). "Field management and critical care in mass disasters." Critical care clinics **7**(2): 401-420.

As previously discussed, the majority of injury cases do not necessarily involve dramatic life-saving actions, but rather very rudimentary, promptly applied precautions. For most victims of trauma, therefore, we offer reassurance and simple compassion in their time of need. One of the more important lessons to be learned here is that, beyond prehospital injury "management" or "treatment," we should always remember to provide the best possible prehospital injury care. By responding as soon as possible and by delivering reassurance and compassion to those who are injured and frightened, we are providing one of the most sacred aspects of the Hippocratic mission. Despite wonderful technologic advances and the need for aggressiveness in disaster management, these humanistic values must always be maintained by those to whom care is entrusted. Successful transport of disaster victims, whether in the prehospital phase or during interhospital transfer, requires careful attention to treatment priorities, such as simple measures for airway control and ventilation, and care to prevent further injuries by appropriate immobilization techniques. The use of fully equipped teams of multidisciplinary critical care specialists in mass disaster situations is in its infancy. It is clear that with properly adapted hardware and personnel trained to function in adverse environments while effectively delivering intensive care to a large number of patients with a variety of clinical syndromes, survival can be significantly increased for the most acutely ill.

4218. Pepper, T., et al. (2019). "Coalition military personnel with stabilised facial fractures are less likely to require tracheostomy: a comparison of treatment in US and UK Medical Treatment Facilities during the Iraq and Afghanistan conflicts." British Journal of Oral and Maxillofacial Surgery **57**(10): e94.

Introduction: The United States (US) and United Kingdom (UK) deployed Medical Treatment Facilities (MTF) in support of the military campaigns in Iraq and Afghanistan. The approach to treatment of patients with facial injuries differed between nations, reflecting management protocols and the capabilities of deployed surgeons. Methods: The US and UK Joint Theatre Trauma Registries (JTTR) were scrutinized for patients with facial injuries at deployed MTF between March 2003 and October 2011. An adjusted multiple logistic regression model was performed using tracheostomy as the

in-dependent variable and treatment in a US MTF, US or UK military, mandible fracture, and treatment of mandible fracture as dependent variables. Results: Facial injuries were identified in 16944 casualties (survivors and died of wounds) across both databases. The most common mechanisms of injury were explosive events (63%), motor vehicle collisions (13%) and gunshot wounds (10%). Patients with facial injuries were equally likely to undergo surgery in US MTF as UK MTF (OR: 1.06, 95% CI: 0.4603 to 1.142, p = 0.6656). US military casualties who had treatment of their mandible fracture (ORIF or MMF) were less likely to have had a tracheostomy than those not treated (OR: 0.61, 95% CI: 0.44 to 0.86; p = 0.0066). Conclusions: Stabilization of facial fractures enabled patients to maintain their own airway, reducing the need for high dependency care. We recommend that facial fractures be definitely treated in deployed MTF, reducing the need for high dependency care.

4219. Perakis, H. and T. D. Woodard (2010). "Endoscopic management of transnasal intracranial penetrating foreign bodies." The Laryngoscope **120 Suppl 4**: S242.

4220. Perciaccante, V. J., et al. (1999). "Head, neck, and facial injuries as markers of domestic violence in women." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **57**(7): 760-763.

PURPOSE: The diagnosis of domestic violence (DV) is difficult because of a lack of clearly defined signs and symptoms. The goal of this study was to confirm and refine the role of head, neck, and face (HNF) injuries as markers of DV., PATIENTS AND METHODS: A cross-sectional study design and a sample of female trauma patients treated in an inner-city hospital emergency room (Grady Memorial Hospital, Atlanta, GA) were used. The predictor study variable was injury location (HNF or other location). The outcome variable was traumatic origin (DV or other cause). A victim of DV was defined as a patient who gave a history of being injured by her spouse or sexual partner. Other data included age, nature of the injury (blunt or penetrating), and injury severity score (ISS). Descriptive, bivariate, and logistic regression statistical analyses were performed., RESULTS: The sample consisted of 100 injured women, with a mean age of 40+/-16.3 years and a mean ISS of 3.3+/-3.0. Thirty-four women were victims of DV. The mean age of the DV victims was 32.5+/-7.3 years, compared with a mean age of 43.9+/-18.2 year in the other-causes group (P = .001). The mean ISS for the DV victims was 3.4+/-3.0, and the mean ISS for the other-causes group was 3.2+/-3.0 (P = .65). DV victims were 7.5 (2.5 < RR < 22.9) times more likely to have HNF injuries than other trauma patients (P < .001). Age was associated with cause and location of injury. After controlling for age, location remained statistically associated with cause (P = .0002). Sensitivity and specificity of HNF injuries and DV were 91% and 59%, respectively., CONCLUSIONS: The data suggest that although HNF injuries and age were sensitive predictors of DV, they remain poor in their specificity as markers.

4221. Perdekamp, M. G., et al. (2003). "[Contact shot from infantry weapons with a flash-suppressor]." Zum absoluten Nahschuss aus Infanteriewaffen mit Mundungsstuck. **212**(1-2): 10-18.

The number of reports on contact shots from firearms with a flash suppressor attached to the muzzle is small. On the basis of a case report (suicidal shot to the forehead with a Kalschnikow AKMS 47 assault rifle) the morphological peculiarities (characteristics soot pattern, relatively small powder cavity and only minor skin tears in the presence of a bony support) are presented and the conclusions to be drawn from the findings regarding the flash-suppressor, the shot distance, the angle of the shot and the way of holding the weapon are discussed.

4222. Perdekamp, M. G., et al. (2005). "[Suicide with multiple graze shots]." Suizid mit multiplen Streifschussverletzungen. **216**(5-6): 150-159.

A 77-year-old man was found in his flat with a shot to the right temple. In spite of hospital treatment he died from the head injury the next day. The weapon at the scene used for committing the suicide was a pistol, make Kaba Special (calibre 6.35 mm). At autopsy, the right temporal region showed a surgically treated, originally stellate gunshot entrance wound with a powder cavity. Close to this penetrating gunshot wound there were 3 parallel graze shot injuries of the scalp. The autopsy findings were consistent with the assumption that all the shots had been fired by the victim himself with suicidal intent. The injury pattern is presented and discussed in relation to the results of the technical investigation of the weapon and the findings at the scene.

4223. Perdekamp, M. G., et al. (2005). "Contact shot with unusual soot pattern." Forensic science international **149**(1): 75-79.

In a suicidal shot to the temple two roundish zones of powder soot blackening were found above the entrance wound. The paired zones of powder soot blackening were caused by two gas outlets located on the upper side of the muzzle end of the weapon used (converted blank cartridge pistol of make Rhoner). The conclusions that can be drawn from this particular soot pattern with regard to the type of the weapon, the muzzle-to-target distance, the direction of fire and the way of holding the weapon are discussed.

4224. Perdekamp, M. G., et al. (2011). "Intracranial impalement with entrance site in the mandibular region: postmortem elucidation of an accidental fall on a wooden plant stick." Forensic science international **209**(1-3): e35-40.

A 78-year-old woman with a history of transient ischemic attacks was found in the doorway of her house in a somnolent and unresponsive condition. In the right mandibular region, a small skin wound was localized, which was surgically treated. Six days after admission to the hospital, an exploratory craniotomy was performed because of abnormal CT findings. Apart from tissue lesions and hemorrhages a small bone fragment was detected in the right cerebral cortex, which was removed. After 11 days in hospital, the patient died from failure of central regulatory functions. At the forensic autopsy, a 15 cm long wound track running upward from the skin wound in the right mandibular region through the bony skull base to the right parietal lobe of the brain was noted. Apparently, the surgically removed bone fragment had been displaced from the right middle cranial fossa. The site of the incident in the deceased's house was inspected again and a bamboo pole used to stabilize a potted plant standing on the floor was found and sent to the trace evidence laboratory. Analysis showed blood and tissue deposits from the victim. On the basis of all the findings and the circumstances of the case, a fatal impalement injury caused by an accidental fall could be assumed.

4225. Perei, S. (2018). "Retrospective study on patterns of homicidal death in western odisha." Medico-Legal Update **18**(2): 141-145.

The study is undertaken in the department of Forensic Medicine and Toxicology, VIMSAR, Burla of Odisha state to examine the pattern of homicidal death in Western Odisha considering the data from 2013 to 2017 (152 cases). Data on age and sex, period of survivability and causes death of the deceased; motive behind, weapons used and place of occurrence of homicides; and relation between the assailant and victim have been collected from the reported cases of homicidal death after doing autopsy. The bivariate and descriptive statistics has been used for data analysis. As the dominant motive for homicides is wealth, wine and woman, the study attempts to examine the motive of homicides along this line. The analysis depict that out of 6140 autopsies done during the study period 152 (2.47%) are found as homicide cases. The distribution of deceased across gender shows that 79.6% are male and 20.4% are female. Maximum of 80.3% of homicides was committed during night time, in 57.9 % cases the place of occurrences is at outside from home, 90.4 % cases death was occurred instantly, 58.6 % cases the victim is either a family member or relative, 52 % cases the weapon used is hard and blunt, 51.3 % cases the cause of death is due craniocerebral injuries, 50.7 % cases the motive behind the homicide is wealth followed by women (22.4%). The month wise distribution of homicide cases depicted that maximum number of occurrences have occurred during the month of March and June (each 13 %) followed by February, September and October (each around 11 %).

4226. Pereira, C., et al. (2012). "Gunshot wounds to the face: level I urban trauma center: a 10-year level I urban trauma center experience." Annals of plastic surgery **68**(4): 378-381.

INTRODUCTION: Gunshot wounds (GSWs) to the face are an infrequent occurrence outside of a war zone. However, when they occur, they constitute a significant reconstructive challenge. We present our 10-year experience at an urban level I trauma center to define the patterns of injury, assess the morbidity and mortality, and estimate the cost to the health care system., METHODS: A retrospective review was performed on all patients admitted to Harbor-UCLA Medical Center with GSWs to the head and neck region between January 1997 and January 2007. Those who had sustained GSWs to the face requiring operative intervention were closely reviewed., RESULTS: Between 1997 and 2007, a total of 702 patients were admitted to the Harbor UCLA Emergency Department having sustained GSWs to the head and neck region, of which 501 patients survived. Of the survivors, 28 patients (26 male, 2 female) sustained GSWs to

their face requiring operative intervention. The mean age of these patients was 28 (+/-8.3) years. They generally presented within a few hours of the injury, but 1 individual arrived over 24 hours later. Low-velocity single gunshots (from handguns) were predominantly involved, with facial fractures occurring in all cases. Fractures were of a localized shattering type without the major displacement of bony complexes seen in motor vehicle accidents. Most required wound debridement and fracture fixation. A few patients (14.2%) underwent free tissue transfer for reconstruction (3 fibular flaps, 1 TRAM). Tracheostomy was performed in 35.7% of patients. Mean length of hospital stay was 8.3 (+/-7.1) days, with 50% of cases requiring admission to the intensive care unit. Mean length of intensive care unit stay was 5.2 (+/-5.7) days. The average cost per patient exceeded $100,000.

4227. Pereira, F. J., et al. (2011). "Management of globe luxation followed by traumatic liquoric fistula: case report." Arquivos brasileiros de oftalmologia **74**(1): 58-60.

This report describes the only case in the literature of globe luxation due to traumatic cerebrospinal fluid fistula to the orbit caused by fire gun with ocular globe maintenance. E.N., female, white, 7 months, admitted with left orbitocranial injury by fire gun. Ocular globe luxation was detected with complete ocular motility restriction and absence of pupillary reflex in the left orbit. Computed tomography showed fracture of the medial orbital wall; bone fragments near the apex of the orbit and a stretched optic nerve. Surgical exploration was performed, showing liquor fistula through the ethmoid-sphenoid wall that was blocked with sponge (Gelfoam R) plus organic glue in the left orbit posterior wall, with immediate resolution of the proptosis and ocular integrity maintenance. Although controversial, maintenance of the ocular globe instead of enucleation was performed due to the integrity of the globe in this case. Despite the blindness, we considered the result to the proposed treatment excellent, once the maintenance of the ocular globe provides a good appearance and will contribute to an adequate facial bone development.

4228. Perez-Arredondo, A., et al. (2016). "Baclofen in the Therapeutic of Sequele of Traumatic Brain Injury: Spasticity." Clinical neuropharmacology **39**(6): 311-319.

Traumatic brain injury (TBI) is an alteration in brain function, caused by an external force, which may be a hit on the skull, rapid acceleration or deceleration, penetration of an object, or shock waves from an explosion. Traumatic brain injury is a major cause of morbidity and mortality worldwide, with a high prevalence rate in pediatric patients, in which treatment options are still limited, not available at present neuroprotective drugs. Although the therapeutic management of these patients is varied and dependent on the severity of the injury, general techniques of drug types are handled, as well as physical and surgical. Baclofen is a muscle relaxant used to treat spasticity and improve mobility in patients with spinal cord injuries, relieving pain and muscle stiffness. Pharmacological support with baclofen is contradictory, because disruption of its oral administration may cause increased muscle tone syndrome and muscle spasm, prolonged seizures, hyperthermia, dysesthesia, hallucinations, or even multisystem organ failure. Combined treatments must consider the pathophysiology of broader alterations than only excitation/inhibition context, allowing the patient's reintegration with the greatest functionality.

4229. Perignon, S., et al. (2008). "[Bilateral oedipism: a case report]." Oedipisme bilateral non concomitant: a propos d'un cas. **31**(6 Pt 1): 614-617.

INTRODUCTION: Oedipism (or self-enucleation) is a rare form of self-mutilation and most often described in acutely psychotic patients, less frequently among drug addicts or the mentally deficient., CASE REPORT: We report a case of a 46-year-old man, who, 3 years after having enucleated his left eye during an acute bout of delirium symptomatic of schizophrenia, mutilated his right eye in the same way. We detail the emergency medical and surgical management indicated in these circumstances., CONCLUSIONS: In most cases described, self-mutilation involves one eye and rarely both. This case of bilateral oedipism is therefore exceptional. In these circumstances, it is necessary to prevent any intracerebral complications induced by the traction exerted on the optic nerve, such as subarachnoid hemorrhage, whose signs can be masked by the patient's psychic state, and to take the neuropsychiatric precautions necessary.

4230. Perju-Dumbravá, D. (2002). "Mechanisms and vulnerant object in head trauma: Lesional morphology." Romanian Journal of Legal Medicine **10**(3-4): 270-276.

The authors presents the most frequent lesions found in neurosurgery in connection with legal medicine. A brief synopsis on lacerations and epicranium haematoma, skull fractures, cerebral trauma lesions is to be found. There are presented many of the modalities of the traumatic events (car accident, blows by fist or foot, guns lesions, etc.).

4231. Perkins, A. and D. A. Peak (2009). "A nail gun injury." International journal of emergency medicine **2**(3): 175-176.

4232. Pérol, M. (2017). "Strategic approach to CNS metastasis." Journal of Thoracic Oncology **12**(11): S1697-S1698.

Brain metastases (BMs) concern more than 10-15% of patients with stage IV NSCLC at baseline and more than 40% during the disease course. The wider use of MRI and improvement of extra-cranial systemic disease control contribute to increase the BMs incidence. The issue of BMs is critical in the management of NSCLC patients in the perspective of the neurological consequences of brain lesions. BMs occurrence is synonymous of a poor outcome in NSCLC but reflects in fact many different situations. Establishing a therapeutic strategy needs first to assess their prognosis; the most appropriate scale is the Graded Prognostic Assessment for Lung Cancer Using Molecular Markers including as prognostic factors EGFR mutations and ALK rearrangement in addition to age, number of BMs, extra-cranial disease and Karnofsky status, with a median survival varying from 3.0 months for the worse subgroup (GPA 0.5-1) to 46.8 months for patients with oncogene addiction and good prognostic factors (GPA 3.5-4). The second step is to evaluate the indications, efficacy and side effects of available therapeutic “weapons.” Corticosteroids are active against cerebral edema and improve symptoms. Whole brain radiotherapy (WBRT) has been for decades the treatment “reflex” of BMs but the emergence of stereotactic radiosurgery (SRS) or radiotherapy (SRT) and the issue of neurocognitive complications led to deferral or omission of WBRT in an increasing number of patients. WBRT remains indicated in patients with symptomatic, large (≤3 cm) and numerous BM. However, palliative WBRT did not provide any benefit in terms of survival, quality of life and QUALYs compared to supportive care alone in the Quartz trial; the subgroup analysis suggests a benefit only in patients with better prognostic factors. Neuroprotective strategies as sparing hippocampi during WBRT are currently evaluated. SRS defined by invasive contention with sub-millimeter accuracy or noninvasive SRT with millimeter accuracy are indicated in case of 1 to 3 BMs (but now up to 10 lesions) with a diameter <3 cm, alone or as a boost on the top of WBRT. SRS/SRT alone avoids neurocognitive toxicity of WBRT and provides a similar OS to that of surgical resection when using SRS/SRT for patients with operable lesions. Radionecrosis is observed in 10-17% of patients treated with SRS/SRT, making difficult the distinction with a tumor relapse. In spite of reduction in local and distant brain failures or in death from neurological causes, adjuvant WBRT after SRS/SRT does not improve overall survival and has a detrimental effect on neurocognitive functions and quality of life. Surgical resection of BMs achieves survival and functional benefit in addition to WBRT. Surgery is indicated in case of a symptomatic lesion, larger than 2 cm, with a mass effect, allowing fast improvement of symptoms. The invasive edge of BMs explains the high local recurrence rate after resection and the need for adjuvant radiotherapy. WBRT is progressively less used in favor of SRS/SRT despite a better intracranial control rate because of a higher rate of cognitive deterioration. Systemic treatment remains critical for extracranial systemic control of the disease. Brain-blood barrier limits the brain penetration of systemic agents, especially with efflux transporters as P-gp, for which many TKIs and cytotoxic agents are substrates. BMs usually cause brain-blood barrier disruption with heterogeneous drug penetration. Cytotoxic chemotherapy provides similar response rates in BMs to those of extracranial disease. Anti-PD- 1 antibodies seem to be active in the brain but available data are scarce. First and second-generation EGFR TKIs have a low brain penetration but sufficient to obtain response rates similar to those achieved for systemic disease; duration of response might be inferior. Osimertinib has a better CNS penetration. For ALK+ disease, crizotinib is a P-gp substrate with a low blood/CSF concentration ratio and brain is the most frequent site of progression. Next-generation ALK TKIs have a better CNS diffusion; ale tinib largely decreases the cumulative incidence of BMs compared to crizotinib. Concurrent administration of TKIs with brain radiotherapy is controversial and is not recommended outside of a clinical trial. Defining an optimal multidisciplinary strategy needs to take into account many parameters, including number, location and size of brain metastases, leptomeningeal lesions, neurological symptoms, risk factors for neurocognitive alteration, extracranial metastases and their control, primary lung tumor control, and identification of a targetable oncogenic addiction. In absence of a targetable genomic alteration, BMs at baseline can benefit from systemic treatment alone in selected patients with no neurological symptoms, small intracranial tumor burden, low risk of impending neurologic issues, on the condition that they are closely monitored; brain radiotherapy can be safely deferred to intracranial progression. Symptomatic BMs require local treatment, by favoring SRS/SRT rather than WBRT; adjuvant WBRT is not recommended but further close monitoring is mandatory to detect new intra-cranial lesions. Surgery is preferred for large lesions, posterior fossa

location or diagnosis; adjuvant SRS/SRT is mandatory to avoid local recurrences. WBRT remains indicated for multiple symptomatic lesions not eligible for SRS/SRT except in poor PS patients. In case of EGFR mutations, asymptomatic patients with BMs are treated with first or second-generation EGFR TKIs but must be closely watched with repeated brain imaging. A recent retrospective study suggests that front-line SRS/SRT might improve overall survival as CNS remains a sanctuary site in oncogene-addicted disease. Symptomatic patients are locally treated, favoring SRS/SRT requiring only a short interruption of systemic treatment. For patients with ALK+ disease, the advent of alectinib as standard front-line treatment should change the management approach to BMs: the low incidence of BMs should allow spacing brain monitoring while the high intra-cranial response rate should permit to delay local treatment. For ALK+ patients developing BMs on ALK TKI, local treatment with SRS/SRT or surgery if necessary is the first option; switching to another TKI with a better brain penetration is another option for patients candidates to WBRT. The longer life expectancy of ALK+ patients leads to defer as far as possible the use of WBRT. However, improvement of intracranial control should be considered in patients at preferential risk of dying from intracranial progression, independently on mutational status.

4233. Persad, S., et al. (2012). "Saved by the orbit-two cases of penetrating facial injuries sparing the eye." West Indian Medical Journal **61**: 32.

Penetrating orbital injuries are almost always accompanied by intracranial and/or intraocular trauma and usually carry an unfavourable visual prognosis. This paper reports two rare cases of penetrating transorbital injuries with benign outcomes. Both cases involved 29-year old males who were rushed to the emergency room, after being involved in separate domestic disputes, each with a knife handle protruding from the brow area. Both patients were fully alert and oriented on presentation with Glasgow Coma Scales of 15/15, no neurological deficits and completely intact globes with no intraocular injuries. The entry wound of one patient started at the frontal bone, just medial to the right brow, traversed the orbit, following the medial wall and exited the medial aspect of the floor of the orbit, with the tip of the blade embedded in the right maxillary sinus. The entry wound of patient two also started in the frontal bone, this time superior-lateral to the left brow, traversed the orbit following the lateral wall, continued into the maxillary sinus and terminated at the base of the skull with the tip of the blade abutting the left lateral pterygoid plate. Each patient underwent emergency surgery by a multidisciplinary team where removal of the knife followed an uneventful course and led to good postoperative visual outcomes. Many factors in these two cases of transorbital penetrating injuries led to overall fortuitous outcomes. These included the initial direction and length of the penetrating foreign bodies and the orientation of these in the orbit. The anatomical positioning of the globe in its protective bony socket also played a pivotal role in protecting the intraocular contents. The energy transfer away from the globe and the protective viscoelastic properties of the sclera were also beneficial sight-saving factors. Lastly, the dissipation of residual kinetic energy away from the orbital contents by the relenting weak orbital floor was an additional protective mechanism.

4234. Persson, L., et al. (1976). "Extravasation, spread and cellular uptake of Evans blue-labelled albumin around a reproducible small stab-wound in the rat brain." Acta neuropathologica **34**(2): 125-136.

A small stab wound was made in the frontal lobe of the rat brain in order to study both the acute damage and the restitution of the blood-brain barrier to macromolecules under well-defined experimental conditions. Intravenously administered Evans blue-labelled albumin (EBA) was used as a tracer and the brain sections were observed in a fluorescence microscope. EBA leaked into the neuropil only during the first 3 days after the trauma. The maximal leakage occurred during the first day after the injury. The tracer spread from the area surrounding the stab wound in a reproducible way, initially roughly centrifugally. Nerve and glial cells close to the wound displayed a diffuse fluorescence of their cell bodies 1 to 6 h after the injury, i.e. at times with maximal extravasation of the tracer. A more granular distribution of the tracer was seen in neurons and glial cells at both very short and long times after EBA injection. Thus, the blood-brain barrier lesion induced was reproducible and reversible as judged by the pattern of EBA leakage. Some cells immediately adjacent to the injury had a diffuse cytoplasmic distribution of the tracer complex, in contrast to cells more distant from the injury, having a more granular distribution of the tracer in their cytoplasm. However, the appearance of the fluorescence in neurons and glia was to a large extent dependent upon the time after the injury, at which the cells were exposed to the tracer complex and on the time that had elapsed from the time of injection of the tracer complex to the sacrifice of the animal. Thus, it seems likely that two factors contribute to the appearance of the neuronal EBA distribution: on one hand the location and possibly extent of cellular damage of the cell, and, on the other hand, the time and amount of EBA to which the cells were exposed.

4235. Persson, L., et al. (1976). "The brain-specific S 100 protein in small cerebral stab wounds in the rat: a quantitative study." Acta neuropathologica **36**(1): 39-45.

A quantitative study of the changes in water-soluble proteins and water-soluble S 100 was made in stab-wounded rat frontal cortex as compared to unoperated controls. No great changes occurred until 30 days after the injury. At that time there was no change in the amount of water-soluble S 100 protein/g wet weight, but a large decrease in the amount of water-soluble proteins/g wet weight and thus a proportionate increase in the amount of water-soluble S 100 protein/mg of water-soluble proteins. The significance of the results is discussed.

4236. Peschel, O., et al. (2013). "Postmortem 3-D reconstruction of skull gunshot injuries." Forensic science international **233**(1-3): 45-50.

BACKGROUND: In cases of severe decomposition or skeletonization of a corpse after cerebral gun shot injury it is difficult to exactly reconstruct the bullet path in the brain. However, in case of murder or homicide this might become necessary to answer forensic questions such as the ability to move or other actions of the victim., MATERIALS AND METHODS: Therefore a method in terms of three dimensional reconstruction technique was developed by fusing computed tomography scans (CT) of the original skull and magnetic resonance images (MRI) of a normal brain of adequate size. Hereby five cases were investigated., RESULTS: In three cases an excellent concordance between the reconstructed bullet trajectory and the autopsy reports was achieved. In one case the original brain was not available for CT-scanning due to previous autopsy. However, the findings were in line with the pathology report. In one case there was a difference of about 1-2 cm between the original autopsy description and the reconstructed bullet path. This was due to only a part of the skull being available for image reconstruction., CONCLUSION: The findings suggest that this method can successfully be applied to adequately reconstruct bullet paths in cases of completely skeletonized skulls, but should carefully be used in cases of incomplete skulls.

4237. Pessoa Neto, J. V., et al. (2019). "Removal of Foreign Bodies in Orbit-Zygomatic-Maxillary Complex." The Journal of craniofacial surgery **30**(7): e598-e600.

Trauma is one of the leading causes of death worldwide. Due to its anatomy and position in the facial skeleton, the orbit becomes a region susceptible to trauma which may also involve the penetration of foreign bodies (FBs). These events can have serious repercussions depending on their extent due to the proximity of the orbit with other noble structures of the face and skull. Because of this, a system of prehospital management of traumas must be established, in order to promote a better prognosis for patients. The present study aims to report the case of a patient suffering from a motorcycle accident with multiple fragments of FBs in the region of orbit-zygomatic-maxillary complex. The emergency surgical removal of the fragments was performed by a multidisciplinary team, involving Ophthalmology and Oral and Maxillofacial Surgery and Traumatology (OMST). Wound cleansing and debridement were performed with subsequent removal of the foreign bodies by the OMST team, in addition to the reduction and fixation of related fractures. As for Ophthalmology, the evisceration of the affected eye was performed due to its anatomical and functional impairment. The patient is 12 months postoperatively, with no aesthetic or functional complaints regarding OMST. The anatomical knowledge of the traumatized region, besides the establishment of the conduct regarding the removal of possible associated foreign bodies are required so that the success of the treatment can be obtained, aiming to minimize the damages to the patient.

4238. Pessoa, T. D. B., et al. (2021). "Endovascular treatment of subclavian artery injury with a complex post-traumatic fistula: Case report." Trauma case reports **32**.

Background: Endovascular treatment in trauma is a promising strategy to reduce perioperative morbidity and mortality. We report the case of a gunshot wound causing an initially undiagnosed subclavian artery injury, with delayed progression to a complex, difficult-to-manage arteriovenous (AV) fistula. Placement of an encapsulated endovascular stent graft resolved the primary lesion, but persistent cervical arteriovenous communications were only repaired after multiple, sequential embolization procedures. Report: A 25-year-old male sustained a gunshot wound to the right neck. Initial treatment failed to identify any vascular injury, and the patient was discharged. Three weeks later, he presented to our facility with headache and a palpable right-sided cervical thrill. Arteriography showed contrast extravasation from

the right subclavian artery and an AV fistula with the ipsilateral internal jugular vein. The arterial injury was repaired with an encapsulated stent graft, but residual contrast leak persisted on follow-up angiography. Three months after the first intervention, cervical thrill was still present; a right vertebral–right internal jugular AV fistula was identified and repaired by distal coil embolization. One month later, persistent symptoms prompted repeat arteriography, which again identified contrast extravasation, now involving the thyrocervical trunk. Selective thyrocervical embolization was ultimately successful, with resolution of symptoms and no further evidence of contrast leak. Conclusion: Delayed management of neck trauma can be challenging due to neovascularization, which hinders open repair in this delicate region. Post-traumatic arteriovenous fistulas are thus a particularly fearsome complication, and can be very difficult to approach; as in our patient, multiple interventions may be required. This case highlights the importance of detecting vascular trauma as early as possible, as a delay in diagnosis can hinder treatment and eventuate challenging late complications. Further studies are needed to demonstrate the long-term benefits of endovascular management of complex vascular injuries of the neck region.

4239. Pessoa, T. D. B., et al. (2018). "Endovascular treatment of subclavian artery trauma associated with multiple arteriovenous fistulas: Case report." Vascular and Endovascular Surgery **52**(8): S38-S39.

Background: Subclavian artery injuries are frequently asso¬ciated with high mortality rates. The diagnosis is often not evident, especially in stable patient, and this can ultimately contribute to treatment delay. Surgical approach may require extensive thoracic access and be associated with injuries of other cervical structures. When these injuries are diagnosed late in the course of the disease, as in the present case, it may hamper conventional surgical access due to local tissue changes after trauma as well as association with other com-plications, such as fistula formation. The endovascular approach is an attractive option to avoid direct access to the hostile region; besides, it is associated with lower risk of bleeding and good results. Case Description: A 25-year-old male, a victim of gunshot trauma to the right supraclavicular region, was discharged from hospital without identification of his vascular lesions. Three weeks afterward, he sought med¬ical assistance again with headache and a cervical thrill. An arteriovenous fistula between the right subclavian artery (RSCA) and the right internal jugular vein (RIJV) was diag-nosed at arteriography. The patient underwent endovascular treatment with implant of a fluency stent-graft (13.5 x 80 mm) in the RSCA with important improvement in the com¬munication. A persisting late-phase overflow was detected close to where the bullet was lodged. A new arteriography was scheduled a month later to elucidate the persisting cervi¬cal thrill. A remaining fistula between the origin of the right vertebral artery (RVA) and a very dilated (RIJV) was diag¬nosed. The Willis polygon was complete and the RVA had retrograde flow. Access to the initial portion of the RVA was made impossible by the stent-graft in the RSCA, and there¬fore, we decided to access the distal portion of the RVA at the base of the skull with the help of neurosurgery and proceed with embolization with a 5 x 15 mm and 4 x 12 mm coils near to its origin. Control image showed significant reduction of flow. One month later, the patient returned still complain¬ing of cervical thrill. New arteriography evidenced another fistula between the RIJV and branches of the thyrocervical trunk, which were embolized with 7 x 20, 5x15, and 4x15 mm coils. The patient evolved with remission of symptoms and a control angiotomography demonstrated good position¬ing of the endoprosthesis and coils with no more communications. Conclusion: The treatment of late subcla¬vian traumatic injuries can be challenging and require multi¬ple approaches, especially if associated with fistulas. Longer follow-up times are warranted.

4240. Peter, H. H., et al. (2016). "Early clinical development of gnbac1 a humanized monoclonal antibody neutralizing MSRV-ENV, a neurotoxic protein, for the treatment of multiple sclerosis." Neurology **86**(16).

Objective: Early clinical development of a humanized monoclonal antibody for multiple sclerosis Background: MSRV-Env is a protein of endogenous retroviral origin. This protein is expressed in active brain lesions of multiple sclerosis (MS) patients notably on the surface of microglial cells. MSRV-Env has a TLR4 mediated effect which is pro-inflammatory and myelinotoxic by blocking oligodendrocyte precursor cell (OPC) maturation, hence inhibiting the remyelination process. Design/Method: GNbAC1 is an IgG4 humanized monoclonal antibody which neutralizes MSRV-Env and prevents cytokine release and the nitrosative stress process at the OPC level. Remyelination observed in the brain of animals treated with GNbAC1 in experimental autoimmune encephalitis models supports the in-vitro effect. Results: After a successful first-in-man study including 33 healthy subjects testing GNbAC1 up to a dose of 6 mg/kg, a high dose pharmacology study assessed safety, tolerability and cerebrospinal fluid (CSF) penetration of GNbAC1 up to doses of 36 mg/kg in 21 healthy subjects. The safety profile was good and the pharmacokinetics of the product was dose-linear with a CSF-serum ratio up to 0.4[percnt]. GNbAC1 was also tested in 10 MS patients, of which 9 were

suffering from progressive MS, in a 12-month study. Long term safety was good. The average EDSS score remained stable over one year in the cohort. From a pharmacodynamics standpoint, MSRV-Env biomarker decreased during treatment as well as TLR4 activation markers. Conclusion: The promising early clinical results of this innovative treatment pave the way for testing GNbAC1 in a Phase IIb clinical trial. GNbAC1 will be tested in 260 relapsing remitting MS patients in a randomized placebo-controlled trial testing 3 doses of GNbAC1 versus placebo during 6 months, which will be followed by a 6-month extension where all placebo patients will be re-randomized to the different active dose arms. The study will start in early 2016.

4241. Peterson, R. S., et al. (2004). "Radial glia express aromatase in the injured zebra finch brain." The Journal of comparative neurology **475**(2): 261-269.

Estrogens have neurotrophic and neuroprotective properties. The synthesis of estrogen occurs via the expression of aromatase. Previous studies have shown that injury to the vertebrate brain results in a rapid and dramatic up-regulation of aromatase expression in astrocytes around the lesion. As part of experiments examining injury-induced glial aromatization, we identified aromatase in radial glia of the zebra finch brain. Adult female zebra finches received a penetrating injury to the right hippocampus. Twenty-four hours after lesioning, birds were administered bromodeoxyuridine (BrdU) and sacrificed 2 hours, 1 day, or 7 days later. We determined the distribution of aromatase and BrdU labeling by using immunocytochemistry. Radial aromatase was localized to cells lining the lateral ventricle adjacent to the lesioned hippocampus. Injury also induced a dramatic accumulation of newly generated cells labeled with BrdU around the lesion. BrdU labeling was strongly associated with aromatase-positive radial fibers, suggesting the migration of newly generated cells along these fibers. In the songbird brain, estrogen supports neuronal recruitment and promotes the survival and addition of new neurons. The presence of aromatase in radial glia provides a mechanism of estrogen delivery to postmitotic cells. Radial aromatization may be a key feature in the repair of the vertebrate brain following neural injury. Copyright 2004 Wiley-Liss, Inc.

4242. Peterson, R. S., et al. (2001). "Rapid upregulation of aromatase mRNA and protein following neural injury in the zebra finch (Taeniopygia guttata)." Journal of neuroendocrinology **13**(4): 317-323.

The expression of aromatase (oestrogen synthase) within the vertebrate central nervous system (CNS) is key in the provision of local oestrogens to neural circuits. Aromatase expression appears to be exclusively neuronal under normal conditions. However, some in vitro studies suggest the presence of astrocytic aromatase in songbirds and mammals. Recently, aromatase in reactive astrocytes has been demonstrated in response to neural injury in the mammalian CNS. Since the glial aromatase expression first documented in cultures of the songbird telencephalon may reflect processes similar to those in response to mammalian neural injury, we investigated whether injury alters the pattern of aromatase-expression in the zebra finch, a species with very high levels of forebrain aromatase expression. Adult males received a penetrating neural injury to the right hemisphere and were killed either 24 or 72 h later. Controls were anaesthetized and otherwise unmanipulated. We determined the expression of aromatase mRNA and protein using in situ hybridization and immunocytochemistry, respectively. Both the transcription and translation of aromatase is dramatically upregulated around the lesion site in response to neural injury in the zebra finch forebrain. This effect is robust and rapid, occurring within 24 h of the injury itself. Cells that upregulate aromatase appear to be reactive astrocytes based upon morphology. The hemisphere contralateral to the injury and both hemispheres in control birds showed the normal, exclusively neuronal pattern of aromatase expression. The upregulation of aromatase in astrocytes may provide high levels of oestrogen available to modulate processes such as CNS repair. Injury-induced upregulation of astrocytic aromatase may be a general characteristic of the injured vertebrate brain.

4243. Petkovic, S., et al. (2011). "Complex suicide: an unusual case with six methods applied." Journal of forensic sciences **56**(5): 1368-1372.

Complex suicides (CSs) are committed by using more than one method. They account for 1.5-5% of all suicides. We present a case of CSs of a 44-year-old man, found dead in the vicinity of his car, in a deserted frozen field. Police investigation excluded homicide, and no medical data confirmed mental illnesses. Autopsy revealed wrist cuts, neck cuts, acid burns in the GI tract, multiple stab wounds to the head by a screwdriver, and several uncertain signs of hypothermia. Toxicology analysis (gas chromatography-mass spectrometry) confirmed ingestion of insecticide. We concluded that stab wounds to the head were the cause of death, while external hemorrhage and hypothermia were

contributing factors. This is the first case of CSs reviewed in the literature where six suicide methods were applied. This particular case is interesting because the victim used a screwdriver as a tool for inflicting stab wounds to the head, which is a rare suicidal method. Copyright © 2011 American Academy of Forensic Sciences.

4244. Petridis, A. K., et al. (2011). "Outcome of craniocerebral gunshot injuries in the civilian population. Prognostic factors and treatment options." Central European neurosurgery **72**(1): 5-14.

AIM: Gunshot wounds to the head are rare in Europe. They may be inflicted by low-velocity handguns, captive bolt guns and tear gas cartridges and mostly result from suicide attempts. The experience of neurosurgeons with this kind of traumatic injury is decreasing; the aim of this study was therefore to analyse prognostic factors which help to decide whether or not to operate and to discuss treatment options., METHODS: Thirty patients with gunshot head injuries treated in our hospital from 1993 to 2008 were retrospectively evaluated. Glasgow Coma Scale (GCS) score, pupil reactivity, lesion localisation, number of bone fragments, intracranial pressure (ICP), midline shift, hypotension, and dural penetration were analysed for their prognostic value. Surgically and non-surgically treated patients were evaluated separately. Complications were registered., RESULTS: A low GCS of 3-8, fixed pupils, >2 bone fragments, bilobar or posterior fossa/brainstem lesions and ICP >45 mmHg were indicators of a poor prognosis., CONCLUSION: Patients with a GCS of 3-8 and two non-reactive pupils should not be operated. If one or both of the pupils are reactive, surgery should be performed irrespective of the GCS score, except in patients with translobar/transventricular wounds. Even if there are no clear contraindications to surgery, the outcome is expected to be poor in patients with a low GCS score, midline shift >10 mm, >2 bone fragments in the brain, and a bilobar, posterior fossa/brainstem or ventricular lesion and ICP >45 mmHg. When surgery is performed the wound and the missile or bone track should be debrided meticulously, the wound and dura should be closed in a watertight fashion and antibiotic prophylaxis as well as tetanus serum should be given. Copyright © Georg Thieme Verlag KG Stuttgart . New York.

4245. Petridis, A. K., et al. (2011). "Transorbital impalement injury with massive intracranial lesion not detected by cranial CT scan." Clinical neuroradiology **21**(3): 167-170.

An extraordinary case of transorbital penetration injury is presented. A 24-year-old male patient was involved in a fight and was pushed against a shelf. He immediately lost consciousness and was brought to hospital. A cranial computed tomogaphy (CT) scan showed a hemorrhage and brain edema over the left hemisphere with orbital roof fracture. A decompressive craniectomy was performed. Intraoperatively, an orbital roof fracture with penetration of the frontobasal dura could be seen which could not be explained by the trauma mechanism. The postoperative magnetic resonance imaging (MRI) with susceptibility-weighted image (SWI) showed two injury tracks from the orbit through the brain which appeared to be penetration injuries. The forensics department was consulted and penetration by a falling candleholder was found to be the cause of the injuries. In this case, the cranial CT alone did not show any indication of a penetration injury. Only MRI revealed the penetration track, which stresses the diagnostic value of this modality and especially the SWI in cases where the trauma mechanism does not correspond to the injury shown in the CT scan.

4246. Petroff, M. A., et al. (1987). "Cranial bone grafts for post-traumatic facial defects." The Laryngoscope **97**(11): 1249-1253.

Recent interest in onlay cranial bone grafts has shown it to be a preferred technique in the reconstruction of facial defects. This paper reports seven patients in whom outer table cranial bone grafts were used to reconstruct post-traumatic facial deformities. These included orbital and zygomatic deformities (2 patients), maxillary defects (2 patients), mandibular defects (2 patients), and nasal deformity (1 patient). A brief review of the development of membranous bone grafting for maxillofacial reconstruction is given. Good cosmetic results were obtained in six of seven patients with no evidence of graft resorption. One patient required removal of the graft because of inadequate soft tissue coverage. No patient suffered any significant donor site morbidity. In summary, this technique is extremely useful in treating post-traumatic bony deformities of the facial skeleton. The excellent graft survival and ease in harvesting the graft make this technique preferable to traditional endochondral grafts taken from the iliac crest and rib.

4247. Petrone, P., et al. (2018). "To kill or be killed: the coup de grace for a warrior after multiple sword wounds." Anthropologischer Anzeiger; Bericht uber die biologisch-anthropologische Literatur **75**(4): 311-323.

Finding traumatic lesions on ancient skeletal remains offers a unique opportunity to investigate the circumstances surrounding the time of death. Here we present the unique find of a late 17th, early 18th century young male from Southern Italy with eight traumatic skull lesions. A detailed anthropological examination using X-ray and 3D CT scanning techniques was conducted in order to evaluate traumatic extent, direction and degree of severity of each skull injury. The nature, number and timing of repair of the traumata suggest that they were intentional blows inflicted in battle. Gross and radiographic evidence shows that the individual survived long after one of these traumata, most likely suffered in a previous battle. Shape, size and location, as well as different orientation and implied trajectory of the multiple wounds, suggest that they were produced by a heavy, sharp cutting weapon. The perimortem aspect of most of the traumata revealed them to be contemporary injuries, suffered in a final assault by a heavy sword during a face-to-face combat. The largest and deepest fracture penetrating the skull cavity possibly resulting in traumatic brain injury was here suggested as the fatal one, even if the victim may have survived for several days prior to death.

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4248. Petrosian, N. G. (1968). "[Differentiation of stab- and gunshot wounds of the head]." O differentsirovanii kolotykh i ognestrel'nykh povrezhdenii golovy. **11**(1): 22-24.

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4249. Petrov, D., et al. (2002). "[Major respiratory tract traumas]." Travmi na magistralnite vuzdukhonosni putishta. **58**(1): 28-31.

Between 1988 and 2000 a total of 33 patients with traumatic tracheobronchial lesions were diagnosed and treated. The trauma was penetrating in 7 (stab and gun-shot), blunt in 10 (car accidents, compression and falling from heights) and iatrogenic in 16 of them (postintubational--15, after foreign body extraction--1). The main clinical and radiological features were subcutaneous emphysema, hemoptysis, respiratory insufficiency, pneumomediastinum and pneumothorax. The diagnosis was confirmed in all patients by early fiberoptic bronchoscopy. "Watch and see" tactics with massive antibiotics therapy was followed in 4 (12%) patients. A surgical treatment was carried out in 29 (88%) patients as follows: simple repair--19 (58%), left pneumonectomy--2 (6%), tracheal resection and anastomosis "end to end"--2 (6%), tracheostomy--1 (3%), thoracocenthesis and drainage--3 (9%) and cervical mediastinotomy--2 (6%). The operative mortality was 9%. The cause of death in these 3 patients were associated brain and spinal cord injuries. In the rest of patients the early and long-term postoperative results were considered very good.

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4250. Petrov, N., et al. (2003). "Acute ventilatory failure after gunshot injury of the facial region management." Anaesthesiology and Intensive Care **30**(4): 49-51.

The difficult airway in facial gunshot wounds present serious problem in anesthesiological practice. The adequate management in this cases improve the outcome. We present the case of the craniofascial gunshot wound with difficult airways and algorithm for effective management.

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4251. Phaily, A. and M. Khan (2019). "Is our current method of cervical spine control doing more harm than good?" Trauma (United Kingdom) **21**(3): 176-183.

Introduction: Early cervical spine immobilisation has long been considered the standard of care in the management of trauma patients with suspected spinal cord injury. There has been conflicting evidence regarding its benefits and risks. This article reviews the current literature and whether the continued use of routine cervical spine immobilisation is still appropriate in modern trauma care. Method: A literature search was conducted using the Medline PubMed, Google Scholar and Cochrane Library online databases. The searches were limited to full text, English language studies conducted on adults in the last 20 years (July 1997 to July 2017). Results: The entrenchment of cervical spine immobilisation in trauma management is multifactorial. In the pre-hospital setting, immobilisation is recommended whilst awaiting full assessment. Fear of missed diagnoses of spinal injuries encourages defensive medicine and over-immobilisation. Effective cervical spine immobilisation is appropriate in certain cases and reduces the risk of further spinal cord injury. However, research has shown that we are over-immobilising, and in penetrating trauma, cervical spine immobilisation increases the risk of mortality. Conclusions: The practice of routine cervical spine immobilisation for trauma patients is outdated, ineffective and results in iatrogenic injury. Routine cervical spine immobilisation is not backed up by robust evidence. It has been clearly shown that in cases of penetrating spinal injuries, cervical spine immobilisation is not only ineffective but is also linked to an increased risk of mortality. Special considerations must also be taken in patients who have pre-existing spinal conditions, impending airway compromise, or at risk of aspiration and

those with head injuries or suspected traumatic brain injuries. A selective approach to cervical spine immobilisation is recommended and should be reserved for cases deemed high risk rather than a standard rule for all trauma patients.

4252. Pham, T., et al. (2018). "Fetal gunshot brain injury leading to late postnatal hydrocephalus." Journal of neonatal-perinatal medicine **11**(4): 427-431.

A male fetus was delivered by emergent caesarean section after a term pregnant mother was caught in crossfire and sustained gunshot injury to her abdomen. Examination of the infant was unremarkable except for a small laceration of the scalp at the anterior fontanelle. Skull radiography showed a dense bullet shaped opacity in the brain. He was managed conservatively and was discharged home on full feeds with normal neurological examination. He developed seizures and progressive hydrocephalus, and underwent a ventriculoperitoneal (VP) shunt placement at 5 weeks of age. At 13 months of age the bullet was removed. To our knowledge this is the first report of fetal brain injury with intact bullet in the brain with survival. This case provides the context for a discussion about factors that contribute to survival and favorable prognosis of infants with fetal penetrating gunshot brain injury.

4253. Phillips, B., et al. (2018). "A subgroup analysis of penetrating injuries to the pancreas: 777 patients from the National Trauma Data Bank, 2010-2014." The Journal of surgical research **225**: 131-141.

BACKGROUND: This study is the first to analyze penetrating injuries to the pancreas within subgroups of severe traumatic brain injury (TBI), early deaths, and potential survivors. Our objectives were to identify national patterns of injury, predictors of mortality, and to validate the American Association for Surgery of Trauma Organ Injury Scale (AAST-OIS) pancreas injury grades by mortality. Secondary outcomes included hospital and intensive care unit length of stay and days on mechanical ventilation., METHODS: Using the Abbreviated Injury Scale 2005 and ICD-9-CM E-codes, we identified 777 penetrating pancreatic trauma patients from the National Trauma Data Bank that occurred between 2010 and 2014. Severe TBI was identified by ICD-9-CM diagnosis codes and Glasgow Coma Score (GCS; n = 7), early deaths were those that occurred within 24 h of admission (n = 82), and potential survivors included patients without severe TBI who survived longer than 24 h following admission (n = 690). We estimated multivariable generalized linear mixed models to predict mortality to account for the nesting of potential survivors within trauma centers., RESULTS: Our results indicated that overall mortality decreased from 16.9% to 6.8% after excluding severe TBI and early deaths. Approximately, 11% of patients died within 24 h of admission, of whom 78% died in the first 6 h. Associated injuries to the stomach, liver, and major vasculature occurred in approximately 50% of patients; rates of associated injuries were highest in patients who died within 6 h of admission. In potential survivors, mortality increased by AAST-OIS grade: 3.5% I/II; 8.3% III; 9.6% IV; and 13.8% V. Predictors of mortality with significantly increased odds of death were patients with increasing age, lower admission GCS, higher admission pulse rate, and more severe injuries as indicated by Organ Injury Scale grade., CONCLUSIONS: From 777 patients, we identified national patterns of injury, predictors of outcome, and mortality by AAST-OIS grade within the subgroups of severe TBI, early deaths, and potential survivors. Because AAST-OIS is not a reported element in the National Trauma Data Bank, we correlated Abbreviated Injury Scale 2005 codes to injury grade and identified an increase in mortality. After controlling for covariance, we found that greater age, lower GCS in stab wounds, higher pulse, and presence of a grade V pancreatic injury independently predicted the likelihood of death in patients surviving beyond 24 h following penetrating injuries to the pancreas.

4254. Phillips, C. D. (1992). "Emergent radiologic evaluation of the gunshot wound victim." Radiologic clinics of North America **30**(2): 307-324.

The incidence and number of victims of gunshot injury in the United States increases yearly. Rapid acute assessment of these individuals includes radiologic examinations. This article is an overview of current management practices and information relevant to the radiologist who is called upon to evaluate these patients.

4255. Phillips, W. J., et al. (1997). "Anesthesia during a mass-casualty disaster: the Army's experience at Fort Bragg, North Carolina, March 23, 1994." Military medicine **162**(6): 371-373.

4256. Philp, H. S., et al. (2012). "Canine zygomatic salivary mucocoele following suspected oropharyngeal penetrating stick injury." The Veterinary record **171**(16): 402.

4257. Philp, L., et al. (2012). "Late outcomes after grafting of the severely burned face: a quality improvement initiative." Journal of burn care & research : official publication of the American Burn Association **33**(1): 46-56.

Many approaches to surgical management of the severely burned face are described, but there are few objective outcome studies. The purpose of this study was to perform a detailed evaluation of the late outcomes in adult patients who have undergone grafting using a standardized surgical and rehabilitation approach for full-thickness (FT) facial burns to identify areas for improvement in the treatment strategy of authors. This was a prospective observational study in which patients who had undergone grafting for FT facial burns by the senior investigator at a regional burn centre between 1999 and 2010 were examined by a single evaluator. The surgical approach included tangential excision based on the facial aesthetic units, temporary cover with allograft then autografting with scalp skin preferentially, split grafts for the upper eyelid, and FT grafts for the lower eyelid. Rehabilitation included compression (uvex and or soft cloth), scar massage, and silicone gel sheeting. Of 35 patients with facial grafts, 14 subjects (age 43 +/- 16 years with 22 +/- 21% TBSA burns) returned for late follow-up at 40 +/- 33 months (range, 5-91 months). A mean of four facial aesthetic units per patient were grafted (range, 1-9 units), with six full facial grafts performed. Scalp was used as donor in 10 of 14 cases. Scalp donor sites were well tolerated with minor alopecia visible in only one case although the donor site visibly extended slightly past the hairline in two cases. Color match with native skin was rated at 8.8 +/- 0.8 of 10 when scalp skin was used compared with 7.5 +/- 1.6 with other donor sites ($P = .06$). On the lip and chin, hypertrophic scars were significantly worse compared with the rest of the facial grafts (Vancouver scar scale 8 +/- 2 vs 3 +/- 1, $P < .01$). Sensory recovery was poor with overall moving two-point discrimination at 11 +/- 3 mm (range, 4-15 mm), and monofilament light touch was 3.8 +/- 0.6. Graft borders were significantly more elevated than graft seams. On the forehead, the most notable problem was a gap between the graft and hairlines of the frontal scalp and eyebrows (range, 0-40 mm). Grafted eyelids required one or more subsequent ectropion releases in the majority of cases. The most common problem for the nose was asymmetry of the nostril apertures. The most problematic late outcomes that the authors identified after facial grafting for FT facial burns included relatively poor sensory return, elevation of graft edges, eyelid ectropion, gaps between grafts and hairline, and marked hypertrophic scarring around the mouth and chin. The results indicate that possible areas for quality improvement include greater attention to the limits of scalp harvest, more attention to pressure application to graft borders and the lip and chin during rehabilitation, greater accuracy in excision and graft placement on the forehead to avoid gaps with the hairlines, and counseling of the patient regarding the high probability of diminished facial sensation.

4258. Pia, H. W. (1979). "Head and brain injuries." Langenbecks Archiv fur Chirurgie **Vol. 349**: 247-252.

Experiences of war surgery since World War I, especially in World War II, in Germany by W. Tonnis, in Korea, Vietnam and Lebanon have proved that penetrating brain injuries require immediate operation by teams of experienced neurosurgical surgeons and nurses. Modern diagnosis by computer tomography immediately reveals every type and form of primary and secondary closed and compound injuries and excludes misinterpretations, additionally present-day neurosurgical technique have improved the prognosis of every type of head injury. Adequate training of surgeons in up-to-date neurotraumatology is absolutely essential if optimal neurotraumatological care is to be provided in case of large scale catastrophe.

4259. Pia, H. W. (1979). "[Open craniocerebral injuries]." Offene Schadel-Hirnverletzungen. **138**: 29-39.

4260. Piataev, G. E. (1966). "[A blind gunshot wound of the main sinus]." Slepoe ognestrel'noe ranenie osnovnoi pazukhi. **28**(6): 79-80.

4261. Piatt, J. (2018). "Penetrating spinal injury in childhood: the influence of mechanism on outcome. An epidemiological study." Journal of neurosurgery. Pediatrics **22**(4): 384-392.

OBJECTIVE: Penetrating injury of the spine in childhood commonly causes profound and life-long disability, but it has been the object of very little study. The goal of the current report is to document temporal trends in the nationwide incidence of this condition and to highlight the differences between penetrating injuries and closed injuries., METHODS: The Kids' Inpatient Database was queried for spinal injuries in 1997, 2000, 2003, 2006, 2009, and 2012. Penetrating mechanism was determined by diagnostic coding for open injuries and by mechanistic codes for projectiles and knives. Nationwide annual incidences were calculated using weights provided for this purpose. Unweighted data were used as a cross-sectional sample to compare closed and penetrating injuries with respect to demographic and clinical factors. The effect of penetrating mechanism was analyzed in statistical models of death, adverse discharge, and length of stay (LOS)., RESULTS: The nationwide incidence of penetrating spinal injury in patients less than 18 years of age trended downward over the study period. Patients with penetrating injury were older and much more predominantly male than patients with closed injuries. They resided predominantly in zip codes with lower median household incomes, and they were much more likely to have public health insurance or none at all. They were predominantly black or Hispanic. The risk of hospital death was no different, but penetrating injuries were associated with much higher rates of adverse discharge after LOS, averaging twice as long as closed injuries. Brain, visceral, and vascular injuries were powerful predictors of hospital death, as was upper cervical level of injury. The most powerful predictor of adverse discharge and LOS was spinal cord injury, followed by brain, visceral, and vascular injury and penetrating mechanism., CONCLUSIONS: Because its pathophysiology requires no elucidation, because the consequences for quality of life are dire, and because the population at risk is well defined, penetrating spinal injury in childhood ought to be an attractive target for public health interventions.

4262. Picard, A., et al. (2004). "[Reconstruction of complex loss of maxillary substance using a vascularized fibular flap after arteriovenous fistulization with a saphenous loop]." Reconstruction d'une perte de substance complexe du maxillaire par transfert de fibula vascularise apres realisation d'une fistule arterio-veineuse par boucle vasculaire saphene. **105**(5): 295-297.

INTRODUCTION: When major loss of bone stock requires a vascularized transfer, the poor quality of the receiver vessels may require complementary lengthening of the vascular pedicle. This can be achieved with venous bypasses or by preparing the recipient site with a vascular loop. We have used this later approach successfully in a patent with major tissue loss involving the maxillary bone., CASE REPORT: A 39-year-old man presented total loss of the maxillary tissues due to a firearm wound. A free fibular flap was considered. Due to the limited length of the fibular pedicle, and the scar tissue in the area of the vascular anastomoses, reconstruction was performed in two phases: first preparation of the recipient site with a saphenous loop then fifteen days later transfer of the fibular flap., DISCUSSION: This technique is an alternative to venous bypass which increases the risk of postoperative thrombosis. The objectives of the vascular loop are to position the anastomoses in a healthy area and to achieve end-to-end anastomoses. This technique has been described basically for the treatment of post-traumatic tissue loss of the limbs, but can be applicable for the face, particularly after radiation.

4263. Picardi, J. L., et al. (1975). "Clindamycin concentrations in the central nervous system of primates before and after head trauma." Journal of neurosurgery **43**(6): 717-720.

The authors measured levels of clindamycin, a drug well established as useful in the treatment of various soft-tissue and parenchymal bacterial infections, in serum, cerebrospinal fluid, and brain tissue of 14 rhesus monkeys. Penetration into brain tissue was erratic and concentrations detected were not significant. Cerebrospinal fluid levels, however, averaged 20.5% of paired serum concentrations and were higher than concentrations needed to inhibit most Gram-positive bacteria. Further studies in humans are indicated before this antibiotic may be used routinely.

4264. Pickering, A. E., et al. (2016). "The effect of presenting complaint on the risk of developing ventilator-associated pneumonia for patients intubated in an academic emergency department." Journal of Investigative Medicine **64**(1): 319-320.

Purpose of Study Ventilator associated pneumonia (VAP) increases ICU length of stay and mortality. Eckert found that 26% of trauma patients intubated in the ED develop VAP as compared to 6.5% of those intubated in the ICU. Green demonstrated that 70% of critical patients were intubated pre-hospital or in the ED and 18.2% remained in the ED for more than 4 hours. Objective To characterize the effect of presenting complaint on VAP risk and prevalence for

patients intubated in the ED. Methods Used A retrospective study was performed using a QI database of patients intubated in the ED. “At-risk for VAP” was defined as intubated >48 hours, with no significant abnormality on chest x-ray in the first 48 hours. “At-risk” patients were identified as VAP positive if they had a new persistent infiltrate on CXR with temperature outside 36-38C, and leukocyte count outside 4,000- 12,000, on chart review. Summary of Results 539 patients were included in the cohort. 244 presented with traumatic complaints, of these 25% (60) were found to be at risk for VAP and 45% (27) of these developed VAP. 295 patients had medical presenting complaints, of these 16% (47) were at risk for VAP and 17% (8) of these developed VAP. Trauma of unknown or less prevalent mechanism was categorized as Other Trauma, including TBI's and multi trauma. 28% of this group was at risk for VAP and 79% of these were VAP positive. 19% of gunshot wounds were at risk and 67% developed VAP. Conclusions Patients with traumatic injury were at higher risk for VAP and developed VAP more frequently.

4265. Pickett, G. E. and R. Vandorpe (2019). "Management of a maxillofacial, transclival penetrating injury." Canadian Journal of Neurological Sciences **46**: S42.

Background: Penetrating traumatic injuries to the clivus are rare. We describe the case of a 79-year-old man who presented to the emergency room with a butter knife protruding from his left cheek. Imaging showed the blade entering just beneath the left zygoma and transecting the clivus to terminate within the prepontine cistern. The tip of the knife abutted the right anterior inferior cerebellar artery and lower basilar artery. Methods: He was brought to the interventional neuroradiology OR with knife in place, by a combined surgical team of ENT, neurosurgery, and neuroradiology. Under local anaesthetic and intravenous sedation, vascular access to the distal left vertebral artery was obtained and a balloon positioned. Traction was applied to the knife and the knife was successfully removed avoiding any angular or rotational movements. An immediate angiogram showed no evidence of arterial injury. Results: The patient recovered uneventfully and was discharged home with no neurological deficit. Follow-up CT/CTA was performed a month later and confirmed no pseudoaneurysm or other complication. Conclusions: Management of penetrating skull base injuries by a multidisciplinary surgical team is advisable. Vascular imaging is crucial. Positioning of balloons within large vessels close to the penetrating object is recommended to control bleeding that may occur on removal.

4266. Pidlisnyi, S. S. (1998). "[Air resorption in traumatic pneumocephalus]." Rezorbtsiia povitria pry travmatychnii pnevmotsefalii.(2): 66-67.

Traumatic pneumocephalus results from severe penetrating craniocerebral injury. Resorption of air depends on its location in the cranial cavity, concurrent injury to the brain. In the subarachnoid space resorption of a small amount of air (less then 60 cm3) occurs within the shortest time possible. In substantia medullaris air is not resorbable. In all cases cranium is supposed to be air-tight in order that full resorption might take place. This will determine the choice of the treatment option to be adopted.

4267. Pienaru, M., et al. (2014). "[Treatment for penetrating wound caused by metallic intraocular foreign body]." REZOLVAREA UNEI PLAGI PENETRANTE CU CORP STRAIN INTRAOCULAR METALIC. **58**(4): 36-39.

INTRODUCTION: Penetrating wounds with intraocular foreign body are ophthalmologic emergencies due to their severity and complexity and may require multiple surgeries for final resolution., CASE REPORT: 30-years-old patient with penetrating wound and metallic intraocular foreign body in the posterior vitreous requires successive operations for IOFB extraction, lensectomy, posterior vitrectomy for rhegmatogenous retinal detachment and then silicone oil extraction with final visual acuity 0, 4 PH.

4268. Pierre, K., et al. (2022). "Blood-based Brain and Global Biomarker Changes Following Combined Hypoxemia and Hemorrhagic Shock in a Rat Model of Penetrating Ballistic-Like Brain Injury." Clinical neurosurgery **68**(SUPPL 1): 115.

INTRODUCTION: Penetrating traumatic brain injury (pTBI) often occurs with systemic insults like hemorrhagic (HS) and hypoxemic (HX) shock. METHODS: 30 rats were randomly assigned to sham, PBBI, HS+HX, and PBBI+HS+HX groups. PBBI and sham groups underwent craniotomy with and without probe insertion and balloon expansion, respectively. HX and HS was then simulated by blood withdrawal and FiO2 reduction. Biomarker serum concentrations were determined at one (D1) and two (D2) days post-injury with ELISA methods. RESULTS: Axonal injury-linked biomarkers pNF-H and NF-L serum levels in PBBI groups were higher than those in sham and HX + HS groups at D1 and

D2 post-injury. The same was true for PBBI + HX + HS compared to sham (D2 only for pNF-H) and HX + HS groups. However, pNF-H and NF-L levels in PBBI + HX + HS were not different than their PBBI counterparts. At D1, αII-spectrin levels in the HX + HS and PBBI + HS + HX groups were higher than the sham groups. αII-spectrin levels in the HX + HS group were higher than the PBBI group. This suggests HX + HS as the common insult driving αII-spectrin elevations. CONCLUSION: pNF-H and NF-L may serve as specific serum biomarkers of penetrating TBI in the presence or absence of systemic insults. αII-spectrin may be a sensitive acute biomarker in detecting systemic insults occurring alone or with pTBI.

4269. Pigadas, N., et al. (2008). "A randomized controlled trial on cross-infection control in maxillofacial trauma surgery: a comparison of intermaxillary fixation techniques." International journal of oral and maxillofacial surgery **37**(8): 716.

Glove perforations and percutaneous injuries occur commonly during the treatment of facial fractures and reveal the need for safer techniques, especially in intermaxillary fixation. The Rapid IMF device does not use any wires and may provide better cross-infection control than wiring methods. The aim of this study was to test the hypothesis that Rapid IMF is associated with fewer glove perforations/ percutaneous injuries than traditional wiring techniques. The authors carried out a randomized controlled trial which included 120 patients with fractures of the mandible requiring open reduction and fixation. The participants were allocated either to the study group and treated with intraoperative Rapid IMF or to the control group and managed with intraoperative eyelet wire ties. Analysis of the results showed that the Rapid IMF group had significantly fewer glove perforations than the traditional method (0.67 per operation compared with 1.5), (P<0.0001). The incidence of skin-penetrating injuries was the same in both groups (rate 0.02/ procedure). The application of Rapid IMF was significantly faster than wiring (P<0.0001). Minor intraoperative complications were noted in both groups, but more in the Rapid IMF group. Most concerned loosening or fracture of the anchorage ties but the surgical outcome was not affected. Rapid IMF is a safer alternative to wiring methods with significant reduction in glove perforation rates and is quicker to apply than conventional wiring techniques.

4270. Pigadas, N., et al. (2008). "A randomized controlled trial on cross-infection control in maxillofacial trauma surgery: a comparison of intermaxillary fixation techniques." International journal of oral and maxillofacial surgery **37**(8): 716-722.

Glove perforations and percutaneous injuries occur commonly during the treatment of facial fractures and reveal the need for safer techniques, especially in intermaxillary fixation. The Rapid IMF device does not use any wires and may provide better cross-infection control than wiring methods. The aim of this study was to test the hypothesis that Rapid IMF is associated with fewer glove perforations/ percutaneous injuries than traditional wiring techniques. The authors carried out a randomized controlled trial which included 120 patients with fractures of the mandible requiring open reduction and fixation. The participants were allocated either to the study group and treated with intraoperative Rapid IMF or to the control group and managed with intraoperative eyelet wire ties. Analysis of the results showed that the Rapid IMF group had significantly fewer glove perforations than the traditional method (0.67 per operation compared with 1.5), (P<0.0001). The incidence of skin-penetrating injuries was the same in both groups (rate 0.02/ procedure). The application of Rapid IMF was significantly faster than wiring (P<0.0001). Minor intraoperative complications were noted in both groups, but more in the Rapid IMF group. Most concerned loosening or fracture of the anchorage ties but the surgical outcome was not affected. Rapid IMF is a safer alternative to wiring methods with significant reduction in glove perforation rates and is quicker to apply than conventional wiring techniques.

4271. Pigolkin, I. I., et al. (2014). "[The method of three-dimensional modeling for the reconstruction of the circumstances of the event taking into consideration blood stains]." Sudebno-meditsinskaia ekspertiza **57**(5): 4-6.

The objective of the present study was to estimate the possibility of using computer-assisted three-dimensional modeling for the solution of selected problems of forensic medical expertise. This approach is illustrated by an example of the reconstruction of the scene of action and circumstances of the injury taking into consideration blood stains.

4272. Pikus, H. J. and P. A. Ball (1995). "Characteristics of cerebral gunshot injuries in the rural setting." Neurosurgery clinics of North America **6**(4): 611-620.

The rural CGW population has not yet undergone the metamorphosis experienced by its urban counterparts. Reminiscent of a past era, suicides far outweight homicides. Although many rural firearm injuries involve hunting accidents, these comprise only a small fraction of CGW at best. Similarly, although many rural firearm injuries involve shotguns or rifles, few CGW result from these weapons. Although the number of patients is small, those with shotgun or rifle injuries manifest lower mortality rates. The authors have confirmed the notion that caliber of civilian weapons is difficult to correlate with outcome. The geographic size of the rural catchment area is an important consideration because it must select a population able to withstand transfer. The authors noted an inverse relationship between length of time before arrival at the facility and mortality. The selection phenomenon probably accounts for the reduced mortality found in the authors series versus most others. Prognostic features of individual gunshot wounds are likely to be similar among varied populations when circumstances of the injury are matched. Thus, one expects similar features on initial examination and CT scan to have similar predictive value. The authors confirmed that CGS and specific deficits were strong predictors of outcome. No patient with a GCS score of 5 or less on admission survived. Absent pupillary response, absent brain stem function, presence of respiratory drive or cough only, and posturing were strong indicators of impending death. The authors confirmed the prognostic value associated with CT evidence of intraventricular hemorrhage, transventricular trajectory, transtentorial herniation, massive edema, and bihemispheric injury. Interestingly, presence of extensive facial fractures, an indicator of trajectory, suggested better outcome. Subarachnoid hemorrhage did not reach prognostic significance. Roughly half of the authors' patients had positive serum ethanol levels, although the test was unable to discern prognosis. Abnormality of any coagulation parameter and frank disseminated intravascular coagulation were correlated with poor outcome. Likewise, thrombocytopenia occurring within the first 24 hours was an indicator of poor prognosis. Although prophylactic antibiotics were not used in all cases, the authors encountered no deep or superficial infections in surviving patients. The prevalence of seizures in the authors' series despite prophylactic AED is unusually high. This feature merits further study.

4273. Pilarczyk, K., et al. (2017). "Does Traumatic Donor Cause of Death Influence Outcome after Lung Transplantation? A Single-Centre Analysis." The Thoracic and cardiovascular surgeon **65**(5): 395-402.

Background Owing to the shortage of donor organs in lung transplantation (LuTX), liberalization of donor selection criteria has been proposed. However, some studies suggested that donor traumatic brain damage might influence posttransplantation allograft function. This article aimed to investigate the association of donor cause of death (DCD) and outcome after LuTX. Methods A retrospective analysis of 186 consecutive double LuTXs at our institution from January 2000 to December 2008 was performed. DCD was categorized into traumatic brain injury (TBI) and nontraumatic brain injury (NTBI). In addition, NTBI was sub classified as spontaneous intracerebral bleeding (B), hypoxic brain damage (H), and intracerebral neoplasia (N). Results DCD was classified as TBI in 50 patients (26.9%) and NTBI in 136 patients (73.1%): B in 112 patients (60.2%), H in 21 patients (11.3%), and N in 3 patients (1.6%). Young male donors predominated in group TBI (mean age 36.0 +/- 14.5 vs. 42.8 +/- 10.7, $p < 0.01$; 29 males in the TBI group [58.0%] vs. 48 males in the NTBI group [35.3%], $p < 0.01$). Groups of DCD did not differ significantly by recipient age or gender, recipient diagnosis, donor ventilation time, or paO2/FiO2 before harvesting. TBI donors received significantly more blood (3.4 +/- 3.8 vs. 1.8 +/- 1.9, $p = 0.03$). A chest trauma was evident only in group T (n = 7 [3.7%] vs. 0 [0%], $p < 0.001$). Mode of donor death did not affect the following indices of graft function: length of postoperative ventilation, paO2/FiO2 ratio up to 48 hours, and lung function up to 36 months. One- and three-year survival was comparable with 84.4 and 70.4% for TBI donors versus 89.4% and 69.2% for NTBI donors. Five-year survival tended to be lower in the TBI group but did not reach statistical significance (43.4 vs. 53.9%). Conclusion This study indicates that traumatic DCD does not affect outcome after LuTX. These results can be achieved with an ideal donor management combined with an individual case-to-case evaluation by an experienced LuTX surgeon. Copyright Georg Thieme Verlag KG Stuttgart . New York.

4274. Pilipenko, G., et al. (2020). "RESULTS OF BRAIN INJURY PRIMARY SURGICAL TREATMENT IN A COMPLEX CARE FOR PATIENTS WITH COMBAT-RELATED PENETRATING CRANIOCEREBRAL GUNSHOT WOUND AT A SPECIALIZED MEDICAL FACILITY." Georgian medical news(301): 13-20.

The aim of the study is to justify the "balanced" approach to brain debridement (BD) in surgical treatment of combat-related penetrating craniocerebral gunshot wound (PCGW) patients and assess immediate and long-term treatment results. The analysis of applied surgical BD techniques was performed in PCGW military personnel with admission Glasgow Coma Scale (GCS) score of 4 or above. The study included 81 injured patients. Average GCS score at

admission was 10+/-3. Blunt injuries were predominant (n=51, 62.9%). Bone fragments were removed in 78 (92.8%) and metal foreign bodies were removed in 32 (38.1%)cases. Demographic and clinical characteristics, nature of brain injury, presence of foreign bodies and depth of their location, surgery extent, and occurrence of complications in postoperative period were taken into account. The outcome data included a Glasgow Outcome Scale (GOS) score at discharge, in 6 and 12 months, grade of speech disorders, extremities strength, and occurrence of convulsive attacks from the time of admission to 12 months. Meningitis developed in 11 (13.6%) cases. 11 (13.6%) patients died. Good recovery (GOS score 4-5) in 12 months was in 8 (38.1%) patients, moderate disability (GOS score 4) in 10 (47.6%) patients. Adverse outcome (GOS score 1-3) was associated with axial dislocation (p=0.015), diametric wound (p<0.001), and purulent-septic complications (PSC) (p<0.05). Intracranial PSCs are statistically significantly associated with duration of subdural space inflow and outflow drainage of 4+ days (p<0.05), bone fragments left in the brain matter (p=0.008), and ventricular hemorrhage on HCT (p=0.016). The choice of a BD technique depended on severity of patient's condition, brain injury, and presence of foreign bodies. Availability of an equipped operating room allowed for thorough surgery. Good outcome indicators testify to appropriateness of the chosen tactic.

4275. Pillgram-Larsen, J., et al. (1992). "[Injuries from mines]." Mineskader. **112**(17): 2183-2187.

In autumn 1991, 157 patients injured by mine explosions were taken care of by a Norwegian military medical unit attached to the United Nations mission in the demilitarized zone between Iraq and Kuwait. 146 of the patients were seen during a three week period of Iraqi mine harvesting in the desert. The detachment worked according to the principles of a second echelon surgical installation. The patients were operated upon if necessary, stabilized and evacuated to Iraqi hospitals. 20 patients in all (13%) died primarily. Four of 109 patients evacuated to the field hospital died (4%). 68 patients had major amputations, in seven of them two extremities were blown off. One patient had an open chest wound, two had tracheal puncture wounds, and one had penetrating head injury. 27 patients had eye injuries, 13 of which were penetrating. 64 major surgical procedures were performed. When evacuation times are long after mine injuries, approximately six hours, almost only patients with injuries to the extremities can be expected to reach hospital for treatment. The pattern of injury was regular, with crushed extremities, amputations and damaged eyes.

4276. Pilo, B., et al. (2011). "Concentric visual field defect related to spontaneous intracranial hypotension." Neuro-Ophthalmology **35**: S70.

INTRODUCTION: Spontaneous intracranial hypotension (SIH) is a rare syndrome characterized by postural headache associated with a low cerebrospinal fluid pressure without a history of dural puncture or penetrating trauma. Cranial MRI typically shows diffuse pachymeningeal gadolinium enhancement, subdural fluid collections or dilatation of epidural veins evidence of descent of the brain. Visual signs and symptoms have been described infrequently in patients with SIH. These include sixth nerve palsy, superior nasal quadrantanopia and temporal hemianopia. OBJECTIVE: To report a case of this condition. RESULTS: A 34 year-old woman who presented with a two-year history of orthostatic headache, rhinorrhea, gait ataxia and a bilateral concentric visual field defect. She had no past history of trauma, sinus surgery or intracranial surgery. Cranial MRI was normal. Neuro-ophthalmological examination ruled out any other causes of concentric visual field defects. Lumbar puncture showed a CSF opening pressure of 9 cm of water. Radioisotope cisternography suggested a dural leak at cribiform plate. CT of the paranasal sinuses only showed a hypoplastic right frontal sinus. The cribiform plate region was repaired with improvement of all symptoms. CONCLUSION: SIH should be included in the differential diagnosis of a bilateral concentric visual field defect.

4277. Pinckers, A., et al. (1983). "The EOG in unilateral eye disease: injuries." Graefe's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle Ophthalmologie **220**(2): 87-91.

In unilateral injuries, the tap to the eye by a penetrating foreign body is sufficient to depress the electro-oculogram (EOG). Total recovery is time-consuming. During the recovery period, complications such as siderosis and detachment may arise, acting with predilection on the light-sensitive EOG component. Blunt traumata and possibly surgical opening of the eyeball predominantly decrease the light-insensitive component of the EOG.

4278. Pineda, J. A., et al. (2012). "Impact of pediatric neurocritical care on traumatic brain injury outcomes." Journal of neurotrauma **29**(10): A146.

Introduction Traumatic brain injury is a leading cause of death and disability in children. The impact of neurocritical care on outcome is largely unknown. The objective of this study was to determine whether implementation of a pediatric neurocritical care team improved outcome for children with severe traumatic brain injury. Methods Retrospective cohort study. Two 6-year intervals before and after implementation of the neurocritical care team were analyzed. Participants included children age 3 to 219 months (0-18 years) consecutively admitted to the Pediatric Intensive Care Unit with severe traumatic brain injury (Glasgow Coma Scale Score ≤ 8). Exclusion criteria:gunshot wound to the head, non-accidental trauma, cardiac arrest prior to ICU admission, and GCS = 3 + fixed and dilated pupils on admission. The primary outcome was disposition at hospital discharge. Secondary outcomes included the Glasgow Outcome Scale score at hospital discharge and length of ICU and hospital stay. Results Implementation of the neurocritical care team improved outcome despite no changes in discharge practices per degree of disability. This improvement included a 72% reduction in mortality and improved disposition at hospital discharge for survivors. There was no difference in age, gender, mechanism of injury and severity of injury between the two groups. There was no difference in secondary outcomes. Conclusions Implementation of a neurocritical care team improved outcome in children with severe traumatic brain injury. Further studies are needed to identify best clinical practices and their impact on long term outcomes.

4279. Ping, X., et al. (2014). "PEG-PDLLA micelle treatment improves axonal function of the corpus callosum following traumatic brain injury." Journal of neurotrauma **31**(13): 1172-1179.

The initial pathological changes of diffuse axonal injury following traumatic brain injury (TBI) include membrane disruption and loss of ionic homeostasis, which further lead to dysfunction of axonal conduction and axon disconnection. Resealing the axolemma is therefore a potential therapeutic strategy for the early treatment of TBI. Monomethoxy poly (ethylene glycol)-poly (D, L-lactic acid) di-block copolymer micelles (mPEG-PDLLA) have been shown to restore depressed compound action potentials (CAPs) of spinal axons and promote functional recovery after spinal cord injury. Here, we evaluate the effect of the micelles on repairing the injured cortical axons following TBI. Adult mice subjected to controlled cortical impact (CCI) were treated with intravenous injection of the micelles at 0 h or 4 h after injury. Evoked CAPs were recorded from the corpus callosum of coronal cortical slices at 2 days after injury. The CCI caused significant decreases in the amplitudes of two CAP peaks that were respectively generated by the faster myelinated axons and slower unmyelinated axons. Micelle treatment at both 0 h and 4 h after CCI resulted in significant increases in both CAP peak amplitudes. Injection of fluorescent dye-labeled micelles revealed high fluorescent staining in cortical gray and white matters underneath the impact site. Labeling membrane-perforated neurons by injecting a membrane impermeable dye Texas Red-labeled dextran into lateral ventricles at 2 h post-CCI revealed that immediate micelle injection after CCI did not reduce the number of dye-stained cortical neurons and dentate granule cells of the hippocampus, indicating its ineffectiveness in repairing plasma membrane of neuronal somata. We conclude that intravenous administration of mPEG-PDLLA micelles immediately or at 4 h after TBI allows brain penetration via the compromised blood brain-barrier, and thereby improves the function of both myelinated and unmyelinated axons of the corpus callosum.

4280. Pingarrón-Martín, L., et al. (2015). "Experience with mandibular reconstruction using transport-disc-distraction osteogenesis." Craniomaxillofacial Trauma and Reconstruction **8**(2): 117-122.

The goal of transport-disc-distraction osteogenesis (TDDO) is to restore bone continuity by using in-situ bone. It may be useful following trauma, gunshot injuries, or tumor ablation, especially when there may be contraindications at the donor site or for prolonged surgery. To the best of the authors' knowledge, this is the first time TDDO has been used for mandibular reconstruction reporting additional procedures, which include osseointegrated dental implants rehabilitation and orthognathic surgery. A retrospective study is performed analyzing all mandibular reconstruction cases that may be suitable for distraction from January 2006 to December 2011. A thorough description of the documented cases includes details about sex, gender, complications, duration of hospitalization, etiology, size, and location of the defect. Eight cases of mandibular reconstruction were included. Six cases correspond to mandibular ameloblastoma. The remaining two cases were mandibular gunshot comminuted fractures. Range of the defects was from 45 to 60 mm. Length of the transport disc was 15 to 20 mm. Protocolized technique consisted of 5 days of latency period, 19 to 45 days of activation term (average 30 days), and 8 to 12 weeks for consolidation. Mean distraction length

achieved was 40.45 mm. We can conclude that TDDO is an alternative to conventional and more invasive procedures, when we face severe segmental mandibular defects reconstruction. It shows the potential to restore a better anatomical bone regeneration, also providing soft tissues and reducing donor-site morbidity. Patients' education and awareness about the proper use of the transport-disc-distraction device is important to optimize functional outcomes.

4281. Pinna, B. R., et al. (2004). "Traumatic facial paralysis's study: Clinical and surgical review." Revista Brasileira de Otorrinolaringologia **70**(4): 479-482.

Traumatic facial paralysis is the second more common cause of facial impairment. Study design: Chart review. Material and method: A retrospective review of 82 patients with facial paralysis was conducted from January 1990 to January 1999. Results: From this group 54 were males (65.8%) and 28 females (34.2%), patients' age ranged from 2 to 75 years (mean age 30.9 y). The kind of trauma was iatrogenic in 15 (18.22%); penetrating injuries into the face in 2 (2.44%); temporal bone fractures in 50 (60.97%); gunshot injuries in 14 (17.07%) and birth injury in 1 (1.22%). There were 71 sudden paralysis (86.5%), 10 progressive paralysis (12.3%) and 1 at birth (1.22%). The beginning electrical tests were symmetrical in 32 (43.84%) and with markedly decreased response in 41 (56.16%). The symmetrical ones had complete recovery in 24, 80% of recovery in 6 and 60% of recovery in 2; the asymmetrical ones with decreased response, only 5 recoveries completely. Conclusion: 1. There was greater male incidence; 2. There were more sudden paralysis and they recovered better than the progressives; 3. There were more patients with temporal trauma with fractures and they recovery better than the others; 4. The electrical tests could give the prognoses to the facial paralysis patient; 5. The worst cases of facial paralysis received more aggressive treatment, with good results.

4282. Piotrowski, W. P. (1992). "[Results of treatment of brain gunshot injuries]." Behandlungsergebnisse nach Hirnschussen. **95**(2): 74-77.

Craniocerebral missile injuries are a relatively rare type of head injury during peacetime. In the Department of Neurosurgery of the Landesnervenklinik Salzburg 72 patients were operated on for gunshot wounds of the brain in the period 1970-1990, and 31 survived. In the same period 6763 patients were treated for other head injuries. As shown by the clinical courses and the operative results, the velocity and thus the extent of the primary brain damage determine the prospects of success in the treatment of cerebral missile injuries.

4283. Pircher, R., et al. (2014). "Muzzle imprint mark: a patterned injury which may be constituted of intradermal blood extravasations." Forensic science international **244**: 166-169.

The muzzle imprint mark in contact shots is usually regarded as a patterned pressure abrasion depicting the barrel end as well as adjacent constructional components of the weapon. Due to parching after exposure to air, the affected skin assumes a brown color, especially along the contours of the impacting structures. Apart from this well-known type of epidermal damage, the imprint mark may also be formed by intradermal hemorrhages. In some cases, these intracutaneous bleedings manifest themselves as circular, curved or straight reddish lines mirroring the surface relief of the weapon's muzzle end. To estimate the frequency of skin hematomas in muzzle imprints, 35 consecutive contact shots to the head (temple, forehead, submental and occipital region) were evaluated. In 3 cases, the muzzle imprint mark exclusively consisted of intracutaneous bruises surrounding the bullet entrance hole. In 14 cases, the muzzle imprint was composed of both excoriations and intradermal hematomas.

4284. Pircher, R., et al. (2017). "Suicide with two makes of captive-bolt guns (livestock stunners) fired simultaneously to the forehead." International journal of legal medicine **131**(6): 1557-1564.

In humans, most fatalities from slaughterer's guns are suicides committed by persons familiar with stunning devices. The great majority of cases accounts for shots to the head, especially the frontal region. Only a small number of two subsequent cranial shots from captive-bolt humane killers have been reported up to now. In the case presented by the authors, a suicide by simultaneous shots to the head fired from two different makes of captive-bolt guns (one of them having two separate outlets for the combustion gases in the muzzle plane, the other type having no additional openings) is described for the first time. One of the shooting devices remained in firm contact with the left hand and

produced patterned staining from rust corresponding to the surface relief of the gun. The medicolegal and criminalistic aspects of this unique case are discussed with reference to the pertinent literature.

4285. Pircher, R., et al. (2019). "Rearward movement of the slide in semi-automatic pistols: a factor potentially influencing the configuration of muzzle imprint marks in contact shots." International journal of legal medicine **133**(1): 169-176.

A muzzle imprint mark is a highly diagnostic finding, which indicates a contact shot. In many cases, it also provides additional information on the type of the weapon used and on the way in which it was held at the time of firing. In semi-automatic pistols, some constructional elements constituting the muzzle plane move to the rear together with the slide, which may prevent them from causing a corresponding imprint close to the bullet entrance hole. The present study comprises 30 consecutive autopsy cases of fatal contact shots to the head inflicted with semi-automatic pistols. The imprint marks accompanying the entrance wounds were compared with the muzzle ends of the respective weapons both before and after retracting the slide. It turned out that in a considerable number of cases (3 out of 30), the retractable parts were not depicted or only to a minor degree as components of the imprint mark. In order to validate the presumed correlation, experimental shots were fired to composite models using pistols in which the movable and the stationary parts forming the muzzle plane were dyed with different paints. Thus, it could be demonstrated that the muzzle imprint preferentially mirrors the front sides of the stationary parts such as the barrel end, the recoil guide, and the gun housing. Immediately after discharge, the slide and the ballooning skin of the bullet entrance site move in the same direction. The stationary parts of the weapon block the expansion of the skin bulging towards the muzzle, so that the skin gets firmly pressed against them. The dynamic interaction between the gun and the entrance region resulting in a characteristic imprint mark could be visualized by the use of a high-speed motion camera recording test shots to different composite models.

4286. Pires, M. S. M., et al. (2013). "An interesting case of gunshot injury to the temporomandibular joint." Craniomaxillofacial Trauma and Reconstruction **8**(1): 79-82.

The head and face are relatively common sites of gunshot injury, and the temporomandibular joint is often affected. These wounds usually produce major deformity and functional impairment, particularly when the temporomandibular joint is affected or when structures such as the facial nerve are damaged. Complications may include mandibular displacement at maximum mouth opening and in protrusion, limited mouth opening, limited lateral movement of the jaw, anterior open bite, and, more rarely, temporomandibular ankylosis. Projectiles that strike the mandible usually cause comminuted fractures; maxillary wounds, in turn, are most commonly perforating. The present report describes a case of gunshot injury in which the projectile lodged within the mandibular fossa but did not cause any fractures. Oral and maxillofacial trauma surgeons must be aware of the different types of gunshot injury, as they produce distinct patterns of tissue destruction due to projectile trajectory and release of kinetic energy into surrounding tissue.

4287. Pistner, H., et al. (1994). "[Microsurgical scapula transplants for reconstruction of the facial skull--experiences with 44 patients]." Mikrochirurgische Scapulatransplantate zur Rekonstruktion des Gesichtsschadels--Erfahrungen mit 44 Patienten. **39**: 122-126.

Great versatility gives composed scapular flaps a particular significance for the reconstruction of defects in face and skull: According to individual requirements one up to five separate elements may be transferred with one vascular pedicle. Anatomical studies of 120 scapulas measured a mean length of 13.4 cm and a mean diameter of 1.2 cm of the lateral margin offering sufficient bone for most indications in the visceral skull. Up to three cutaneous flaps may cover nearly every defect in the head. 44 patients were treated in the years 1989 to 1993 using scapular flaps, most of them combinations consisting of bone and skin elements. In two patients a so called 4-in-1-flap was transferred including the latissimus-dorsi-flap. All donor sites could be closed primarily. Venous thrombosis caused one loss of a flap. Infections healed without sequelae. Medical gymnastics brought full rehabilitation of the donor site within 6 months.

4288. Pitlyk, P. J. (1983). "Removal of retained bone fragments." Journal of neurosurgery **58**(4): 624-625.

4289. Pitsika, M. and V. Tsitouras (2013). "Cerebellar mutism." Journal of neurosurgery. Pediatrics **12**(6): 604-614.

Mutism of cerebellar origin is a well-described clinical entity that complicates operations for posterior fossa tumors, especially in children. This review focuses on the current understanding of principal pathophysiological aspects and risk factors, epidemiology, clinical characteristics, treatment strategies, and outcome considerations. The PubMed database was searched using the term cerebellar mutism and relevant definitions to identify publications in the English-language literature. Pertinent publications were selected from the reference lists of the previously identified articles. Over the last few years an increasing number of prospective studies and reviews have provided valuable information regarding the cerebellar mutism syndrome. Importantly, the clarification of principal terminology that surrounds the wide clinical spectrum of the syndrome results in more focused research and more effective identification of this entity. In children who undergo surgery for medulloblastoma the incidence of cerebellar mutism syndrome was reported to be 24%, and significant risk factors so far are brainstem involvement and midline location of the tumor. The dentate-thalamo-cortical tracts and lesions that affect their integrity are considered significant pathophysiological issues, especially the tract that originates in the right cerebellar hemisphere. Moderate and severe forms of the cerebellar mutism syndrome are the most frequent types during the initial presentation, and the overall neurocognitive outcome is not as favorable as thought in the earlier publications. Advanced neuroimaging techniques could contribute to identification of high-risk patients preoperatively and allow for more effective surgical planning that should focus on maximal tumor resection with minimal risk to important neural structures. Properly designed multicenter trials are needed to provide stronger evidence regarding effective prevention of cerebellar mutism and the best therapeutic approaches for such patients with a combination of pharmacological agents and multidisciplinary speech and behavior augmentation.

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4290. Pittman, D. M. and L. E. Smith (1985). "Complications of colostomy closure." Diseases of the colon and rectum **28**(11): 836-843.

A series of 126 colostomy closures was analyzed to evaluate factors contributing to morbidity. There were no deaths, but there was a 33 percent complication rate. Patients with penetrating abdominal trauma and foreign-body rectal perforations had fewer serious complications following colostomy closures than patients with diverticulitis or cancer. No significant difference was found in the anastomotic leak rate, length of surgery or length of hospitalization in patients with sutured or stapled anastomoses. Most patients in this series had end colostomies that required limited resection and anastomoses. Complication rates were comparable with previous series, which consisted predominantly of loop colostomy closures. The incidence of surgical complications was not related to the time interval between colostomy formation and closure. Timing of closure, however, significantly influenced the complication rate in two specific patient groups: patients with intraperitoneal colon perforation at the initial procedure when closure was performed within four weeks, and patients with surgical complications at the time of colostomy creation if they underwent closure within eight weeks. Early closures in patients still recovering from colostomy complications were associated with the highest incidence of anastomotic leak. Wound infections at stoma sites were decreased by leaving the skin open. The average hospitalization was 11.1 days for patients without complications, 15.5 days for those with wound infection, 18.5 days for patients with ileus, and 20.4 days for patients with anastomotic leaks. This study illustrates that the optimal time for colostomy closure must be determined on an individual basis. The morbidity can be minimized by delaying closure in specific groups of patients for one to two months. Delaying closure for an arbitrary time interval in all patients, however, is not warranted.

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4291. Pitts, W. R. (1946). "The treatment of penetrating wounds of the brain produced by missiles of warfare." The Southern surgeon **12**: 88-109.

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4292. Pizzoni, C. and E. Pierangeli (2008). "Traumatic Brain by gunshot wounds." Rivista Italiana di Neurobiologia **5**(2): 113-120.

Traumatic brain injury (TBI) is the fourth all cause of death in the United States and is the principal cause of death in persons aged 1-44 years. About 2 million TBIs occur each year in the United States. Analysis of the trauma literature has revealed that 50% of all trauma deaths in the United States are secondary to TBI, and gunshot wounds to the head caused 35% of these. TBIs can be divided into non-penetrating, penetrating and perforating injuries. Non-

penetrating injuries include damage of the bone and unbroken meningeal membranes. Penetrating injuries is a wound in which a projectile breaches the cranium but does not exit it, while in perforating injuries there is an exit wound. Despite the incidence of these injuries, the morbidity and mortality of penetrating and perforating head injury remain high. Improvements in the understanding of the mechanisms of TBI and aggressive medical and surgical management of patients with these injuries may conduct to improved outcomes. This work focuses on the pathophysiology of both primary and secondary mechanisms of injury, describes the treatment of patients and concludes with a list of possible complications and patient outcome.

4293. Plackett, T. P., et al. (2015). "Re-evaluating the need for hospital admission and observation of pediatric traumatic brain injury after a normal head CT." Journal of pediatric surgery **50**(10): 1758-1761.

There is no consensus on the optimal management of pediatric patients with suspected trauma brain injury and a normal head CT. This study characterizes the clinical outcomes of patients with a normal initial CT scan of the head. A retrospective chart review of pediatric blunt trauma patients who underwent head CT for closed head injury at two trauma centers was performed. Charts were reviewed for demographics, neurologic function, CT findings, and complications. 631 blunt pediatric trauma patients underwent a head CT. 63% had a negative CT, 7% had a non-displaced skull fracture, and 31% had an intracranial hemorrhage and/or displaced skull fracture. For patients without intracranial injury, the mean age was 8 years, mean ISS was 5, and 92% had a GCS of 13-15 on arrival. All patients with an initial GCS of 13-15 and no intracranial injury were eventually discharged to home with a normal neurologic exam and no patient required craniotomy. Not admitting those children with an initial GCS of 13-15, normal CT scan, and no other injuries would have saved 1.8 +/- 1.5 hospital days per patient. Pediatric patients who have sustained head trauma, have a negative CT scan, and present with a GCS 13-15 can safely be discharged home without admission. Copyright Published by Elsevier Inc.

4294. Planas, J. (1984). "The use of a buried wire frame to reduce contracture of grafts." Plastic and reconstructive surgery **74**(6): 798-808.

Contracture following the successful take of a split-thickness cutaneous graft may be difficult to avoid if a force opposite to the contraction cannot be applied. In this paper, a procedure is described in which a wire-frame buried around the graft maintains it expanded during the contractile period.

4295. Plantman, S., et al. (2012). "Characterization of a novel rat model of penetrating traumatic brain injury." Journal of neurotrauma **29**(6): 1219-1232.

A penetrating traumatic brain injury (pTBI) occurs when an object impacts the head with sufficient force to penetrate the skin, skull, and meninges, and inflict injury directly to the brain parenchyma. This type of injury has been notoriously difficult to model in small laboratory animals such as rats or mice. To this end, we have established a novel non-fatal model for pTBI based on a modified air rifle that accelerates a pellet, which in turn impacts a small probe that then causes the injury to the experimental animal's brain. In the present study, we have focused on the acute phase and characterized the tissue destruction, including increasing cavity formation, white matter degeneration, hemorrhage, edema, and gliosis. We also used a battery of behavioral models to examine the neurological outcome, with the most noteworthy finding being impairment of reference memory function. In conclusion, we have described a number of events taking place after pTBI in our model. We expect this model will prove useful in our efforts to unravel the biological events underlying injury and regeneration after pTBI and possibly serve as a useful animal model in the development of novel therapeutic and diagnostic approaches.

4296. Plantman, S., et al. (2014). "A novel mouse model of penetrating TBI." Journal of neurotrauma **31**(5): A25.

A penetrating traumatic brain injury (pTBI) occurs when an object hits the head with sufficient force to penetrate the skin, skull, and meninges, and inflict injury directly to the brain parenchyma. This type of injury has been notoriously difficult to model in small laboratory animals. We recently developed a rat model for pTBI (Plantman et. al. J Neurotrauma 2012 29:1219-32). The present study describes the adaptation of this model for use with mice. Our novel pTBI model is based on a modified air rifle that accelerates a pellet, which in turn hits a small probe that then causes the injury to the animal's brain. The speed and depth of penetration is controlled by adjusting the loading pressure in the

air-rifle. The present study includes a technical characterization of issues such as the relationship between loading pressure and depth of penetration. Further, we have characterized the tissue destruction, including increasing cavity formation, neuronal degeneration, blood-brain barrier defects, and gliosis. We also evaluated basic outcome measures (survival, weight gain and performance on rotarod). We expect this model will prove useful in our efforts to unravel the biological events underlying injury and regeneration after pTBI.

4297. Platt, A., et al. (2020). "Cranial Vault Reconstruction and Evacuation of Hemorrhage After a Bifrontal Gunshot Wound to the Brain." World neurosurgery **138**: 408-410.

Civilian gunshot wounds to the brain are associated with high overall mortality; however, outcomes can vary significantly depending on bullet trajectory. This report details the outcome of a patient who sustained a bifrontal gunshot wound with multiple associated calvarial and frontal sinus fractures. Although surgery for penetrating brain injury is most frequently employed for relief of mass effect and decompression of vital structures, this case report describes a more comprehensive technique involving duroplasty, obliteration of the frontal sinus, and cranial vault reconstruction with the aim of decreasing the rate of cerebrospinal fluid leak, infection, reoperation, and readmission.

4298. Platt, S. (2005). "Evaluation and treatment of the head trauma patient." In Practice **27**(1): 31-35.

Severe head trauma is associated with high mortality, with death often resulting from progressive increases in intracranial pressure. Brain injury in dogs and cats is most frequently caused by road traffic accidents, but can also be due to falls, kicks, gunshot wounds and animal bites. Appropriate management of patients with head trauma remains a controversial area in veterinary medicine because of a lack of retrospective studies evaluating treatment approaches for dogs and cats with similar injuries. Notwithstanding, management of affected cases must be immediate if the animal is to recover to a level that is both functional and acceptable to the owner. The first veterinary surgeon to deal with an animal suffering from brain injuries following an inciting traumatic event will dictate that patient's fate! It is important to be aware of the optimal way to assess head trauma cases before making treatment decisions. Many dogs and cats can indeed recover from severe brain injuries if treatable systemic and neurological abnormalities are identified promptly. This article discusses current recommendations for optimising the chances of success for such patients.

4299. Platz, A., et al. (1995). "[Outcome after craniocerebral gunshot injury]." Outcome nach Schadelschussverletzung.(2): 118-121.

Gunshot wounds to the head have a high morbidity and mortality [1, 2, 3, 4, 5]. In our areas this kind of injury is rarely seen, being mostly due to attempted suicide [6]. To help determine the optimal management of patients with penetrating GSW to the head, retrospective experience with 47 patients from 1986 to 1993 is presented. Due to our experiences we provide the following treatment of patients with craniocerebral gunshot wounds: After a short neurological examination and the stabilization of the vital parameters, we do further examination with skull X-ray and a CT. With these informations we decide about the further treatment: We operate patients with stable vital signs, with GCS higher than 3, as long the ventricular system is not involved. 18 patients survived the injury. The currently living 16 patients were examined and checked concerning outcome after GSW to the head. 11 of 16 patients had a GOS 4 or 5. The remaining 5 patients are dependent on permanent help.

4300. Plotkin, A., et al. (2020). "Penetrating Carotid Artery Injury: Epidemiology, Predictors of Associated Injury, and Repair Technique." Journal of the American College of Surgeons **231**(4): S352.

Introduction: Penetrating carotid artery injury (PCAI) is significantly morbid and deadly, often presenting in extremis with associated injury and central nervous system (CNS) deficit. Repair may be challenging, with arterial reconstruction vs ligation role poorly defined. This study evaluates contemporary outcomes and management of PCAI. Methods: Penetrating carotid artery injury patients in the National Trauma Data Bank from 2007 to 2015 were analyzed. Outcomes were compared between repair and ligation groups after additionally excluding external carotid injury (ECI) and concomitant jugular vein injury (JVI). Primary endpoints were in-hospital mortality and stroke. Secondary endpoints were associated injury frequency and operative management. Results: There were 3,536 PCAI (58.5% gunshot wounds, 41.5% stab wounds). Gunshot wounds more frequently had associated brain (46.1% vs. 16.7%, p <0.001) and spinal cord

(8.6% vs 1.5%, p < 0.001) injury; stab wounds more frequently had JVI (18.8% vs 26.5%, p < 0.001). In-hospital mortality was 17.8% and stroke rate was 6.4%. After excluding ECI and concomitant JVI, 163 underwent ligation and 59 had operative repair. Ligation patients had lower presenting Glasgow Coma Scale scores (8 vs 14, p = 0.015). Stroke rate was equivalent (11.7% vs 10.2%, p = 0.99); however, in-hospital mortality was higher after ligation (27.4% vs 14%, p = 0.047). On multivariable analysis, ligation was not associated with an increased stroke (Table) or in-hospital mortality. Tachycardia and central nervous system deficit were associated with stroke; Injury Severity Score and Glasgow Coma Scale score were associated with in-hospital mortality. Conclusion: Penetrating carotid artery injury is highly fatal, with a high stroke rate. In this study, carotid repair was not associated with improved stroke rate or death compared with ligation, particularly in patients with high Injury Severity Score and preoperative neurological deficit. [Formula presented]

4301. Pluisch, F. and K. Sellier (1994). "[Does a bone gunshot wound leave pure lead bullet metal residues?]." Fuhrt der Beschuss von Knochen mit Reinblei-KK-Geschossen zu Metallabrieb? **194**(5-6): 155-160.

The objective of the study was to give a survey on the possibilities and limits of reconstruction in cases of gunshot injuries of the vertebral bodies. X-ray examinations of the vertebral column hit by lead bullets of .22 rimfire ammunition regularly revealed small fragments of lead from the missile deposited along the wound track through the bone.

4302. Plurad, D. S., et al. (2021). "The Effect of Trauma Center Verification Level on Outcomes in Traumatic Brain Injury Patients Undergoing Interfacility Transfer." Academic emergency medicine : official journal of the Society for Academic Emergency Medicine **28**(3): 292-299.

BACKGROUND: Previous literature demonstrates increased mortality for traumatic brain injury (TBI) with transfer to a Level II versus Level I trauma center. Our objective was to determine the effect of the most recent American College of Surgeons-Committee on Trauma (ACS-COT) "Resources for the Optimal Care of the Injured Patient" resources manual ("The Orange Book") on outcomes after severe TBI after interfacility transfer to Level I versus Level II center., METHODS: Utilizing the Trauma Quality Program Participant Use File of the American College of Surgeons admission year 2017, we identified patients with isolated TBI undergoing interfacility transfer to either Level I or Level II trauma center. Logistic regression was performed to determine independent associations with mortality., RESULTS: There were 10,268 (71.6%) transferred to a Level I center and 4,025 (28.4%) were transferred to a Level II center. They were mostly male (61.4%) with a mean +/- SD age of 61 +/- 20.8 years. Mean Injury Severity Score was 16.3 +/- 6.3 and most were injured in a single-level fall (51.5%). Patients transferred to a Level I center were less likely to be White (82.3% vs. 84.7%, 0.002) and more likely to have sustained penetrating trauma (2.7% vs. 1.6%, <0.001). The incidence of severe TBI (Glasgow Coma Scale [GCS] = 3-8) was similar (9.3% vs. 8.3%, 0.068). On logistic regression, severity of TBI predicted death; however, there was no difference in adjusted mortality outcome with admission to a Level II versus a Level I center (0.998 [0.836-1.192], 0.985)., CONCLUSIONS: There is no mortality discrepancy in patients with isolated TBI transferred to a Level II versus Level I center despite previous contrary evidence and thus no reason to bypass a Level II in favor of a Level I. This relative improvement potentially relates to the new requirements as defined in the latest version of the ACS-COT's resources manual.

4303. Plymale, J., et al. (2010). "Corrected QT Interval in Children With Brain Death." Pediatric cardiology **31**(7): 1064-1069.

Prolongation of the QT interval is a well-documented finding in adults with severe brain injury. However, QT prolongation has not been well documented in the pediatric population with brain injury. Our objective was to determine the range of QT intervals in children with the diagnosis of brain death, hypothesizing that the QT interval corrected for heart rate (QTc) is longer in this population than in a normal population. All previously healthy children (<18 years) dying in our hospital from 1995 to 2007 with a diagnosis of brain death and at least one electrocardiogram (ECG) with normal anatomy by echocardiogram were included. Admission details, past medical and family history, demographic data, and laboratory data were collected. The QT and preceding RR intervals from three sinus beats on a standard 12-lead ECG were measured. The QTc was calculated with the Bazett method, and the values were averaged. Thirty-seven patients met inclusion criteria. Five had event histories concerning for possible underlying rhythm disturbances; data analysis was performed with and without these patients. The QTc data were normally distributed.

The mean (SD) QTc for the entire cohort was 452 (61) ms. Excluding the five patients, it was 449 (62) ms. On multivariate analysis, sex (QTc female < male) and hypokalemia were associated with QTc prolongation. QTc in children with brain death is normally distributed but significantly longer than QTc in normal children. Until rapid genetic testing for channelopathies is universally available, our findings suggest that potential pediatric cardiac donors with isolated prolongation of the QTc in this setting may be acceptable in the absence of other exclusionary criteria.

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4304. Pniel, D. and T. K. Withers (2018). "A case of multiple nail gun injuries to the head and one to the heart." Surgical neurology international **9**(1).

Background: Nail gun injuries, while uncommon, can present significant treatment challenges. Many are often caused by work-related accidents, they have also been seen in suicide attempts and assaults. Case Description: A 53-year-old male was transferred from a peripheral hospital to a tertiary center after being found confused and with a left-sided weakness. Initial scans showed four nails penetrating the skull, with one additional nail in the pericardium. These all underwent surgical removal, and due to meticulous pre- and perioperative planning, the patient had a largely uneventful recovery. Conclusion: The challenging nature of these injuries requires extensive workup prior to surgical decision-making in order to minimize potential complications.

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4305. Poeppl, W., et al. (2012). "Penetration of doripenem in human brain: an observational microdialysis study in patients with acute brain injury." International journal of antimicrobial agents **39**(4): 343-345.

Concentration-time profiles of unbound doripenem were determined by microdialysis in the cerebral interstitium of five patients with acute brain injury. The ratio of the area under the concentration-time curve in brain to that in plasma (AUC(brain)/AUC(plasma)) was 0.17 in one patient and 0.01 in the remaining four patients. Based on the percentage of the dosing interval during which the doripenem concentration exceeded a certain minimum inhibitory concentration (T>MIC), a value of >=35% of the dosing interval was reached for pathogens with MICs up to 0.05 mg/L. The present data indicate that breakpoints based on concentrations of doripenem in plasma may overestimate antimicrobial activity in brain parenchyma.

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4306. Pogorzelski, G. F., et al. (2018). "Epidemiology, prognostic factors, and outcome of trauma patients admitted in a Brazilian intensive care unit." Open Access Emergency Medicine **10**: 81-88.

Background: Trauma is a major cause of hospital admissions and is associated with manifold complications and high mortality rates. However, data on intensive care unit (ICU) admissions are scarce in developing and low-income countries, where its incidence has been increasing. Objectives: To analyze epidemiological and clinical factors and outcomes in adult trauma patients admitted to the ICU of a public teaching hospital in a developing country as well as to identify risk factors for complications in the ICU. Patients and methods: Retrospective cohort of adult trauma patients admitted to the general ICU of a public teaching hospital in southern Brazil in the year 2012. Demographic, clinical, and outcome data from the ICU were analyzed. Results: During the study period, 144 trauma patients were admitted (83% male, Acute Physiology and Chronic Health Evaluation Score II =18.6±7.2, age =33.3 years, 93% required mechanical ventilation). Of these, 60.4% suffered a traffic accident (52% motorcycle), and 31.2% were victims of violence (aggressions, gunshot wounds, or stabbing); 71% had brain trauma, 37% had chest trauma, and 21% had abdominal trauma. Patients with trauma presented a high incidence of complications, such as infections, acute renal failure, acute respiratory distress syndrome, and thrombocytopenia. The ICU mortality rate was 22.9%. Conclusion: In a Brazilian public teaching ICU, there was a great variability of trauma etiologies (mainly traffic accidents with motorcycles and victims of violence); patients with trauma had a high incidence of complications and mortality in the ICU.

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4307. Pogorzelski, R., et al. (2007). "Surgical treatment for thoracic injuries - One clinic's experience." Polski Przeglad Chirurgiczny **79**(10): 1157-1167.

The aim of the study was to present one clinic's experience in the treatment of thoracic injuries. Particular attention was paid to the methods for treatment of patients after thoracic injuries. Material and methods. During the years 1996-2006, 273 patients with thoracic injuries were hospitalized in the clinic; 0.9% of all patients treated during this time. There were 66 women (24.2%) and 207 men (75.8%), aged 17 to 85 years (average: 34.9). Results. Among all

of the thoracic injuries analyzed, the most common was traffic accidents, which made up 111 (40.7%) cases. Next, accidents of violence made up 87 (31.9%) cases, and accidental falls and falls from heights 62 (22.7%) cases. Rare were self-mutilations, crash traumas and gunshot traumas. Isolated injury was observed in 107 cases, and 166 (60.8%) patients had multifocal trauma and multi-organ injuries. 50 patients (18.3%) had acute, penetrating injuries, and 223 patients (81.7%) had blunt thoracic injuries. During hospitalization, other traumas were diagnosed: rib fractures in 107 cases (39.2%), pleurohematoma in 37 cases (13.6%), pneumothorax in 36 cases (13.2%), pneumohemothorax in 26 cases (9.5%), lung contusion in 43 cases (15.8%), posttraumatic aorta aneurysm in 31 cases (11.4%), and contusion of the heart or great vessels in 8 cases (2.9%). The applied treatment was: pleural cavity drainage in 86 cases (27.8%), immediate thoracotomy in 24 cases (8.8%), laparotomy in 23 cases (8.4%), stent-graft implantation in posttraumatic aneurysms in 30 cases (11%), and other specialized operations in 46 cases (16.9%). Qualified surgical treatment was performed in 176 cases (64.5%) out of 273. Multispecialized treatment was used in 46 cases (16.8%). 16 patients died (5.9%), most directly after admission to the hospital. Conclusions. 1. Over 30% of patients need no surgical treatment after thoracic trauma. 2. The most common coexisting injuries with thoracic trauma are cranio-cerebral injuries and bone fractures. 3. The main cause of death is oligovolemic shock due to heart and great vessels contusion.

4308. Pohlenz, P., et al. (2007). "Clinical indications and perspectives for intraoperative cone-beam computed tomography in oral and maxillofacial surgery." Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics **103**(3): 412-417.

OBJECTIVES: Intraoperative cone-beam computerized tomography (CBCT) imaging has been introduced in oral and maxillofacial surgery. Using midfacial fractures as the pioneer model, this study describes the spectrum of further promising clinical indications for intraoperative CBCT and a clinical combination with intraoperative navigation., STUDY DESIGN: One hundred seventy-nine patients admitted for surgical treatment of the facial skeleton were included in the study. Intraoperatively, 3-dimensional images were generated with the mobile CBCT scanner Arcadis Orbic 3D, obtained from Siemens Medical Solutions, in a variety of indications., RESULTS: The acquisition of the data sets was uncomplicated, and image quality was sufficient to assess the postoperative result in all cases. In the example of a facial gunshot injury, a navigation system for intraoperative localization of the metal foreign bodies was used.

4309. Pohlmann-Eden, B. and J. Bruckmeir (1997). "Predictors and dynamics of posttraumatic epilepsy." Acta neurologica Scandinavica **95**(5): 257-262.

OBJECTIVES: The goal of our study was to identify clinical, neurophysiological and neuroradiological variables in severe head trauma (SHT) with predictive value for posttraumatic epilepsy (PTE) and to evaluate the influence of each risk factor for the dynamics of epilepsy., MATERIALS AND METHODS: We systematically compared 57 PTE patients with 50 age and sex-matched control patients with SHT and no PTE. Mean follow-up was 8 years., RESULTS: Of all PTE-patients 68.5% had their first seizure within 2 years after the trauma. Significant risk factors for PTE were focal signs in the first examination ($P < 0.01$), missile injuries ($P < 0.01$), frontal lesions ($P < 0.01$), intracerebral hemorrhage ($P < 0.01$), diffuse contusion ($P < 0.01$), prolonged posttraumatic amnesia ($P < 0.001$), depression fracture ($P < 0.01$) and cortical-subcortical lesions ($P < 0.001$). The combination of the last 3 variables conferred a particularly high risk for PTE (logistic regression analysis). Combined seizure pattern, high seizure frequency, AED-noncompliance and alcohol abuse predicted poor seizure control., CONCLUSION: The risk for PTE is clearly determined by those variables which correlate with the severity, the extent of tissue loss and the penetrating nature of the brain trauma.

4310. Policicchio, D., et al. (2018). "Delayed diagnosis of post-traumatic aneurysm of distal anterior cerebral artery." Surgical neurology international **9**(1).

Background: Traumatic intracranial aneurysms (TICA) are often associated with poor prognosis and should be diagnosed as soon as possible to prevent delayed intracranial hemorrhage and high rates of morbidity/mortality related to bleeding. Diagnosis requires a high index of suspicion. The goal of treatment is to exclude the aneurysm issue with surgical or endovascular methods. Case Description: We report the case of a 19-year-old boy who suffered a cranio-orbital trauma; 2 weeks after initial trauma he deteriorates with a new intracranial bleeding. Immediate angiography resulted negative. Delayed follow-up by magnetic resonance angiography showed an unruptured aneurysm of anterior cerebral artery that was successfully clipped. Conclusions: A TICA should be suspected in case of delayed deterioration in head-injured patient, prompt diagnosis and treatment could improve prognosis and reduce morbidity and mortality.

4311. Polin, R. S., et al. (1995). "Multivariate analysis and prediction of outcome following penetrating head injury." Neurosurgery clinics of North America **6**(4): 689-699.

Schemes for predicting outcome in craniocerebral missile injury have ranged from Cushing's analysis that was based on the physical characteristics of the injury to complex logistic analyses that incorporate radiographic, laboratory, and clinical data. Generation of predictive scales is discussed, focusing on the utility of the Glasgow Coma Scale (GCS) score at presentation, presence or absence of coagulopathy, and radiographic evidence of the volume and type of tissue damage.

4312. Polkinghorne, P. J. (1996). "Inadvertent perforation of the globe during regional anaesthesia." Australian and New Zealand journal of ophthalmology **24**(1): 43-45.

PURPOSE: This retrospective study was undertaken to review the clinical signs and management of patients with perforating eye injuries associated with regional anaesthesia for ophthalmic surgery., METHODS: Fifteen consecutive patients presenting with inadvertent perforation of the globe were evaluated. Eleven required vitreoretinal surgery. The indications were retinal detachment (six eyes), vitreous haemorrhage (four) and an epiretinal membrane (one eye)., RESULTS: Those eyes with retinal detachments generally had a poor functional outcome in spite of the retinae being attached in five of the six eyes. The operative findings of those eyes with vitreous haemorrhage but attached retina demonstrated varying retinal tear configurations., CONCLUSIONS: Eyes with perforating injuries following intraorbital anaesthesia are at risk of developing a retinal detachment. In those eyes presenting with dense vitreous but attached retina, consideration of vitrectomy and laser photocoagulation is advised.

4313. Pollak, S. and I. Wieser (1988). "[Teeth as an intermediate target--a cause for rapid disintegration of the full metal-jacketed bullets used by the military]." Zahne als Zwischenziel--eine Ursache fur die rasche Zerlegung von militarisch verwendeten Vollmantelgeschossen. **100**(22): 729-733.

Sharp-pointed full metal-jacketed bullets fired from assault rifles are expected to have a low tendency of deformation or destruction within biological tissues. In principle this also should apply to small calibre projectiles .223. If a bullet penetrates the oral region, contact with teeth can cause early break up and even total disintegration of the projectile. Under such circumstances the fragments are possibly retained within the body. A case of accidental gunshot injury to the head inflicted with an assault rifle AUG Steyr. 223 of the Austrian army serves to demonstrate and discuss the wound ballistic effects in relation to the altered behaviour of the projectile. Analogous findings were reproduced in experimental models.

4314. Pollanen, M. S., et al. (1992). "Fracture of temporal bone with exsanguination: pathology and mechanism." The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques **19**(2): 196-200.

Eight cases of basal skull fracture with transverse fracture of the petrous temporal bone with medial extension to the internal carotid artery and lateral extension of the structures of the middle ear are described. Injuries in all cases were due to major blunt impact to the head usually occurring in a motor vehicle accident. General autopsy revealed major blood loss without any obvious external or internal site of hemorrhage suggesting that exsanguination was a complication of the head injury. The internal carotid arteries at the most medial extension of the fractures were lacerated or transected in all cases. In selected cases, the cervical internal carotid arteries were perfused and perfusate escaped rapidly from the ear(s) with the majority of fluid bypassing the cerebral venous system. Magnetic resonance image reconstruction of sequential sections of the fractured base of the skull confirmed the laceration of the internal carotid arteries and disruption of the middle ear. Based on this evidence, we propose that some displaced fractures of the base of the skull produce carotid-middle ear continuities which act as arterial shunts, resulting in rapid fatal exsanguination through the ear.

4315. Pollard, Z. F. (1990). "Accommodative esotropia after ocular and head injury." American journal of ophthalmology **109**(2): 195-198.

Five children lost their ability for motor fusion after traumatic injury to either the eye or head. All patients had the onset of accommodative esotropia within two months of the traumatic episode. The ocular alignment of each child was controlled by the use of spectacles that corrected the accommodative requirements. These patients are unique because they did not show any evidence of accommodative esotropia before their injuries. One child developed accommodative esotropia with a high ratio of accommodative convergence to accommodation. The use of bifocal spectacles controlled the deviation for this child.

4316. Pollion, P., et al. (2014). "A ten years old child with ballistic type of cranial trauma." Revue de Medecine Legale **5**(4): 165-169.

A 10-year old Guadeloupean child suffered from a fall while he played with his friends during carnival time. When the rescue arrived, he had a Glasgow Coma Score 7 with hemiparetic neurological deficit, twitching and vomiting. The external review also noted a millimetre wound of the left eye inner canthus. After orotracheal intubation, he was transferred to the intensive care unit. The CT scan report revealed multiple skull fractures and the presence of two intracranial metal tone foreign bodies, all along a fronto-occipital ballistic path. Despite resuscitation, the child will die from complications of a refractory intracranial hypertension. The medicolegal autopsy confirmed bone and intracranial hemorragic lesions and allowed the removal of the occipital foreign body. By a joint work of investigators, the piece of lead could be identified as a fragment of a ballast used at the extremity of craft whips used during the festival in order to increase their visual and sound effect.

4317. Polushkin, K. D. (1968). "[A case of prolonged presence of a rifle shell casing in the brain]." Sluchai dlitel'nogo nakhozhdeniia rauzheinoi gil'zy v mozgu. **43**(5): 97-98.

4318. Pomara, C., et al. (2012). "Radiological evidence of a modern 'martyr's crown': suicide by multiple self-inflicted nail gun shots." Singapore medical journal **53**(8): e169-171.

A man attempted suicide by shooting seven nails into his head with a nail gun; five in the right temporal region and two in the left. He subsequently presented at the emergency department with complaints of headache. He was found to be oriented in space and time, with no focal neurological deficits. The patient handed the nail gun to the doctors and informed them that he had earlier attempted suicide. Radiological studies showed the presence of nails arranged like a 'martyr's crown'. The man died six days after the surgical removal of the nails. Autopsy was refused by Italian authorities. We conclude that imaging techniques are an adjuvant to forensic medical diagnosis and forensic autopsies.

4319. Pomara, C., et al. (2008). "A medieval murder." The American journal of forensic medicine and pathology **29**(1): 72-74.

On rare occasion, the body or skeleton of a murder victim may be discovered hundreds of years, or even millennia, after the crime. The murder of the 5000-year-old Stone Age man, found frozen in the ice of the Italian Alps, being the most recent example. In most of these cases too much time has passed to allow the application of modern forensic technology. We describe here a homicide that occurred between 1310 and 1390. The victim died of a crossbow injury, with a bolt passing between the 2nd and 3rd vertebrae, completely transecting the brainstem. The crossbow was, for more than 2 and one half centuries (1200-1460), the weapon of choice in European armies, and its use would not have been unusual. The choice of weapon, and other features of the crime, makes it possible to arrive at some reasonable conclusions about the circumstances of the death.

4320. Pons, J., et al. (1977). "[Destruction, of traumatic origin, of the orbito-palpebral region and of the nasal pyramid]." Destruction d'origine traumatique de la region orbito-palpebrale et de la pyramide nasale. **78**(8): 529-533.

Sequelae of nose and orbito-oculo-palpebral destructions from a traumatic origin can present on the therepeutical level under various aspects according to the lesions observed. Accidental damages must indeed be treated by surgical and prosthetic means. The loss of the ocular globe and of its annexes make of these traumatisms an essentially plastic problem, difficult indeed but bringing about satisfactory issues on the whole.

4321. Pooboni, S. K., et al. (2004). "Pneumocephalus in neonatal meningitis: diffuse, necrotizing meningo-encephalitis in Citrobacter meningitis presenting with pneumatosis oculi and pneumocephalus." Pediatric critical care medicine : a journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies **5**(4): 393-395.

UNLABELLED: OBJECTIVE /PATIENT: Gas-containing encephalitis is rarely associated with neonatal meningitis. We report a case of a 19-day-old baby who presented with a rapid onset of septic shock complicated by progressively increasing gas accumulation within the brain and anterior chamber of the eye. We describe the evolution of the clinical picture and the management., INTERVENTIONS: Ventilatory support, fluid resuscitation, and continuous venovenous hemofiltration were provided in view of multiple system failure. Despite effective antibiotic therapy and supportive management, the patient died with worsening accumulation of gas within the brain, resulting in brainstem death., RESULTS: Computed tomographic images were characteristic of diffuse necrotizing meningo-encephalitis. Postmortem examination showed friable brain tissue with venous infarction and extensive gas accumulation. Citrobacter koseri was identified from the blood and cerebrospinal fluid cultures., CONCLUSION: This case re-emphasises the importance of C. koseri as both a community-acquired and nosocomial neonatal pathogen. Radiologic evidence suggestive of diffuse necrotizing meningo-encephalitis in combination with pneumocephalus and pneumatosis oculi in Citrobacter infections has never been described before. Diagnostic imaging with computed tomographic scanning of the brain and initiation of broad-spectrum antibiotics with good penetration into cerebrospinal fluid are indicated as soon as infection with Citrobacter species is suspected clinically, with appearance of pneumatosis oculi as a rare, late finding.

4322. Poole, G. V., et al. (1996). "Laparoscopy in trauma." The Surgical clinics of North America **76**(3): 547-556.

Laparoscopy is a nearly century-old technique that has experienced a resurgence of interest from surgeons since the development of technology that has broadened its applications. Although laparoscopy has been used to evaluate patients with possible abdominal trauma, its use for this purpose is limited by the availability of other diagnostic procedures that may be more suitable for particular circumstances and are more accurate for certain injuries. Laparoscopy is contraindicated in patients who are hypovolemic or hemodynamically unstable and should not be performed in patients with clear indications for celiotomy. It may not be appropriate for patients with cardiac dysfunction, nor for those with significant head injuries who are at risk for intracranial hypertension. Its best applications may be in stable patients with stab wounds or those with tangential gunshot wounds of the abdomen. The likelihood of missing hollow visceral injuries depends upon the indications for conversion to celiotomy. If peritoneal violation or the presence of a small amount of blood in the peritoneal cavity is used as an indication for celiotomy, then the missed injury rate will be low but the unnecessary celiotomy rate will be diminished only slightly compared with a policy of mandatory celiotomy. Excessive enthusiasm for laparoscopy in trauma might result in its use when other diagnostic measures or simple observation are more appropriate. The desire to perform a procedure can be compelling, especially in circumstances in which the general surgeon would not operate upon a patient but simply provide postoperative care after other surgeons have operated. The use of laparoscopy for these purposes can only be condemned, as it increases the costs and risks of care without improving the outcome. The role of laparoscopy in trauma is evolving, and further research into its diagnostic role and therapeutic applications is clearly needed.

4323. Poorman, G. W., et al. (2019). "Traumatic fracture of the pediatric cervical spine: Etiology, epidemiology, concurrent injuries, and an analysis of perioperative outcomes using the kids' inpatient database." International Journal of Spine Surgery **13**(1): 68-78.

Background: The study aimed to characterize trends in incidence, etiology, fracture types, surgical procedures, complications, and concurrent injuries associated with traumatic pediatric cervical fracture using a nationwide database. Methods: The Kids' Inpatient Database (KID) was queried. Trauma cases from 2003 to 2012 were identified, and cervical fracture patients were isolated. Demographics, etiologies, fracture levels, procedures, complications, and concurrent injuries were assessed. The t-tests elucidated significance for continuous variables, and v2 for categoric values. Logistic regressions identified predictors of spinal cord injury (SCI), surgery, any complication, and mortality. Level of significance was P, .05. Results: A total of 11 196 fracture patients were isolated (age, 16.63 years; male, 65.7%; white, 65.4%; adolescent, 55.4%). Incidence significantly increased since 2003 (2003 vs 2012, 2.39% vs 3.12%, respectively), as did Charlson Comorbidity Index (CCI; 2003 vs 2012, 0.2012 vs 0.4408, respectively). Most common etiology was motor

vehicle accidents (50.5%). Infants and children frequently fractured at C2 (closed: 43.1%, 32.9%); adolescents and young adults frequently fractured at C7 (closed: 23.9%, 26.5%). Upper cervical SCI was less common (5.8%) than lower cervical SCI (10.9%). Lower cervical unspecified-SCI, anterior cord syndrome, and other specified SCIs significantly decreased since 2003. Complications were common (acute respiratory distress syndrome, 7.8%; anemia, 6.7%; shock, 3.0%; and mortality, 4.2%), with bowel complications, cauda equina, anemia, and shock rates significantly increasing since 2003. Concurrent injuries were common (15.2% ribs; 14.4% skull; 7.1% pelvis) and have significantly increased since 2003. Predictors of SCI included sports injury and CCI. Predictors of surgery included falls, sports injuries, CCI, length of stay, and SCI. CCI, SCIs, and concurrent injuries were predictors of any complication and mortality, all (P, .001). Conclusions: Since 2003, incidence, complications, concurrent injuries, and fusions have increased. CCI, SCI, falls, and sports injuries were significant predictors of surgical intervention. Decreased mortality and SCI rates may indicate improving emergency medical services and management guidelines. Level of Evidence: III Clinical Relevance: Clinicians should be aware of increased case complexity in the onset of added perioperative complications and concurrent injuries. Cervical fractures resultant of sports injuries should be scrutinized for concurrent SCIs.

4324. Pope, E. J. and O. B. C. Smith (2004). "Identification of traumatic injury in burned cranial bone: an experimental approach." Journal of forensic sciences **49**(3): 431-440.

Interpreting patterns of injury in victims of fire-related deaths poses challenges for forensic investigators. Determining manner of death (accident, suicide or homicide) using charred remains is compounded by the thermal distortion and fragmentation of soft and skeletal tissues. Heat degrades thin cranial structures and obscures the characteristic signatures of perimortem ballistic, blunt, and sharp force trauma in bone, making differentiation from thermal trauma difficult. This study documents the survivability and features of traumatic injury through all stages of burning for soft tissue reduction and organic degradation of cranial bone. Forty cadaver heads were burned in environments simulating forensic fires. Progression of thermal degradation was photographically documented throughout the destructive stages for soft tissues and bone to establish expected burn sequence patterns for the head. In addition to testing intact vaults, a percentage were selectively traumatized to introduce the variables of soft tissue disruption, fractures, impact marks, and incisions throughout the cremation process. Skeletal materials were recovered, reconstructed, and correlated with photographs to discern burn patterns and survivability of traumatic features. This study produced two important results: (1) Identification of preexistent trauma is possible in reconstructed burned cranial bone. Signatures of ballistic (internal and external bevel, secondary fractures), blunt force (impact site, radiating fractures), and sharp force (incisions, stabs, sectioning) survive the cremation process. (2) In non-traumatized specimens, the skull does not explode from steam pressure but does fragment as a result of external forces (collapsed debris, extinguishment methods) and handling. The features of both results are sequentially described throughout the progression of thermal destruction.

4325. Popov, V. S., et al. (1989). "[The use of ultrasonic echotomography in the diagnosis and treatment of intracranial complications of gunshot penetrating wounds of the skull and brain]." Primenenie ul'trazvukovoi ekhotomografii v diagnostike i lechenii vnutricherepnykh oslozhnenii ognestrel'nykh pronikaiushchikh ranenii cherepa i golovnogo mozga.(5): 63.

4326. Popovic, V. (1970). "[2 rare cases of brain injuries by projectile]." Dva retka slucaja ranjavanja mozga projektilom. **27**(3): 120-121.

4327. Porchet, H., et al. (2016). "Pharmacokinetic and safety study of GNbAC1, a humanized monoclonal antibody for multiple sclerosis." European Journal of Neurology **23**: 404.

Introduction: MSRV-Env is a protein of endogenous retroviral origin. This protein is expressed in active brain lesions of multiple sclerosis (MS) patients. Due to its proinflammatory and myelinotoxic effects, MSRV-Env appears as a pertinent target in MS. GNbAC1 is an IgG4 humanized monoclonal antibody (mAB) which neutralises MSRV-Env and prevents cytokine release and the nitrosative stress process in oligodendrocyte precursor cells. Methods: This randomised placebo-controlled doseescalation study evaluated the safety and pharmacokinetics in the plasma and cerebro-spinal fluid (CSF) of GNbAC1 in 21 healthy volunteers at doses of 6, 18, 36mg/kg. Lumbar punctures were

performed at Days 2, 15 and 29 postinfusion. Results: All subjects completed the study. GNbAC1 was well tolerated. All adverse events were mild or moderate in severity. There were no notable dose or treatment related trends in the number or type of adverse events. Pharmacokinetic data show a dose-linear pharmacokinetics in the plasma. The concentration of GNbAC1 in CSF was assessed after intravenous infusion at Day 2, 15, and 29. A mean CSF/serum ratio of 0.12% was observed at Day 2 increasing to 0.39% at Day 15 and 0.42% at Day 29. The pharmacokinetic profile of GNbAC1 in the CSF shows a progressive increase in this compartment up to an equilibrium. Conclusion: GNbAC1 safety at high dose was shown in this study. The CSF pharmacokinetic data show that the brain penetration of GNbAC1 is favourable compared to other mABs. These results paved the way to launch a Phase IIb trial testing GNbAC1 in MS patients.

4328. Porojan, V.-A., et al. (2019). "Traumatic Diaphragmatic Lesions - Considerations Over a Series of 15 Consecutive Cases." Chirurgia (Bucharest, Romania : 1990) **114**(1): 73-82.

Introduction: Diaphragmatic injuries are produced by blunt or penetrating thoracoabdominal trauma. They are potentially life-threatening due to the herniation of abdominal organs into the pleural cavities and severe associated lesions. The aim of this retrospective study was to analyse the clinical presentation and management of patients admitted with diaphragmatic rupture in our institution. Material and Method: We performed a 5-year retrospective study of patients admitted with acute blunt or penetrating diaphragmatic rupture in the Department of General Surgery of "Bagdasar- Arseni" Emergency Hospital. We have studied sex, age, mechanism of trauma, side-location, timeto-diagnosis, concomitant injuries, surgical treatment and outcome. Results: Fifteen patients (8 males, 7 females, mean age: 42 years) with diaphragmatic rupture (left-side: 13, right-side: 2) following blunt (8 patients) or penetrating (7) trauma were included. Patients with blunt diaphragmatic injury had larger tears and abdominal viscera herniation was observed in 6of these cases. A direct suture was performed for all 15 patients. Laparotomy was the surgical approach preferred in most of the cases. Mortality rate was 20%, mainly caused by severe associated lesions. Conclusion : Although traumatic diaphragmatic lesions are frequently associated with severe cerebral and thoraco-abdominal trauma that is also the main cause of death, a prompt diagnosis and treatment can lead to good outcome. Copyright Celsius.

4329. Poroy, C., et al. (2016). "Traumatic globe subluxation and intracranial injury caused by bicycle brake handle." Archives of Trauma Research **5**(3).

Introduction: Penetration of a bicycle brake handle into the orbit is a rare and serious type of trauma. Globe subluxation due to such trauma has not been previously reported. Case Presentation: A 10-year-old girl presented after falling from a bicycle, which resulted in the handbrake penetrating her right upper eyelid. On examination, the globe was subluxated anteriorly, there was no light perception, and the pupilla was fixed and dilated. Radiologic studies revealed orbitonasal fractures, hemorrhage, emphysema in the orbit and cranium, and rupture of the extraocular muscles. The globe was replaced into the orbit with the help of lateral cantholysis and orbital septotomy. During 22 months of follow-up, the globe remained intact, but total loss of vision, blepharoptosis, and extraocular motility restriction persisted. Conclusions: This case and previous reports show that bicycle brake handles can cause severe, penetrating orbital and cerebral traumas that can result in vision loss or fatality. Brake handles should be designed to protect bicyclists from such injuries.

4330. Porri, S., et al. (2013). "Use in rapid administration of specific antibiotic therapy in severe mycoplasma pneumoniae encephalitis." Swiss Medical Weekly **143**: 28S.

Mycoplasma pneumoniae is a well known cause of acute childhood encephalitis, accounting for a significant proportion of cases. It has been associated with a poor prognosis, neurological complications arising in 15-30% of cases and mortality rates as high as 9%. Physiopathological pathways responsible for the neurological manifestations are not clearly understood, but several different mechanisms, either coexiting or not, are most likely involved: direct invasion of the central nervous system, auto-immunity, cytokinemediated inflammatory response, neurotoxin production, vasculopathy. The role of antibiotic therapy in the management of acute Mycoplasma pneumoniae encephalitis remains uncertain. Therapeutic success might depend upon the current clinical stage of the disease, a reflection of the different underlying pathological mechanisms. We report the case of a previously healthy 7-year-old boy with a 7-day history of fever and respiratory symptoms, who presented with sudden onset severe altered level of consciousness and epileptic seizures of bitermporal origin. Evidence of Mycoplasma pneumoniae was obtained by PCR in a throat specimen. High

levels of cytokines Il-6 and Il-8 were measured in the cerebrospinal fluid. Outcome was favourable following the rapid administration of ciprofloxacine, a fluoroquinolone with high bactericidal activity against Mycoplasma pneumoniae as well as good cerebrospinal fluid penetration. The efficiency of this therapeutic strategy suggests the reduction in direct cerebral lesions by Mycoplasma pneumoniae or in the inflammatory response secondary to the elimination of the circulating pathogen. Furthermore, it could enable a reduction in the risk of subsequent indirect neurological lesions.

4331. Porta, D., et al. (2013). "The importance of an anthropological scene of crime investigation in the case of burnt remains in vehicles: 3 case studies." The American journal of forensic medicine and pathology **34**(3): 195-200.

Inspection of a crime scene is a crucial step in forensic medicine, and even the methods taught by forensic anthropology are essential. Whereas a thorough inspection can provide crucial information, an approximate inspection can be useless or even harmful. This study reports 3 cases of burnt bodies found inside vehicles between 2006 and 2009 in the outskirts of Milan (Italy). In all 3 cases, the victim was killed by gunshot, and the body was burnt in the vehicle to destroy signs of skeletal injury and prevent identification. In every case, the assistance of forensic anthropologists was requested, but only after the inspection of the body at autopsy showed that the remains were incomplete, thus making it more difficult to determine the identity, cause, and manner of death. A second scene of crime inspection was therefore performed with strict anthropological and adapted archeological methods by forensic anthropologists to perform a more complete recovery, proving how much material had been left behind. These cases clearly show the importance of a proper recovery and of the application of forensic anthropology methods on badly charred bodies and the importance of recovering every fragment of bone: even the smallest fragment can provide essential information. Thus, a precise coordination, a correct and thorough recovery of bone fragments, and an anthropological approach are crucial for many issues: analysis of the scene of crime, reconstruction of the corpse, and reconstruction of the perimortem events.

4332. Porzionato, A., et al. (2018). "The utility of plastinates in court: a case of firearm homicide." Forensic science, medicine, and pathology **14**(2): 216-220.

Plastination is a technique renowned for its use in the preservation of human tissues or organs, and is mainly employed in anatomical training and in research regarding various scientific fields. The advantages of this method are related to the natural appearance, absence of odor, and easy-handling of the plastinated products. The use of plastinates in forensic sciences, their potential role in personal identification, and their usefulness in interpretation of post-mortem findings has been described, although literature on this topic is poor. The present paper is the first report of a firearm homicide where the brain of the victim was plastinated and presented in court as documentary evidence. Three dimensional examination of the brain during the trial allowed the judge to directly evaluate the pathway of the projectile and to compare it with the information that was presented based on depositions, post mortem data and police investigations, in a more straightforward manner. The important role played by plastination in the reported case in assisting with the final verdict could be a catalyst to extend the use of this technique to other criminal cases.

4333. Posthuma, L. M., et al. (2014). "Thirteen intracranial nails: no neurological and neuropsychological disabilities." Acta neurochirurgica **156**(5): 1021-1023.

4334. Potapov, A. A., et al. (1996). "Late diagnosis and removal of a large wooden foreign body in the cranio-orbital region." The Journal of craniofacial surgery **7**(4): 311-314.

The rare case of a large wooden foreign body impaled in the cranio-orbital region, and its late diagnosis and successful removal, is presented. A 26-year-old man was admitted to a regional hospital after suffering a severe penetrating craniocerebral injury from a motorcycle accident. Two months after the accident, computed tomographic examination at Burdenko Neurosurgical Institute revealed a large foreign body located in the cranio-orbital region and penetrating the right temporal lobe, with surrounding abscess development. Radiological examination, including three-dimensional computed tomography, enables one to choose the optimal surgical approach and to remove the foreign body, thereby avoiding purulent, inflammatory complications.

4335. Potapov, A. A., et al. (1992). "[Prolonged crushing of the head (the biomechanics, clinical picture, diagnosis and treatment)]." Dlitel'noe sdavlenie golovy (biomekhanika, klinika, diagnostika, lechenie).(2-3): 5-12.

Analysis of the victims of the earthquake in Armenia made it possible to distinguish a form of trauma, unique in biomechanics and pathogenesis, which was not described earlier, namely, prolonged compression of the head (PCH). Its clinical picture is characterized by superimposition and mutual aggravation of general organismic, general brain, cerebral and extracerebral focal symptomatology. Variants of the relations of the syndrome of prolonged compression of the soft tissues of the head and the craniocerebral damages proper are described. A detailed CT characterization of PCH is given. The principles of stage treatment of victims and the indications for compelled nonoperative and surgical tactics in PCH are suggested for the first time.

4336. Potapov, A. A., et al. (2015). "[Guidelines for the management of severe head injury. Part 1. Neurotrauma system and neuroimaging]." Zhurnal voprosy neirokhirurgii imeni N. N. Burdenko **79**(6): 100-106.

Traumatic brain injury is one of the main causes of mortality and disability in young and middle-aged individuals. The patients with severe traumatic brain injury who are in coma are the most difficult to deal with. Appropriate diagnosis of the primary brain injuries and early prevention and treatment of secondary damage mechanisms largely determine the possibility of reducing mortality and severe disabling consequences. The authors compiled these guidelines based on their experience in development of international and Russian recommendations on the diagnosis and treatment of mild traumatic brain injury, penetrating gunshot injury of the skull and brain, severe traumatic brain injury, and severe consequences of brain injuries, including a vegetative state. In addition, we used the materials of international and Russian recommendations on the diagnosis, intensive care, and surgical treatment of severe traumatic brain injury published in recent years. The proposed recommendations are related to organization of medical care and diagnosis of severe traumatic brain injury in adults and are primarily addressed to neurosurgeons, neurologists, neuroradiologists, anesthesiologists, and emergency room doctors, who are routinely involved in management of these patients.

4337. Potapov, A. A., et al. (2016). "[Guidelines for the diagnosis and treatment of severe traumatic brain injury. Part 2. Intensive care and neuromonitoring]." Zhurnal voprosy neirokhirurgii imeni N. N. Burdenko **80**(1): 98-106.

Traumatic brain injury (TBI) is one of the major causes of death and disability in young and middle-aged people. The most problematic group is comprised of patients with severe TBI who are in a coma. The adequate diagnosis of primary brain injuries and timely prevention and treatment of the secondary injury mechanisms largely define the possibility of reducing mortality and severe disabling consequences. When developing these guidelines, we used our experience in the development of international and national recommendations for the diagnosis and treatment of mild traumatic brain injury, penetrating gunshot wounds to the skull and brain, severe traumatic brain injury, and severe consequences of brain injuries, including a vegetative state. In addition, we used international and national guidelines for the diagnosis, intensive care, and surgical treatment of severe traumatic brain injury, which had been published in recent years. The proposed guidelines concern intensive care of severe TBI in adults and are particularly intended for neurosurgeons, neurologists, neuroradiologists, anesthesiologists, and intensivists who are routinely involved in the treatment of these patients.

4338. Potapov, A. A., et al. (2014). "[Penetrating head and brain injuries with nonmetal foreign bodies]." Zhurnal voprosy neirokhirurgii imeni N. N. Burdenko **78**(6): 101-106.

Penetrating brain injuries (PBI) are common in neurosurgical practice. Most of them are civil or war-time missile and blast injuries. This type of trauma is widely presented in neurosurgical publication, textbooks and clinical evidence-based guidelines. At the same time, PBI by non-metallic foreign bodies are very rare. All the data are limited to case reports and small series of cases. Moreover, there are no clinical consideration on diagnosis, treatment, complication, outcome and prognosis of PBI by non-metallic penetrating brain injuries. In this review all the data are summarized to provide recommendations on the diagnosis and treatment of PBI by non-metallic foreign bodies.

4339. Potapov, A. A., et al. (1996). "Removal of a cranio-orbital foreign body by a supraorbital-pterion approach." The Journal of craniofacial surgery **7**(3): 224-227.

Foreign body removal in blind, penetrating craniocerebral injuries, especially those involving craniobasal localization, could entail additional brain trauma risk. Under such conditions one can use surgical approaches for tumor removal or clipping of intracranial aneurysms. In this report, we present a case of blind, penetrating craniofacial injury in which a supraorbital-pterion approach for foreign body removal was used. Craniography, carotid angiography, and computed tomography data, including three-dimensional imaging, were taken into consideration while planning the operation.

4340. Potoka, D. A., et al. (2000). "Impact of pediatric trauma centers on mortality in a statewide system." The Journal of trauma **49**(2): 237-245.

BACKGROUND: Regional pediatric trauma centers (PTC) were established to optimize the care of injured children. However, because of the relative shortage of PTC, many injured children continue to be treated at adult trauma centers (ATC). As a result, a growing controversy has evolved regarding the impact of PTC and ATC on outcome for injured children., METHODS: A retrospective analysis of 13,351 injured children entered in the Pennsylvania Trauma Outcome Study between 1993 and 1997 was conducted. Patients were stratified according to mechanism of injury, injury severity, specific organ injury, and type of trauma center: PTC; Level I ATC (ATC I); Level II ATC (ATC II); or ATC with added qualifications to treat children (ATC AQ). Mortality was the major outcome variable measured., RESULTS: Most injured children were treated at a PTC or ATC AQ. The majority of children below 10 years of age were admitted to PTC. Patients treated at PTC and ATC had similar injury severity as determined by median Injury Severity Score, mean Revised Trauma Score, and Glasgow Coma Scale. Overall survival was significantly better at PTC and ATC AQ compared with ATC I and ATC II. Survival for head, spleen, and liver injuries was significantly better at PTC compared with ATC AQ, ATC I, or ATC II. Children who sustained moderate or severe head injuries were more likely to undergo neurosurgical intervention and have a better outcome when treated at a PTC. Despite similar mean Abbreviated Injury Scores for spleen and liver, significantly more children underwent surgical exploration (especially splenectomy) for spleen and liver injuries at ATC compared with PTC., CONCLUSION: Children treated at PTC or ATC AQ have significantly better outcome compared with those treated at ATC. Severely injured children (Injury Severity Score > 15) with head, spleen, or liver injuries had the best overall outcome when treated at PTC. This difference in outcome may be attributable to the approach to operative and nonoperative management of head, liver, and spleen injuries at PTC.

4341. Pottker, T. I., et al. (1997). "Suicide with an air rifle." Annals of emergency medicine **29**(6): 818-820.

We report the case of a 14-year-old boy who committed suicide with the use of an air rifle. We include a brief description of his clinical presentation and course, as well as radiography and autopsy findings. This case represents an uncommon mechanism of suicide with an instrument commonly possessed by adolescents and demonstrates the potential lethality of air rifles. Today's air rifles employ one of three gas-compression systems: pneumatic, spring-air or gas compression. They are capable of generating velocities between 200 and 770 feet/second, enabling pellets or BBs to penetrate skin, soft tissue, and bone. This case also highlights the need for preventive measures, including public education and legislation.

4342. Potts, F. L., 3rd, et al. (1987). "Penetrating head trauma by a boat cleat." North Carolina medical journal **48**(1): 21-22.

4343. Poulos, C. K. and B. L. Peterson (2012). "Two cases of firearm grip impressions on the hands of suicide victims." The American journal of forensic medicine and pathology **33**(1): 61-63.

Many factors are used to help distinguish firearm suicides from homicides and accidents, including range of fire, location of entrance defects, wound path trajectory, backspatter (blowback), and gunshot residue. Specifically, authors have discussed examination of the hands for backspatter, gunshot residue, cylinder gap effects, iron staining, and trauma as means of supporting a person having held a firearm while committing suicide. Here, we discuss 2 cases where suicidal gunshot wounds were accompanied by unique firearm grip impressions on the hands of the decedents. In 1 case, a "negative"[impression of a grip pattern was left in a decedent's hand and in another case a grip pattern was left on the decedent's hand in dried blood. Such impressions can be used to provide support for establishing suicide as the manner of death.

4344. Powers, D. B. and R. I. Delo (2013). "Characteristics of ballistic and blast injuries." Atlas of the oral and maxillofacial surgery clinics of North America **21**(1): 15-24.

Ballistic injury wounds are formed by variable interrelated factors, such as the nature of the tissue, the compositional makeup of the bullet, distance to the target, and the velocity, shape, and mass of the of the projectile. This complex arrangement, with the ultimate outcome dependent on each other, makes the prediction of wounding potential difficult to assess. As the facial features are the component of the body most involved in a patient's personality and interaction with society, preservation of form, cosmesis, and functional outcome should remain the primary goals in the management of ballistic injury. A logical, sequential analysis of the injury patterns to the facial complex is an absolutely necessary component for the treatment of craniomaxillofacial ballistic injuries. Fortunately, these skill sets should be well honed in all craniomaxillofacial surgeons through their exposure to generalized trauma, orthognathic, oncologic, and cosmetic surgery patients. Identification of injured tissues, understanding the functional limitations of these injuries, and preservation of both hard and soft tissues minimizing the need for tissue replacement are paramount.

4345. Powers, D. B., et al. (1998). "Stereolithography: a historical review and indications for use in the management of trauma." The Journal of cranio-maxillofacial trauma **4**(3): 16-23.

BACKGROUND: Stereolithography (SL) is a new adjunct for treatment planning in complex maxillofacial trauma. It uses an argon/ion laser to polymerize acrylic resin models of reformatted computerized tomographic radiographs. SL provides superior anatomical detail and translucency, and it can be sterilized and transported to the operative field, if necessary., DISCUSSION: A review of the historical development of SL technology is presented, along with three clinical cases, showing the advantages of SL models in the treatment of patients with complex maxillofacial trauma., CONCLUSION: SL technology provides superior understanding of anatomic relationships, the ability to perform presurgical simulation of the proposed procedure, preoperative adaptation of biomaterials, decreased time in the operating room and associated patient morbidity, and improved residency training and patient education. The primary disadvantages of SL are availability and cost.

4346. Powitzky, R., et al. (2008). "Spectacular impalement through the face and neck: a case report and literature review." The Journal of trauma **65**(6): E53-57.

4347. Powner, D. J., et al. (1992). "Changes in serum catecholamine levels in patients who are brain dead." The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation **11**(6): 1046-1053.

Prospective blood samplings from 15 patients admitted with a Glasgow Coma Score of less than 7 were obtained to observe and compare epinephrine, norepinephrine, and dopamine serum levels in patients with brain injury before, after, and in the absence of brain death. Nine of the patients developed or were admitted after brain death. Wide variations in catecholamine blood levels over time were documented, and subgroup analysis precluded useful statistical comparison or inference of the data. The data are presented therefore as descriptive observations only. No apparent differences were noted between similarly injured patients in whom brain death did not develop and patients before brain death or between patients with penetrating versus nonpenetrating brain injury. Brain death was preceded by hypertension and corresponding elevations in serum catecholamine levels in one patient with complete data. Catecholamine levels appeared to fall after brain death in most patients. Only minimal changes in myocardial histology were present in three donor hearts, and the two transplanted hearts functioned satisfactorily. Serum catecholamine measurement or monitoring does not provide a precise method of determining potential injury to the donor heart before or after brain death. Other experimental data and clinical observation indicate that some hearts may be injured in the donor during the evolution of brain death. Pharmacologic intervention may prevent such injury in experimental animals but must be used before brain death is induced. Such interventions should be studied in selected human donors before brain death to determine whether cardiac function is improved in the donor or recipient.

4348. Pradeep, N., et al. (2015). "Treatment of post-traumatic carotid-cavernous fistulas using pipeline embolization device assistance." BMJ case reports **2015**.

This report describes two cases of post-traumatic, high flow carotid-cavernous fistulas that demonstrated residual shunting after initial embolization with coils and Onyx, and that were successfully closed with pipeline embolization devices. Following their combined endovascular treatments, the patients experienced clinical improvement of symptoms with durable obliteration of the fistulous communications. Copyright 2015 BMJ Publishing Group Ltd.

4349. Prahlow, J. A. and J. J. Barnard (1999). "Contact gunshot wound of the head: Diagnosis after surgical debridement of the wound." Journal of clinical forensic medicine **6**(3): 156-158.

A case of homicidal contact gunshot wound of the head is described. The victim survived approximately 1 day and one-half following the shooting, during which time the bullet was recovered during surgery the injuries were 'well-documented', and surgical debridement of the wound destroyed any visible evidence of gunshot residue on the scalp or underlying bone. Autopsy revealed a skull fragment with soot deposition within the depths of the injured brain, allowing an accurate determination of range-of-fire. The case reiterates the importance of performing autopsies on all homicides.

4350. Praneeth, K., et al. (2019). "Synchondral Fracture of the Posterior "Hemiarch" of Pediatric Atlas with Cerebrospinal Fluid Fistula following a Penetrating Neck Injury." Pediatric neurosurgery **54**(6): 424-427.

INTRODUCTION: As such, the incidence of spinal fractures in young children is less than that of adults due to an increased pliability of the immature bones. The presence of unfused synchondroses in these children predisposes them to an infrequent pattern of fractures that traverse through ossification centers. Such synchondral injuries are uncommonly reported in the C1 and C2 vertebrae. Those that have been occasionally described in C1 involved the anterior synchondrosis. Furthermore, penetrating injuries to a pediatric spine are relatively rare., CASE PRESENTATION: In this context, we present a 4-year-old child in whom a penetrating injury to an immature atlas led to an unusual disjunction of the posterior synchondrosis with fracture displacement of the posterior "hemiarch" of the atlas that plunged into the dura, resulting in a cerebrospinal fluid fistula., CONCLUSION: We discuss the possible mechanism and considerations in the management of this unique presentation. Such an atypical fracture pattern involving the posterior hemi ring of the pediatric atlas is previously unknown. Copyright © 2019 S. Karger AG, Basel.

4351. Prasad, C., et al. (2021). "Healthcare-associated infections in pediatric patients in neurotrauma intensive care unit: A retrospective analysis." Indian Journal of Critical Care Medicine **25**(11): 1308-1313.

Background: Healthcare-associated infections (HAIs) can impact the outcome following traumatic brain injury (TBI) in children. We undertook a retrospective observational study to see the incidence, risk factors, and microbiological profile for HAIs in pediatric TBI. We also studied the impact of baseline patient characteristics, HAIs on patient outcome, and antibiotic resistance of different types of bacteria. Methods: Data on pediatric TBI patients of age up to 12 years were collected via a computerized patient record system (CPRS) from January 2012 to December 2018. Descriptive Chi-square test and Wilcoxon signed rank test were used to characterize baseline parameters. General linear regression models were run to find an unadjusted and adjusted odds ratio (OR). Results: HAIs were found in 144 (34%) out of 423 patients. The most commonly seen infections were of the respiratory tract in 73 (17.26%) subjects. The most predominant microorganism isolated was Acinetobacter baumannii in 188 (41%) samples. A. baumannii was sensitive to colistin in 91 (48.4%) patients. Male gender (OR 0.630; p-value 0.035), fall from height (OR 0.374; p-value 0.008), and higher injury severity scale (ISS) (OR 1.040; p-value 0.002) were independent risk factors for development of HAIs. Severe TBI, higher ISS and Marshall grade, and HAIs were significantly associated with poor patient outcome. Conclusion: Severe TBI poses a significant risk of HAIs. The most common site was the respiratory tract, predominately infected with A. baumannii. HAIs in pediatric TBI patients resulted in poor patient outcome.

4352. Prasetyo, E., et al. (2020). "Management of transorbital penetrating intracranial injury by a homemade metal arrow: Serials case report." Open access Macedonian journal of medical sciences **8**(C): 30-35.

BACKGROUND: Transorbital penetrating intracranial injury (TOPI) is rare lesions, representing about 0.4% of traumatic brain injury. This uncommon injury has potentially severe and fatalities brain damage with high mortality rate

if not promptly treated. CASE REPORT: We presented three patients with TOPI following penetration by a homemade metal arrow; unfortunately, two patients (cases 1 and 2) death on arrival at our hospital. As a survival patient (case 3), a 15-year-old boy presented with a homemade metal arrow entered through a right superior orbital fissure into the right cerebral hemisphere. Plain skull radiograph showed that the tip of the shaft was located in the right of the posterior cerebral hemisphere and confirmed by computerized tomography (CT) and three-dimensional CT of his brain. Injury to the right middle cerebral arteries was apparent on non-contrast CT angiography. Using a right occipital craniotomy approach with C-arm radiography fluoroscopy guidance, we successfully removed the arrow. Follow-up studies confirmed an excellent outcome. CONCLUSIONS: Pre-operative imaging is mandatory to evaluate the trajectory, brain, and vascular injury for appropriate surgical planning and post-operative care of patients with TOPI.

4353. Prasetyo, E., et al. (2020). "Transorbital-penetrating intracranial injury due to a homemade metal arrow: A case report." Annals of Medicine and Surgery **57**: 183-189.

A transorbital-penetrating intracranial injury (TOPI) is an unusual traumatic brain injury. This rare injury has the potential to result in serious and fatal brain damage with a high mortality rate and requires prompt multidisciplinary surgical intervention. Here, we describe an interesting case in which a patient who presented with accidental penetrating injuries of the brain was found to have a transorbital-penetrating intracranial injury (TOPI). We chose an anterior approach to the foreign body above the entrance wound for removal in a retrograde manner with fluoroscopic guidance. The patient remained well with no complications and was discharged on postoperative day 10. Reasonable diagnostic imaging, surgical planning, and careful post-surgery management can increase patients successful outcomes.

4354. Prassinos, N. N. (2006). "Fractures combination of the proximal antebrachium in an immature dog that resembles Monteggia fracture." Veterinary and comparative orthopaedics and traumatology : V.C.O.T **19**(3): 184-186.

A 5-month-old German shepherd dog with a combination of a proximal radial physeal fracture and a proximal ulnar diaphyseal comminuted fracture, with cranial displacement of their distal fragment, was presented. This fractures combination resembles type I Monteggia fracture. After surgical reduction of the fractures, three full-cerclage wires were used to stabilize the ulnar fracture, and two positional screws were placed across the radius and ulna immediately distally to the growth plate to hold these bones in apposition. Four weeks post-operatively, the screws were removed since sufficient callus had been formed and the dog was free of lameness. It seems that if the appropriate conditions for a type I Monteggia fracture develop in an immature dog, proximal radial physeal fracture instead of radial head luxation may accompany ulnar diaphyseal fracture.

4355. Prat, D., et al. (2021). "Ocular injuries incurred by Israeli defense forces during low-intensity conflicts." Injury **52**(2): 292-298.

BACKGROUND: To describe ocular injuries sustained by Israeli Defense Forces (IDF) soldiers during low-intensity conflicts from 1998 to 2017, and to evaluate the use of protective eyewear., METHODS: Retrospective analysis of data retrieved from two tertiary Israeli medical centers and the military trauma registry. The analysis included all IDF soldiers with ocular injuries who were referred to these centers between 1998 and 2017. Data on injury type, the use of protective eyewear, and interventions were retrieved and analyzed. Additional data regarding the use of protective eyewear and ocular injuries in 108 patients with head and neck injuries in one operation was analyzed., RESULTS: A total of 126 soldiers, all males, mean age 22 (SD 5.3) years, sustained ocular injuries during low-intensity conflicts and treated at one of the two participating medical centers. Blast was the most common type of injury (n = 70/126, 56%), followed by shrapnel (n = 37/126, 29%) and gunshot wound (n = 12/126, 9%). The Birmingham Eye Trauma Terminology System (BETTS) injury pattern disclosed lamellar laceration (n = 34/126, 27%), intraocular foreign body (n = 27/126, 21%), penetrating (n = 10/126, 8%), and perforating (n = 7/126, 6%) injuries. Average VA improved from 20/140 at presentation to 20/60 after surgical or conservative intervention, the median VA improved from 20/40 to 20/30 ($P < 0.001$). Forty-nine patients (49/126, 39%) had poor visual outcome. The mean follow-up lasted 22 (SD 31) months. The use of protective eyewear was correlated with better initial VA(20/30 vs 20/217, $P = 0.07$). Among 108 patients with head and neck injuries, there was a higher rate of ocular injuries in the group of patients who did not use protective eyewear (n = 26/73, 36% vs n = 4/35, 11%, $P = 0.016$)., CONCLUSIONS: Ocular injuries are common occurrences in low-intensity conflicts. The use of protective eyewear significantly reduces these injuries and should be mandatory., LEVEL OF EVIDENCE: III, prognostic.

4356. Pratt, L. W. (1985). "Chain saw injuries of the head and neck." Ear, nose, & throat journal **64**(5): 215-222.

4357. Prayer, D. and C. Rametsteiner (2001). "[Acute head trauma: diagnostic imaging]." Schadelhirntrauma: Radiologische Akutdiagnostik. **151**(21-23): 496-501.

Computed tomography (CT) ist the primary modality of choice for imaging patients with acute head trauma. Lesions of the soft tissues and of the bones can be assessed more precisely than with other imaging modalities. With magnetic resonance imaging (MRI) additional information may be gained especially in subacute and chronic posttraumatic conditions. Urgent indication to perform a CT examination depends on the patient's history and on the mechanism of trauma. Image interpretation has been performed in the context of typical pathologic effects of trauma and with respect to potential therapy.

4358. Prein, J., et al. (1996). "[Gunshot injuries of the mandible]." Schussverletzungen des Unterkiefers. **41**: 160-165.

43 patients with gunshot wounds of the mandible were treated in Tubingen and Basel between 1968 and 1995. Among them were 31 patients (= 72.09%) with bone loss and defect fractures. Over that time period the treatment principles of gunshot wounds have not changed. They are based on an early soft tissue closure and an approach from the inside to the outside. Besides that modern techniques in maxillofacial reconstructive surgery, which include the application of biocompatible plates and screws and the introduction of microvascular reconstructive techniques, have enlarged the therapeutical options. Every patient needs an individual approach to his special medical condition, which is illustrated in three exemplary cases. The combination of the above mentioned modern reconstructive techniques prevents long and multiple hospital stays and invalidity. Furthermore it is the basis for social reintegration as well as functional and esthetic rehabilitation.

4359. Prendergast, D. M., et al. (2004). "The use of a marked strain of Pseudomonas fluorescens to model the spread of brain tissue to the musculature of cattle after shooting with a captive bolt gun." Journal of applied microbiology **96**(3): 437-446.

AIMS: The aim of this study was to use a marked strain of Pseudomonas fluorescens to model the spread of central nervous system (CNS) tissue in cattle following captive bolt stunning., METHODS AND RESULTS: The marked organism was introduced by injection through the captive bolt aperture immediately after stunning and was subsequently detected in a wide range of derived tissues, including blood, organs, and the musculature of the entire forequarters of test animals. This was dependent on the use of high concentrations of the organism that were recovered sufficiently and rapidly to minimize the bactericidal properties of the circulatory system. These results suggest that a marked organism could potentially be used to model the effects of captive bolt stunning on the dissemination of CNS tissue from the brain., CONCLUSIONS: These results indicate that current commercial methods of captive bolt stunning may induce widespread and significant mobilization of CNS tissue within beef carcasses. This may lead to the widespread dissemination of such materials within meat destined for human consumption., SIGNIFICANCE AND IMPACT OF THE STUDY: In the absence of rapid, simple and sufficiently sensitive methods for the direct detection of prion in commercially slaughtered animals, marked organisms can provide useful models in studies of the dissemination kinetics of prion disease in captive bolt stunned animals.

4360. Prgomet, D., et al. (1998). "Mortality caused by war wounds to the head and neck encountered at the Slavonski Brod Hospital during the 1991-1992 war in Croatia." Military medicine **163**(7): 482-485.

From July 1, 1991, until January 1, 1993, a total of 7,720 patients (soldiers and civilians) with war wounds were treated at Dr. Josip Bencevic General Hospital in Slavonski Brod, Croatia. Treatment was provided for 7,043 patients, whereas 677 individuals (8.8%) killed in action (KIA) were examined at the Forensic Department. There were 1,456 patients (18.9%) with head and neck wounds: 1,176 soldiers and 280 civilians. The mortality rate was significantly greater in patients with head and neck wounds (N = 271, 40.0%) than in those with injuries to the thorax (N = 163, 24.1%) and abdomen (N = 62, 9.2%; $p < 0.01$ for both). During treatment, 188 patients (2.4%) died of wounds (DOW). The DOW mortality was 5.2% (61 of 1,185), 4.0% (41 of 1,026), and 2.9% (25 of 867) for wounds of the head and neck,

thorax, and abdomen, respectively. There was no significant difference in the mortality rate between head and neck and thorax wounds: however, the former exceeded the mortality rate recorded for abdominal wounds ($p < 0.05$). No significant differences were observed between soldiers and civilians with head and neck injuries either in the KIA (205 of 1,176, 17.4% vs. 66 of 280, 23.5%, respectively) or the DOW group (51 of 971, 5.3% vs. 10 of 214, 4.7%, respectively. According to the mechanism of head and neck wounding, there were 1,046 explosive (71.9%), 226 gunshot (15.5%), and 184 other (12.6%) wounds. Lethal outcome was significantly more common in gushot than in explosive wounds (79 of 226, 35% vs. 243 of 1,046, 23.2%; $p < 0.01$). The proportion of head and neck injuries did not differ significantly from literature reports on recent conventional wars. The site of wounding, i.e., at the battlefield or elsewhere, had no effect on the prognosis of wounds to the head and neck. Gunshot head and neck injuries showed a significantly higher mortality rate.

4361. Price, R. (2003). "Re: Al Mulla A, Purva M and Behbehani A. Fireworks injury: temporal bone penetration and a wooden intra-cranial foreign body. J R Coll Surg Edinb 2001; 46 (4): 249-51." The surgeon : journal of the Royal Colleges of Surgeons of Edinburgh and Ireland **1**(4): 243.

4362. Pricola, K. L., et al. (2011). "Successful repair of a gunshot wound to the head with retained bullet in the torcular herophili." World neurosurgery **76**(3-4): 362.e361-364.

BACKGROUND: Nonlethal missile injuries to the dural venous sinus system are rare. To date successful repair of isolated penetrating injury to the torcular herophili has not been reported without significant associated morbidity. We report the case of a gunshot wound injury to the occipital region with retained bullet fragment in the confluence of the sinuses causing traumatic sinus venous thrombosis., METHODS: Occipital and suboccipital craniotomy for removal of bullet in the torcula, repair of sinus defect, and repair of depressed skull bone fragments was performed., RESULTS: The procedure resulted in restoration of proximal and distal flow across the dural sinus system and preservation of torcular sinus patency with excellent neurological outcome. Technical considerations in the repair of penetrating torcular injuries are discussed., CONCLUSIONS: Gunshot wounds with retained bullet fragments in the torcula can be successfully repaired with preservation of neurological function after retrieval of metallic foreign body and restoration of venous sinus patency.

4363. Pringle, C., et al. (2021). "Manchester Arena Attack: management of paediatric penetrating brain injuries." British journal of neurosurgery **35**(1): 103-111.

PURPOSE: The Manchester Arena bombing on 22 May 2017 resulted in 22 deaths and over 160 casualties requiring medical attention. Given the threat of modern- era terrorist attacks in civilian environments, it is important that we are able to anticipate and appropriately manage neurological injuries associated with these events. This article describes our experience of managing paediatric neurosurgical blast injuries, from initial triage and operative management to longer-term considerations., MATERIALS AND METHODS: Case study and literature review., RESULTS: Paediatric traumatic and penetrating brain injury patients often make a good neurological recovery despite low GCS at time of injury; this should be accounted for during triage and operative decision making in major trauma, mass casualty events. Conservative management of retained shrapnel is advocated in view of low long-term infection rates with retained shrapnel and worsened neurological outcome with shrapnel retrieval. All penetrating brain injuries should receive a prolonged course of broad-spectrum antibiotics and undergo long term follow-up imaging to monitor for the development of cerebral abscesses. MRI should never be utilised in penetrating brain injury cases, even in the absence of macroscopically visible fragments, due to the effect of MRI ferromagnetic field torque on shrapnel fragments. Anti-epileptic drugs should only be prescribed for the initial seven days after injury, as continuing beyond this does not incur any benefit in the reduction of long term post-traumatic epilepsy., CONCLUSION: All receiving neurosurgical units should become familiar with optimum management of these thankfully rare, but complex injuries from their initial presentation to long term follow up considerations. All neurosurgical units should have well-rehearsed local plans to follow in the event of such incidents, ensuring timely deliverance of appropriate neurosurgical care in such extreme settings.

4364. Pringle, C. and I. D. Kamaly-Asl (2019). "Managing paediatric ballistic brain injuries." British journal of neurosurgery **33**(4): 457-458.

Objectives: Improvised explosive devices cause ballistic penetrating traumatic brain injuries (PTBIs). Most UK trained neurosurgeons will not have managed these complex injuries. Given the increasing frequency of terrorist attacks in civilian environments, it is important that we are able to anticipate and appropriately manage these injuries. Design: We present our experience of managing paediatric PTBIs sustained from the Manchester Arena blast. Subjects: Paediatric ballistic brain injury patients. Methods: Literature review. Results: Children with PTBIs and GCS <5 at presentation or prolonged traumatic coma can make an acceptable neurological recovery (up to 40% and 70%); this should be considered at triage. Tempered debridement and conservative management of retained shrapnel is associated with improved neurological outcomes and similar infection rates when compared to aggressive management. PTBIs should receive minimum 5 days broad spectrum antibiotics, with longer courses and regular surveillance imaging for retained shrapnel. Delayed cerebral abscesses have been reported up to 7 years post injury. Persistent CSF leak is associated with increased infection rate. Victims should be screened and vaccinated against blood borne viruses. There is no benefit of prophylactic anti-epileptics beyond 7 days post injury when considering late seizure occurrence. Late seizure occurrence is associated with low GCS, shrapnel, haematomas and infection. Conclusions: PTBIs create management challenges at time of presentation and throughout treatment.

4365. Procaccio, F., et al. (2001). "Deaths with acute cerebral lesion and heart-beating potential organ donors in the Veneto region." Minerva anestesiologica **67**(1-2): 71-78.

BACKGROUND: The study was aimed at describing the clinical characteristics of dead patients with acute cerebral lesion and analyzing reasons of the shortage of heart-beating potential organ donors in the Intensive Care Units (ICUs) in the Veneto Region., METHODS: Data have been prospectively recorded in 23 ICUs over six months for deceased patients with acute cerebral lesion (clinical data, death diagnosis) and for any potential organ donor (medical suitability, family interview, organ retrieval)., RESULTS: In the ICUs of the Veneto Region in 1998 deceased patients with acute cerebral lesion were 187 per million population (p.m.p.); 317 cases have been studied. Median age was 64 years (range 7-93). Heart-beating death was legally confirmed only in 98/317 cases (31%) against a clinical diagnosis of brain death in 203/317 (64%). Only 82/317 (26%) were considered eligible donors and 48/317 (15%) became real donors (22.8 p.m.p.). Among the remaining 235 cadavers, 105 were over 70 years old. In the group of 130 under 70 years absolute contraindications were present only in 30 and problematical clinical situations were reported in 100., CONCLUSIONS: The number of deaths with acute cerebral lesion represents a sensible index and a key factor for evaluating the potential organ donor pool in small regions and in the single intensive care unit. Collected data demonstrate that in the Veneto Region the efficiency of solid organ retrieval can be improved and that organ donor shortage may depend, beyond family refusal, on clinical and cultural factors that hamper stabilized heart-beating deaths. Most potential donors with age over 70 or problematical clinical situations are preventively excluded by ICUs physicians. To improve organ donation all the patients who die in spite of neuro-intensive treatment should be prevented from circulatory arrest to permit legal declaration of death. Thus more potential organ donors without absolute contraindications could be recovered and time would exist for discussing any problematical situation with experts in organ procurement, particularly in respect to existing urgencies in the waiting list.

4366. Procaccio, F., et al. (2015). "Deaths with acute cerebral lesions in ICU: does the number of potential organ donors depend on predictable factors?" Minerva anestesiologica **81**(6): 636-644.

BACKGROUND: As the potentiality of deceased organ donation mostly depends on the number of brain deaths (BDs), the aim of this study is to quantify rates and probabilities of BD declaration in Italy., METHODS: Deaths with acute cerebral lesion (ACLDs) in the Italian ICUs have been prospectively collected. A total of 27,490 ACDLs occurred in 5 years. Age, gender, etiology, timing of death and ICU Region have been utilized for multivariate analysis., RESULTS: The global ratio of BD declarations to ACLDs was 39.9%. The rates of ACLDs, BD declarations and actual donors were 93.5, 37.3 and 19.7 pmp respectively. Wide variability resulted among Regions, with 148.2 ACLDs, 77.8 BD declarations and 42 donors pmp as benchmark. The probability of being BD declared was significantly higher in stroke compared with head injury (OR 1.6, P<0.001) and in females (OR 1.5, P<0.001), with half the Regions missing around 50% of BD declarations compared with the benchmark, particularly in elderly patients., CONCLUSION: Predictable factors associated with BD declaration can be identified in ACLD management. Positive factors leading to the identification of potential organ donors, i.e., the capacity of declaring BD in all the patients fulfilling BD criteria irrespective of age and etiology, could be captured in the best performing regions and reproduced throughout the Country. The implementation of simple

indicators based on prospective ACLD monitoring, i.e. the declared BDs to ACLDs in ICU ratio, may be helpful in achieving efficiency targets and reliable comparisons of outcomes in the identification of BD potential organ donors.

4367. Prockop, L. D. (2006). "Weapons of mass destruction: Overview of the CBRNEs (Chemical, Biological, Radiological, Nuclear, and Explosives)." Journal of the neurological sciences **249**(1): 50-54.

The events of September 11, 2001, made citizens of the world acutely aware of disasters consequent to present-day terrorism. This is a war being waged for reasons obscure to many of its potential victims. The term "NBCs" was coined in reference to terrorist weapons of mass destruction, i.e., nuclear, biological and chemical. The currently accepted acronym is "CBRNE" which includes Chemical, Biological, Radiological, Nuclear, and Explosive weapons. Non-nuclear explosives are the most common terrorist weapon now in use. Nuclear and radiological weapons are beyond the scope of this publication, which focuses on the "CBEs", i.e. chemical, biological and explosive weapons. Although neurologists will not be the first responders to CBEs, they must know about the neurological effects in order to provide diagnosis and treatment to survivors. Neurological complications of chemical, biological and explosive weapons which have or may be used by terrorists are reviewed by international experts in this publication. Management and treatment profiles are outlined.

4368. Promsopa, C. and U. Prapaisit (2019). "Removal of intraconal bullet through endoscopic transnasal surgery with image-guided navigation system 8 months after injury: a case report." Journal of medical case reports **13**(1): 65.

BACKGROUND: Lodgment of a bullet within the orbit is uncommon. The decision to remove these objects poses a challenge to surgeons due to a high risk of complications. Currently, endoscopic transnasal surgery with navigator assistance facilitates the localization of foreign bodies allowing their safe removal with minimal surrounding tissue damage or optic nerve injury., CASE PRESENTATION: We describe a case of a 26-year-old Thai woman with a chronic intraorbital foreign body located within her medial intraconal space. The chronic intraorbital foreign body was successfully removed by endoscopic transnasal surgery, combined with assistance from a navigation system, 8 months after injury without any damage to her eye or disturbance in vision., CONCLUSION: Intraconal foreign bodies, such as bullets, are a chronic problem and should be observed in the long term; prompt surgical removal should be performed if indicated.

4369. Provenzale, J. (2007). "CT and MR imaging of acute cranial trauma." Emergency radiology **14**(1): 1-12.

A wide variety of imaging findings can be seen in the setting of acute head trauma. The purpose of this manuscript is to review the major computed tomography and magnetic resonance imaging findings of various types of traumatic head injuries with the intent of providing the reader with a means to diagnose these lesions quickly and accurately.

4370. Pruitt B.A, Jr. (2001). "Management and prognosis of penetrating brain injury." Journal of Trauma - Injury, Infection and Critical Care **51**(2 SUPPL.): S1-S86.

4371. Puche Mira, A., et al. (1987). "[Craniocerebral injury caused by compressed air shotgun]." Traumatismo craneoencefalico por arma de aire comprimido. **26**(6): 473-474.

4372. Puentes, K., et al. (2011). "Non-fatal gunshot wounds in the context of intimate partner violence. The importance of a multidisciplinary approach: a case report." Journal of forensic and legal medicine **18**(5): 221-224.

According to Portuguese law, if a case of intimate partner violence is noticed or suspected by a professional working in public services, reporting it to the police, medico-legal services or directly to the public prosecutor is mandatory. However, in most cases, reporting does not take place, despite its vital importance in triggering the multidisciplinary intervention that will ensure the correct and timely diagnosis and protection of the victim. In the present case, the victim, a 37 year-old woman, was sexually and physically abused by her husband in their home, and was physically abused again at the victim's mother's house. The victim mentioned that her husband struck her in the

head with a hammer and shot a handgun while in her mother's house. However, she denied having a gunshot wound. The couple's daughter was also slapped in the face by her father. The police took the victim to the emergency room of a central hospital to receive medical attention, while the medical examiner on duty was called to the same emergency room to perform a medico-legal evaluation in the context of the intimate partner violence reported to the police. Medico-legal assessment revealed scalp injuries that had not been detected during the first inspection by the emergency room attending physicians who had performed a neurological examination, which revealed no neurological dysfunction. A cranial computed tomography with three-dimensional reconstitution and virtual dissection, requested by the medical examiner, revealed two projectiles trapped in between the inner and the outer table of the cranium, with linear fractures only in the inner table and no brain injuries. Gynecological examination with the collection of biological evidence, also performed by the medical examiner, made it possible to identify a male DNA profile matching her husband's. The victim was subjected to neurosurgery and a follow-up, and was released one month after the traumatic event. A forensic psychological evaluation, performed one month after the traumatic event, revealed the presence of reactive symptoms to the occurrence. This multidisciplinary intervention and the use of modern diagnosis imaging techniques allowed for a timely diagnosis and treatment, adequate protection of the victim and her family, as well as the identification of the aggressor, who was arrested.

4373. Puffenbarger, M. S., et al. (2019). "Reduction of Computed Tomography Use for Pediatric Closed Head Injury Evaluation at a Nonpediatric Community Emergency Department." Academic emergency medicine : official journal of the Society for Academic Emergency Medicine **26**(7): 784-795.

OBJECTIVE: The purpose of this study was to determine if implementation of a Pediatric Emergency Care Applied Research Network (PECARN)-based Closed Head Injury Assessment Tool could safely decrease computed tomography (CT) use for pediatric head injury evaluation at a nonpediatric community emergency department (ED)., METHODS: A quality improvement project was initiated at a nonpediatric community ED to implement an institution-specific, PECARN-based Pediatric Closed Head Injury Assessment Tool. Baseline head CT use at the participating ED was determined for children with closed head injury through retrospective chart review from March 2014 through November 2015. Head injury patients were identified using International Classification of Disease (ICD)-9 codes for head injury, unspecified (959.01) and concussion with and without loss of consciousness (850-850.9) until October 2015, after which ICD-9 was no longer used. To identify eligible patients after October 2015, lists of all pediatric patients evaluated at the participating ED were reviewed, and patients were included in the analysis if they had a physician-assigned discharge diagnosis of head injury or concussion. Exclusion criteria were age >= 18 years, penetrating head trauma, history of brain tumor, ventriculoperitoneal shunt, bleeding disorder, or presentation > 24 hours postinjury. Medical history, injury mechanism, symptoms, head CT use, and disposition were recorded. Implementation of the Pediatric Closed Head Injury Assessment Tool was achieved through provider education sessions beginning in December 2015 and ending in August 2016. Head CT use was monitored for 12 months postimplementation, from September 2016 through August 2017. Patients were classified into low, intermediate, or high risk for clinically important traumatic brain injury (ciTBI) by chart review. ED length of stay (LOS), disposition, and ED returns within 72 hours were recorded. Categorical variables were compared using chi-square test or Fisher's exact test, and continuous variables, using Kruskal-Wallis test., RESULTS: A total of 252 children with closed head injury were evaluated preimplementation (March 2014 through November 2015), 132 children were evaluated during implementation (December 2015 through August 2016), and 172 children were evaluated postimplementation (September 2016 through August 2017). Overall CT use decreased from 37.7% (95% confidence interval [CI] = 31.7-43.7) preimplementation to 16.9% (95% CI = 11.3-22.5) postimplementation ($p < 0.001$). Only 1% (95% CI = 0%-2.9%) of low-risk patients received a head CT postimplementation compared to 22.6% (95% CI = 16.1%-29.1%) preimplementation ($p < 0.001$). CT use among patients >= 24 months decreased from 42.9% (95% CI = 36.5%-49.6%) to 19.6% (95% CI = 13.1%-26.1%; $p < 0.001$) and remained low and unchanged for patients < 24 months. Transfers to a pediatric trauma center and ED returns within 72 hours were unchanged, while median ED LOS improved from 1.5 to 1.3 hours ($p = 0.03$). There were no missed ciTBIs after implementation of the guideline., CONCLUSION: Implementation of the PECARN-based Pediatric Closed Head Injury Assessment Tool reduced head CT use in a nonpediatric ED. The greatest impact was seen among children aged >= 24 months at very low risk for ciTBI.

4374. Puffenbarger, M. S., et al. (2018). "Implementation of a pediatric minor head trauma guideline at a community emergency department." Academic emergency medicine **25**: S128.

Background: Head trauma is a common complaint among children in the ED. The Pediatric Emergency Care Applied Research Network (PECARN) guideline identifies children at very low risk for clinically important traumatic brain injury (ciTBI) and has safely reduced head CT use at pediatric EDs. Most children first present to non-pediatric EDs where they are more likely to receive a head CT. The purpose of this study was to determine if implementation of a PECARNbased minor head trauma guideline could safely decrease head CT use at a non-pediatric community ED. Methods: A retrospective chart review of 384 patients determined the baseline head CT use at a non-pediatric community ED. Patients were identified by ICD-9 codes for head injury, unspecified (959.01) and concussion with and without loss of consciousness (850-850.9). Exclusion criteria were age ≥18 years, penetrating head trauma, history of brain tumor, ventriculoperitoneal shunt, or bleeding disorder, or presentation >24 hours post-injury. Medical history, injury mechanism, symptoms, head CT use, and disposition were recorded. The head trauma guideline was implemented and CT use monitored among 172 patients identified by discharge diagnosis. Patients were classified into low, intermediate, and high ciTBI risk based on physician documentation. ED length-of-stay (LOS), disposition, and ED returns within 72 hours were recorded. Categorical variables were compared with the Chi-Square test or Fisher's Exact test, and the Kruskal-Wallis test was used for continuous variables. Results: Seven patients were excluded for co-morbidities and 69 patients were excluded for presenting >24 hours post-injury. Overall CT use decreased to 16.9% post-implementation from 30.5% pre-implementation (p <0.001). CT use among patients ≥24 months decreased to 19.6% from 36.3% (p <0.001), and remained low and unchanged for patients ≤24 months. Only 0.95% of low risk patients received a head CT post-implementation compared to 18.4% preimplementation (p <0.001). Median ED LOS, transfers to a pediatric trauma center, and ED returns within 72 hours were unchanged with no missed ciTBIs after implementation of the guideline. Conclusion: Implementation of the PECARN-based minor head trauma guideline safely reduced head CT use in a non-pediatric ED. The greatest impact was seen among older children at very low risk for ciTBI.

4375. Pugh, M. J., et al. (2021). "Emergence of post-traumatic epilepsy in post-9/11 veterans: Traumatic brain injury severity, deployment and multimorbidity." Journal of neurotrauma **38**(14): A46-A47.

Objective: To identify predictors of epilepsy in Post-9/11 Veterans. Background: The association of traumatic brain injury (TBI) and epilepsy in Veterans has been examined among those with combat deployments due to the high TBI prevalence. We hypothesized that epilepsy would be more likely in those with a history of TBI and deployment where blast injury/military exposures are common. Design/Methods: Retrospective observational study using merged Veterans Health Administration (VHA) and Department of Defense health data (2002-2019) for Veterans who entered VHA care 2002-2014. We identified epilepsy using ICD9/10 codes and use of antiseizure medications. We identified TBI severity using ICD9/10 codes and TBI screening data, and mental/physical health comorbidities using ICD9/10 codes before the index date (EPILEPSY: date of the first antiseizure medication after epilepsy-consistent diagnosis; No EPILEPSY: median time from first DoD care to epilepsy [2625 days]). We excluded individuals with verified psychogenic non-epileptic seizures and used logistic regression to identify predictors of epilepsy. Results: In this cohort (N = 1,226,280), 30,993 (2.53%) met epilepsy criteria. After controlling for mental/physical health comorbidities, odds of epilepsy were significantly lower for deployed (vs. non-deployed; adjusted odds ratio [AOR] 0.76; 0.73-0.79) and those without TBI were less likely than those with mTBI (AOR 1.60; 1.55-1.66), moderate/severe TBI (AOR 2.84; 2.36-2.61), penetrating TBI (AOR 5.13; 4.71-5.58). Other strong predictors included other neurological conditions such as ALS, MS, Parkinson's disease (OR 6.73; 6.38-7.10), stroke (OR 3.61; 3.45-3.77), headache/migraine (OR 2.34; 2.28-2.40), and cardiac disease (OR 1.91; 1.84-1.98). Conclusions: TBI, including mTBI, was associated with epilepsy, but those deployed were LESS likely to develop epilepsy. Chronic physical and mental health conditions that preclude deployment were associated with epilepsy and may be of equal concern to clinicians caring for patients with epilepsy and/or TBI; however more sophisticated statistical models are needed to better understand the interactions among TBI, deployment and chronic mental/physical comorbidities.

4376. Pugh, M. J., et al. (2021). "Risk factors for epilepsy among post-9/11 veterans: Traumatic brain injury and deployment status." Neurology **96**(15 SUPPL 1).

Objective: To identify predictors of epilepsy in Post-9/11 Veterans. Background: The association of TBI and epilepsy in Veterans has been examined among those with combat deployments. We hypothesized that individuals with epilepsy would be more likely than those without epilepsy to have history of TBI and a history of deployment where

blast injury/military exposures are more common. Design/Methods: Retrospective observational study using merged Veterans Health Administration (VHA) and Department of Defense health data (2002-2019) for Veterans who entered VHA care 2002-2014. We identified epilepsy using ICD9/10 codes and use of antiseizure medications. We identified TBI severity using ICD9/10 codes and TBI screening data, and mental/physical health comorbidities using ICD9/10 codes before the index date (EPILEPSY: Date of the first anti-seizure medication after epilepsy-consistent diagnosis; No EPILEPSY: Median time from first care in DoD to epilepsy [2625 days]). We excluded individuals with verified psychogenic non-epileptic seizures. We used logistic regression to identify predictors of epilepsy. Results: In this cohort (N=1,226,280), 30,993 (2.53%) met criteria for epilepsy. After controlling for mental/physical health comorbidities, odds of epilepsy were significantly lower for deployed (vs. non-deployed; AOR 0.76; 0.73-0.79). Compared to individuals without TBI, those with mTBI (OR 1.60; 1.55-1.66), moderate/severe TBI (OR 2.84; 2.36-2.61), penetrating TBI (OR 5.13; 4.71-5.58) had significantly higher odds of epilepsy. Other strong predictors included other neurological conditions such as ALS, MS, Parkinson's disease (OR 6.73; 6.38-7.10), stroke (OR 3.61; 3.45-3.77), headache/migraine (OR 2.34; 2.28-2.40), and cardiac disease (OR 1.91; 1.84-1.98). Conclusions: TBI, including mTBI, was associated with epilepsy, but those deployed were LESS likely to develop epilepsy. Chronic physical and mental health conditions that preclude deployment were associated with epilepsy and may be of equal concern to clinicians caring for patients with epilepsy and/or TBI; however more sophisticated statistical models are needed to better understand the interactions among TBI, deployment and chronic mental/physical comorbidities.

4377. Pugh, M. J., et al. (2014). "The prevalence of epilepsy and association with traumatic brain injury in veterans of the Afghanistan and Iraq wars." Brain injury **28**(5-6): 807.

Objective: While studies from prior wars and civilians have linked traumatic brain injury with epilepsy, little evidence is available for Veterans of the Afghanistan and Iraq (OEF/OIF/OND) wars. A recent investigation by the DoD indicated that epilepsy incidence increased 52% from 2006 to 2010, with ∼8% of those with epilepsy having a previously diagnosed TBI. However, those with more severe and penetrating TBI, who are at highest risk of post-traumatic epilepsy and more frequently discharged from the military, were underrepresented in that active duty population. The purpose of this study was to determine the prevalence of epilepsy in the population of OEF/OIF Veterans who receive VA care and to determine if TBI exposure was associated with epilepsy. Methods: This cross-sectional observational study utilized national inpatient and outpatient data. Participants included individuals who received care from the Veterans Health Administration (VA) in fiscal years 2009-2010. Algorithms developed for use with ICD-9-CM codes were used to identify patients who met criteria for epilepsy (VA algorithm), traumatic brain injury (TBI; Armed Forces Health Surveillance Center) and other risk factors for epilepsy (e.g. stroke, substance use disorder). TBI was divided into penetrating TBI (pTBI) and other TBI. TBI and other risk factors were identified prior to the index date (date of first seizure or 1 October 2009 for those without seizure). Results: Among 256 284 OEF/OIF veterans who received VA care in 2009-2010, 2719 met criteria for epilepsy. Epilepsy prevalence was 10.6 per thousand with an age-adjusted prevalence of 6.1. In addition, 29 297 veterans were diagnosed with TBI prior to the index date. Statistically significant associations were found between epilepsy and prior TBI diagnosis (pTBI: adjusted odds ratio (AOR) 18.77 (95% CI=9.21-38.23); other TBI AOR 1.64 (1.43-1.89)). Younger veterans (18-49 years vs 65 and older; AOR 2.22 [1.55-2.59] and those with prior stroke (AOR 5.50 [4.04-7.49]) were also significantly more likely to meet epilepsy criteria. Conclusions: Among OEF/OIF veterans, epilepsy was associated with a previous TBI diagnosis and pTBI had the strongest effect. Studies of war-related epilepsy in Vietnam War veterans with TBI have shown additional new cases of epilepsy accruing over decades post-war. A detailed prospective study is needed to understand the evolving relationship between epilepsy and TBI in OEF/OIF veterans.

4378. Pugh, M. J. and A. Van Cott (2021). "Risk for early onset Dementia among Veterans: The contributions of TBI and Epilepsy." Archives of physical medicine and rehabilitation **102**(10): e18.

Research Objectives: To identify the impact of TBI and epilepsy on subsequent diagnoses of early onset dementia (EOD) in a cohort of post-9/11 era Veterans as both are associated with dementia in older individuals and are more common in Post-9/11 Veterans than the general population. Design: Retrospective observational study of Post-9/11 Veterans in VA care FY02-FY18. Setting: National longitudinal data from Departments of Defense and Veterans Affairs. Participants: Post-9/11 Veterans 3 years of care. Interventions: N/A. Main Outcome Measures: EOD was operationalized using ICD-9-CM/10 diagnoses for diagnoses previously identified as reliable for EOD (Alzheimer's and frontotemporal dementia). TBI severity was identified using self-reports from the VA Comprehensive TBI Evaluation and

ICD-9-CM/10 codes. Epilepsy was identified using a previously validated algorithm requiring ICD-9-CM/10 codes and anticonvulsant medications. Covariates included socio-/military demographics, prior deployment and comorbid conditions associated with dementia. We conducted logistic regression analysis predicting EOD to identify associations for epilepsy and TBI severity controlling for potential confounders. Results: Among the 1,055,873 Veterans who met inclusion criteria, 923 had EOD (7.4/1000 epilepsy; 0.7/1000 no epilepsy). Epilepsy (aOR 2.41 [1.98-2.93]) and TBI of all severity (aORs: mTBI 1.67 [1.40-1.99]; moderate/severe TBI 2.31 [1.80-2.98]; penetrating TBI 2.87 [2.08-3.97]) were significantly associated with EOD. Other significant predictors (aORs >1.5; p <.001) included age 50-64 and 40-49 (vs. 30-39), other neurological conditions, stroke, schizophrenia, depression, and bipolar disorder. Conclusions: Epilepsy and TBI (of all severities) were associated with EOD. While there was a near linear association of TBI severity and EOD which is consistent with prior research, there was no significant interaction between TBI and epilepsy. This suggests that each condition contributes to EOD. However, those with more TBIs have higher risk for epilepsy and EOD suggesting the mechanism of added impact of TBI severity may work through other neurological/neurodegenerative conditions. Indeed, other strong predictors of EOD (e.g., stroke, other neurological conditions) supports this hypothesis and the idea that multimorbidity associated with TBI may reveal phenotypes of neurodegenerative outcomes that require further evaluation. Author(s) Disclosures: None.

4379. Pugh, M. J., et al. (2021). "Early onset dementia in post-9/11 veterans: Traumatic brain injury, epilepsy, and chronic disease." Journal of neurotrauma **38**(14): A79-A80.

Research Objectives: To identify the association of TBI and epilepsy on diagnoses of early onset dementia (EOD) in a cohort of post-9/11 era Veterans as both are associated with dementia in older individuals and are more common in Post-9/11 Veterans than the general population. Design: Retrospective observational study of Post-9/11 Veterans in VA care FY02-FY18 using national longitudinal data from Departments of Defense and Veterans Affairs. Participants: Post-9/11 Veterans <65 years at VA care entry and >3 years of care. Main Outcomes: EOD was operationalized using ICD-9-CM/10 diagnoses for diagnoses found reliable in prior research (Alzheimer's and frontotemporal dementia). TBI severity was identified using selfreports (VA Comprehensive TBI Evaluation) and ICD-9-CM/10 codes. Epilepsy was identified using ICD-9-CM/10 codes and anticonvulsant medications. Covariates included socio-/military demographics, prior deployment and comorbid conditions associated with dementia. Logistic regression analysis identifie associations with EOD for epilepsy and TBI severity controlling for potential confounders. Results: Among the 1,055,873 Veterans who met inclusion criteria 923 met criteria for EOD (7.4/1000 epilepsy; 0.7/1000 no epilepsy). Epilepsy (aOR 2.41 [1.98-2.93]) and TBI of all severity was associated with EOD (aORs: mTBI 1.67 [1.40-1.99]; moderate/severe TBI 2.31 [1.80-2.98]; penetrating TBI 2.87 [2.08-3.97]). Other significant predictors (aORs >1.5; p <.001) included age 50-64 and 40-49 (vs. 30-39), other neurological conditions, stroke, schizophrenia, depression, and bipolar disorder. Conclusions: Epilepsy and TBI (of all severities) were associated with EOD. Consistent with prior research there was a near linear association of TBI severity and EOD, but no significant interaction between TBI and epilepsy. Thus, each condition contributes to EOD. However, those with more severe TBIs have higher risk for epilepsy and EOD suggesting the mechanism of added impact of TBI severity may work through other neurological/neurodegenerative conditions. Indeed, other strong predictors of EOD (e.g., stroke) supports this hypothesis and the idea that multimorbidity associated with TBI may reveal phenotypes of neurodegenerative outcomes that require further evaluation.

4380. Pugh, M. J. V., et al. (2015). "The prevalence of epilepsy and association with traumatic brain injury in veterans of the Afghanistan and Iraq wars." The Journal of head trauma rehabilitation **30**(1): 29-37.

OBJECTIVE: To examine the association of epilepsy with traumatic brain injury (TBI) in Afghanistan and Iraq (Operation Enduring Freedom [OEF]/Operation Iraqi Freedom [OIF]) Veterans., DESIGN: Cross-sectional observational study., PARTICIPANTS: A total 256 284 OEF/OIF Veterans who received inpatient and outpatient care in the Veterans Health Administration in fiscal years 2009-2010., MAIN OUTCOME MEASURES: We used algorithms developed for use with International Classification of Diseases, Ninth Revision, Clinical Modification, codes to identify epilepsy, TBI (penetrating TBI [pTBI]/other TBI), and other risk factors for epilepsy (eg, stroke). TBI and other risk factors were identified prior to the index date (first date of seizure or October 1, 2009) for primary analyses., RESULTS: Epilepsy prevalence was 10.6 per 1000 (N = 2719) in fiscal year 2010; age-adjusted prevalence was 6.1. Of 37 718 individuals with a diagnosis of TBI, 29 297 Veterans had a diagnosis of TBI prior to the index date. Statistically significant associations were found between epilepsy and prior TBI diagnosis (pTBI: adjusted odds ratio = 18.77 [95% confidence interval, 9.21-38.23]; other TBI: adjusted odds ratio = 1.64 [1.43-1.89])., CONCLUSIONS: Among OEF/OIF Veterans, epilepsy was

associated with previous TBI diagnosis, with pTBI having the strongest association. Because war-related epilepsy in Vietnam War Veterans with TBI continued 35 years postwar, a detailed, prospective study is needed to understand the relationship between epilepsy and TBI severity in OEF/OIF Veterans.

4381. Punjabi, S. K., et al. (2012). "Associated injuries with facial trauma - A study." Journal of the Liaquat University of Medical and Health Sciences **11**(2): 60-63.

Objectives: The objectives of the study were to determine the incidence of associated injuries with maxillofacial fractures and to enlist the age and gender distribution of maxillofacial trauma and also to find out cause, bone most frequently affected with it. Material and Methods: History was taken from patients affected with facial trauma along with 2 diagnostic radiographs. Age, gender, cause, type of injury and fractures elsewhere in the body were recorded. Study was carried out at Emergency Department of Liaquat University Hospital Hyderabad in a period of 1 year i.e. from 1st January 2011 to 30 December 2011. Results: Total of 680 patients was included in this study. Out of these males were predominantly affected (72%), mean age was found to be 36.4 years. Road traffic accident (RTA) was the most common cause of injury (51%) and mandible was the most common bone involved (51%). Out of associated injuries tibia (12.35%) and ulna (11.23%) were most common injuries. Conclusion: Our study showed a high frequency of trauma in males in 3rd decade of life. Road traffic accident (RTA) was the most common cause and mandible the most common bone affected. Tibia and ulna were common associated injuries with facial trauma.

4382. Punt, J. (1978). "Chronic extradural hematoma presenting 33 years after penetrating cranial trauma. Case report." Journal of neurosurgery **49**(1): 103-106.

A case is reported of a 53-year-old normotensive man who presented, 33 years after a penetrating cranial war injury, with dysphasia of 10 month's duration, which proved to be due to a chronic extradural hematoma. The pathogenesis and symptomatology are discussed, and it is proposed that the lesion had been present since the original injury.

4383. Puntaric, D., et al. (2000). "Neurologic recovery after penetrating craniocerebral war injury." Neuroepidemiology **19**(3): 149-152.

From June 1, 1991, until December 31, 1992, 116 patients with penetrating craniocerebral war injuries inflicted at the east Slavonian front were treated at the Osijek University Hospital. There were 26 (22.4%) gunshot wounds and 90 (77.6%) wounds inflicted by explosive devices and projectiles. Four years after the injury, a study of the survivors' condition was carried out. No difference was recorded in the survival rate between the patients with gunshot wounds compared with explosive wounds. Rehabilitation produced good results in the survivors, in the prevention of both acute and chronic complications and permanent damage. Older age, lower Glasgow Coma Scale, and level of consciousness were found to be prognostic indicators of outcome. Copyright 2000 S. Karger AG, Basel

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4384. Purdiaev, I. S. (1979). "[Preventive wound of the skull inflicted via the nasal aperture]." Pronikaiushcheee ranenie cherepa, nanesennoe cherez otverstie nosa. **22**(1): 54-56.

4385. Puri, B. K., et al. (1994). "Self-inflicted intracranial injury." The British journal of psychiatry : the journal of mental science **164**(6): 841-842.

4386. Puri, P., et al. (1999). "Management of ocular perforations resulting from peribulbar anaesthesia." Indian journal of ophthalmology **47**(3): 181-183.

PURPOSE: To analyze the clinical presentation and outcome of treatment for globe perforation secondary to peri-bulbar anaesthesia., METHODS: Eight patients (3 females and 5 males) aged 66-84 years were included in the study. Ocular perforations were suspected in 3 cases before or during surgery, in 4 cases diagnosis was established within one week and in one case at 3 weeks. Three patients underwent indirect argon laser photocoagulation to seal the retinal break, one patient had cryotherapy, 3 patients underwent a pars plana vitrectomy with fluid gas exchange and endo-

laser; and one patient refused any further treatment., RESULTS: The final visual acuity after a mean follow up of 14 months was better than 6/9 in 2 patients, between 6/9-6/12 in 4 patients, and perception of light in 2 patients., CONCLUSION: If diagnosed early and treated adequately, a majority of patients with globe perforation during periocular anaesthetic could be saved.

4387. Purushothuman, S., et al. (2013). "The response of cerebral cortex to haemorrhagic damage: experimental evidence from a penetrating injury model." PloS one **8**(3): e59740.

Understanding the response of the brain to haemorrhagic damage is important in haemorrhagic stroke and increasingly in the understanding the cerebral degeneration and dementia that follow head trauma and head-impact sports. In addition, there is growing evidence that haemorrhage from small cerebral vessels is important in the pathogenesis of age-related dementia (Alzheimer's disease). In a penetration injury model of rat cerebral cortex, we have examined the neuropathology induced by a needlestick injury, with emphasis on features prominent in the ageing and dementing human brain, particularly plaque-like depositions and the expression of related proteins. Needlestick lesions were made in neo- and hippocampal cortex in Sprague Dawley rats aged 3-5 months. Brains were examined after 1-30 d survival, for haemorrhage, for the expression of hyperphosphorylated tau, Abeta, amyloid precursor protein (APP), for gliosis and for neuronal death. Temporal cortex from humans diagnosed with Alzheimer's disease was examined with the same techniques. Needlestick injury induced long-lasting changes-haem deposition, cell death, plaque-like deposits and glial invasion-along the needle track. Around the track, the lesion induced more transient changes, particularly upregulation of Abeta, APP and hyperphosporylated tau in neurons and astrocytes. Reactions were similar in hippocampus and neocortex, except that neuronal death was more widespread in the hippocampus. In summary, experimental haemorrhagic injury to rat cerebral cortex induced both permanent and transient changes. The more permanent changes reproduced features of human senile plaques, including the formation of extracellular deposits in which haem and Abeta-related proteins co-localised, neuronal loss and gliosis. The transient changes, observed in tissue around the direct lesion, included the upregulation of Abeta, APP and hyperphosphorylated tau, not associated with cell death. The findings support the possibility that haemorrhagic damage to the brain can lead to plaque-like pathology.

4388. Puschel, K., et al. (2001). "[Once again: risk of injury caused by blank pistols]." Noch einmal: Verletzungsgefahren durch Schreckschusswaffen. **207**(1-2): 26-32.

The nature and extent of the use of blank pistols in Hamburg (according to the Hamburg crime statistics about 300 to 400 such cases per year; 34 cases involving head and neck wounds from 1989 to 1999 were investigated at our institute; among these 8 suicides, no homicide) as well as patterns of injuries caused by close distance blank pistol shots were analysed. 7 of these cases are described in detail. The results of our studies corroborate the warning statements made by many criminological and medico-legal experts regarding the danger inherent in these allegedly harmless weapons. Blank cartridge pistols can, when shot from a close distance, cause most severe injuries involving penetration into body cavities and bodily organs (especially in the head and neck), and even perforation of the skull. Therefore, we call for a much stricter control of weapons of this kind.

4389. Puspitasari, V., et al. (2019). "Glial Fibrillary Acidic Protein Serum Level as a Predictor of Clinical Outcome in Ischemic Stroke." Open access Macedonian journal of medical sciences **7**(9): 1471-1474.

BACKGROUND: Glial Fibrillary Acidic Protein (GFAP) is a protein produced by astrocytes in response to brain injury, which then penetrates the cerebrospinal fluid and the blood stream., AIM: We sought to determine whether GFAP serum level in acute ischemic stroke could predict clinical outcome., METHODS: As much as 64 patients with first-ever ischemic stroke had their GFAP serum level measured at 72 hours after onset. The National Institute of Health Stroke Scale (NIHSS) was assessed during the 72 hours of onset, the seventh day, and followed up 1 month after., RESULTS: There were 46 men and 18 women included in the study. Mean age was 58.3 years old, and nearly half of them (46.9%) were between 50-59 years old. More than half (58.7%) presented with moderate to a severe stroke and mean GFAP serum level was 0.113 +/- 0.029 ng/mL. GFAP serum levels had a significant correlation with NIHSS after 1 month (p = 0.04, r = 0.259)., CONCLUSION: There is a significant correlation between GFAP serum levels with stroke severity scale after 1 month of stroke onset.

4390. Puybasset, L., et al. (2014). "Critical appraisal of organ procurement under Maastricht 3 condition." Annales francaises d'anesthesie et de reanimation **33**(2): 120-127.

The ethics committee of the French Society of Anesthesia and Intensive Care (Sfar) has been requested by the French Biomedical Agency to consider the issue of organ donation in patients after the decision to withdraw life-supportive therapies has been taken. This type of organ donation is performed in the USA, Canada, the United Kingdom, the Netherlands and Belgium. The three former countries have published recommendations formalizing procedures and operations. The French Society of Anesthesia and Intensive Care (Societe francaise d'anesthesie et de reanimation [Sfar]) ethics committee has considered this issue and envisioned the different aspects of the whole process. Consequently, it sounded a note of caution regarding the applicability of this type of organ procurement in unselected patients following a decision to withdraw life-supportive therapies. According to French regulations concerning organ procurement in brain-dead patients, the committee stresses the need to restrict this specific way of procurement to severely brain-injured patients, once confirmatory investigations predicting a catastrophic prognosis have been performed. This suggests that the nature of the confirmatory investigation required should be formalized by the French Biomedical Agency on behalf of the French parliamentarians, which should help preserve population trust regarding organ procurement and provide a framework for medical decision. This text has been endorsed by the Sfar.

4391. Pykhteeva, E. N., et al. (2007). "[A combined penetrating gunshot wound of the orbit, maxillary sinus and cells of the ethmoid bone]." Vestnik otorinolaringologii(4): 64-65.

4392. Qi, H. and K. Li (2021). "Civilian gunshot wounds to the head: a case report, clinical management, and literature review." Chinese Neurosurgical Journal **7**(1).

Background: Civilian gunshot wounds to the head refer to brain injury caused by projectiles such as gun projectiles and various fragments generated by explosives in a power launch or explosion. Gunshot wounds to the head are the deadliest of all gun injuries. According to literature statistics, the survival rate of patients with gunshot wounds to the head is only 9%. Due to the strict management of various types of firearms, they rarely occur, so the injury mechanism, injury and trauma analysis, clinical management, and surgical standards are almost entirely based on military experience, and there are few related reports, especially of the head, in which an individual suffered a fatal blow more than once in a short time. We report a case with a return to almost complete recovery despite the patient suffering two gunshot injuries to the head in a short period of time. Case presentations: We present a case of a 53-year-old man who suffered two gunshot injuries to the head under unknown circumstances. On initial presentation, the patient had a Glasgow Coma Scale score of 6, was unable to communicate, and had loss of consciousness. The first bullet penetrated the right frontal area and finally reached the right occipital lobe. When the patient reflexively shielded his head with his hand, the second bullet passed through the patient's right palm bone, entered the right frontotemporal area, and came to rest deep in the lateral sulcus. The patient had a cerebral hernia when he was admitted to the hospital and immediately entered the operating room for rescue after a computed tomography scan. After two foreign body removals and skull repair, the patient recovered completely. Conclusions: Gunshot wounds to the head have a high mortality rate and usually require aggressive management. Evaluation of most gunshot injuries requires extremely fast imaging examination upon arrival at the hospital, followed by proactive treatment against infection, seizure, and increased intracranial pressure. Surgical intervention is usually necessary, and its key points include the timing, method, and scope of the operation.

4393. Qian, C. and C.-c. Chen (2004). "[Three-dimensional architecture and ultrastructure of the cerebral microvasculature of missile brain wound in cats]." Di 1 jun yi da xue xue bao = Academic journal of the first medical college of PLA **24**(7): 765-767.

OBJECTIVE: To explore the changes of cerebral microvasculature in cats with missile brain wound., METHODS: The microvascular corrosion casts of the brain were examined by scanning electron microscopy, and the ultra-thin slices of the brain were inspected by transmission electron microscopy., RESULTS: The brain microvasculature showed evidently abnormal morphological changes, with both vasospasm and vasodilation as well as concurrent bleeding and ischemia. Strong pathological contraction of vascular sphincter, rupture of some microvessels, and increased microvilli

and vacuoles in the endothelial cells were observed. Loosening of the intercellular tight junction and basal membrane rupture occurred along with perivascular swelling and neural cell damages., CONCLUSION: Morphological or functional changes occur in the cerebral microvasculature leading to secondary brain injury after missile brain wound in cats.

4394. Qin, Z. M. (1981). "[Roentgen manifestation of penetrating gunshot injuries of the head (analysis of 116 cases) (author's transl)]." Zhonghua fang she xue za zhi Chinese journal of radiology **15**(4): 290-293.

4395. Qiu, W. W., et al. (1999). "Neurotologic evaluation of facial nerve paralysis caused by gunshot wounds." Ear, nose, & throat journal **78**(4): 270-passim.

Facial nerve injury is one of the most common neurotologic sequelae of a gunshot wound (GSW) to the head or neck. However, few neurotologic studies have been performed on the nature and time course of such facial nerve impairments. This study was designed to characterize the neurotologic manifestations and time course of facial nerve paralysis caused by GSWs to the head and neck. We conducted a battery of electrodiagnostic tests on 10 patients who had experienced traumatic facial paralysis due to a GSW to the head or neck. The etiologies of facial nerve paralysis--including direct injury, compression, fracture, and concussion of the temporal bone--were demonstrated by audiologic, radiologic, and surgical findings. Hearing loss and other cranial nerve injuries were also seen. Six of the 10 patients experienced a complete paralysis of the facial nerve and a poor recovery of its function. We also present a comprehensive case report on 1 patient as a means of discussing the evaluation of facial nerve function during the course of management.

4396. Quatrehomme, G., et al. (2016). "Bone beveling caused by blunt trauma: a case report." International journal of legal medicine **130**(3): 771-775.

The authors report a fatal case of blunt trauma to the skull caused by a rib of a beach umbrella. The skull displayed a round hole in the right temporal bone with typical internal beveling. Blunt trauma mimicking a gunshot wound (round perforation of the skull with internal beveling) is very rarely reported in the forensic literature.

4397. Quattrocchi, K. B., et al. (1990). "Traumatic aneurysm of the superior cerebellar artery: case report and review of the literature." Neurosurgery **27**(3): 476-479.

Less than 10% of the 250 reported cases of traumatic intracranial aneurysms have involved the posterior circulation. Traumatic aneurysms of the superior cerebellar artery are extremely rare, with only three cases previously reported. This is the first report of a traumatic superior cerebellar artery aneurysm in which the diagnosis was suggested by computed tomographic scan. The potential for a good outcome suggests the value of early angiography when the history and diagnostic imaging studies suggest the possibility of a traumatic aneurysm.

4398. Queiroz, A. B., et al. (2017). "Endovascular treatment of traumatic injuries of the vertebral artery: Initial experience of a teaching hospital." Vascular **25**(3): 48.

Background: Trauma of the vertebral artery with subsequent formation of a pseudoaneurysm is an uncommon clinical situation and is associated with a high mortality rate, due to either further bleeding or occurrence of neurological complications. Its incidence is most often related to penetrating cervical trauma. The clinical presentation is varied, being asymptomatic or presenting signs and symptoms as pulsatile mass, vertigo, diplopia or headache. The management of these lesions aims mainly to restore the habitual flow of this artery, free of cerebral events with the preservation of life. The endovascular treatment of these lesions is a viable option and presents good clinical results according to the literature. Aim: To describe the initial clinical and angiographic results of endovascular therapy in the treatment of posttraumatic vertebral artery pseudoaneurysms in a teaching institution. Materials and Methods: Two cases of post-traumatic vertebral artery pseudoaneurysms were reported and treated in the year 2016 at the Endovascular Surgery Department of the Ana Nery Hospital, in Salvador-Bahia. The mean age was 19 years (16-22 years), all the patients were male with injuries secondary to penetrating gun shot wound in the cervical region. All cases underwent arterial embolization with coils. Results: In both patients, endovascular therapy resulted in an immediate occlusion of the pseudoaneurysms with good clinical and angiographic results. Conclusion: In this initial sample, the

endovascular approach of post-traumatic vertebral artery pseudoaneurysms proved to be safe and effective, presenting as an important option for the therapeutic arsenal of the modern vascular surgeon.

4399. Queiroz, L. S. and J. Lopes de Faria (1978). "Evolution of dark neurons in experimental brain stab wounds." Virchows Archiv. B, Cell pathology **28**(4): 361-370.

4400. Quencer, R. M., et al. (1976). "Jugular venography for evaluation of abnormalities of the skull base." Journal of neurosurgery **44**(4): 485-492.

Jugular venography done to evaluate abnormalities at the base of the skull demonstrated three distinctly different patterns depending on whether there is occlusion, invasion, or growth with in the internal jugular vein. Improper technique results in a lack of intracranial dural sinus filling which may masquerade as venous occlusion. This problem is avoided by adequate neck compression along with proper volume and rate of delivery of contrast. Radiographically, an abnormal jugular vein at the base of the skull will show a concave defect in true occlusion, constriction or invasion of the vein by tumor, or tumor growth within the vein.

4401. Quenzer, F., et al. (2021). "Self-Inflicted Gun Shot Wounds: A Retrospective, Observational Study of U.S. Trauma Centers." The western journal of emergency medicine **22**(3): 518-524.

INTRODUCTION: Intentional self-harm (suicide) by firearms is a growing problem in the United States. Currently, there are no large studies that have identified risk factors for patients who die from self-inflicted gunshot wounds. Our objectives are to 1) identify risk factors for patients with the highest morbidity and mortality from self-inflicted gunshot wounds (SIGSWs) at trauma centers 2) present the outcomes of victims of SIGSW by handguns (HG) versus all other specified guns (AOG) and 3) compare the presentations and outcomes of victims with head or face (HF) injuries to other regions of the body., METHODS: We performed a retrospective analysis from the National Trauma Database (NTDB) data between 2012 and 2013 of all SIGSW patients who presented to trauma centers. Categorical data included patient characteristics upon presentation and outcomes which were compared between patients with HG injury versus AOG injury using the Chi-Squared test, where AOG includes shotguns, hunting rifles, and military firearms. Additionally, analysis of head and face (HF) injuries versus other bodily injuries (OBI) were compared between the HG group versus AOG group using Chi-squared test., RESULTS: There were 7,828 SIGSWs, of those, 78% (6,115) were white and 84.3% (6,600) were male. There were 5,139 HG injuries, 1,130 AOG injuries, and 1,405 unidentified gun injuries. The HG group was likely to be older (>55 years old), hypotensive (systolic blood pressure < 90), have a lower Glasgow Coma Score (GCS < 9), use illegal, or use prescription drugs. In comparing HF injuries (4,799) versus other bodily injuries (OBI) (3,028), HF group was more likely to use handguns, expire in ED, require ICU, and have a higher percent of overall mortality. Of the total OBI, the thorax, upper extremities, and abdomen were the most commonly injured., CONCLUSION: In our retrospective study of SIGSWs, we were able to demonstrate that SIGSW by handguns are associated with higher rates of mortality versus all other types of firearms. SIGSWs in older white males with handguns are the most at-risk for severe complications. Future efforts should improve screening methods for handguns in suicidal patients and at developing prevention programs.

4402. Quesada, L. M., et al. (2018). "PBBI lesion, axonal injury reduced while improving motor outcome with human neural stem cell transplants." Journal of neurotrauma **35**(16): A113-A114.

Penetrating traumatic brain injury(PTBI) is common in the USA and worldwide, outcome remains poor in survivors. In the absence of ''neuroprotective'' therapies, progressive secondary tissue loss after PTBI underlies disability among survivors. This study tests transplantation of human neural stem cells (hNSCs) as a treatment to mitigate lesion in penetrating ballistic-like brain injury (PBBI), a rat PTBI model. One-week post PBBI male Sprague Dawley rats (7-10/ group) were randomized to: (1) injured treated with vehicle (media, no cells), (2) uninjured (sham+hNSCs), two PBBI groups (PBBI+hNSC) either (3) into surrounding (peri) or (4) within lesion core(intra), one million cells were stereotactically microinjected into brains of immunosuppressed group 2-4. Motor function was assessed on grid walk prior to euthanization at 12 weeks post-transplantation. Lesion size, axonal injury was quantitated with Matlab based scripts of brain sections stained with histochemical stains. Lesion size and remote secondary axotomy were significantly reduced in transplant groups. Engraftment or neuronal differentiation did not differ between groups 3 and 4, despite

being higher than in sham. On the grid walk test, sham animals had fewer foot faults than vehicle group as expected. Compared to vehicle, groups 3 and 4 had significantly reduced foot faults but still significantly higher than control. A two-way ANOVA of the rat brain cortical tissue quantity between +3.72mm and -0.28mm bregma (rat motor cortex) there was significant interaction between bregma levels and treatment. There was reduction in lesion size in both transplant groups ($p < 0.05$). Lesion seize reduction was due to significant increase in tissue sparing in the perilesional transplant group compared to vehicle ($p < 0.01$). One-way ANOVA revealed no statistically significant differences in spared tissue between two transplant groups but greater sparing of the motor cortex in perilesional transplantation. The concomitant reduction in lesion area and increased cortical tissue sparing suggests that transplantation of hNSCs reduced the progression of PBBI induced cortical atrophy, spared motor cortex reduced secondary axotomy may be associated with improved motor performance in transplant groups. This data provides a rationale for use of hNSC transplants to mitigate PTBI induced secondary tissue loss. Perilesional rather than intralesional transplantation conferred greater neuroprotection.

4403. Quinn, L. M., et al. (2006). "Transorbital penetrating brainstem injuries." Archives of ophthalmology (Chicago, Ill. : 1960) **124**(6): 915-916.

4404. Quinones-Hinojosa, A., et al. (2004). "Diagnosis of posttraumatic transverse sinus thrombosis with magnetic resonance imaging/magnetic resonance venography: report of two cases." The Journal of trauma **56**(1): 201-204.

4405. Rabái, F., et al. (2014). "Contralateral and third ventricular compression are early CT signs heralding secondary infarcts in non-penetrating severe traumatic brain injury." Journal of neurotrauma **31**(5): A67.

Posttraumatic secondary infarction (PTCI) is a common secondary injury following severe traumatic brain injury (sTBI). Several risk factors for PTCI have been identified including low admission GCS, raised ICP, herniation and decompression surgery but no known early CT signs predicting PTCI have been identified yet. Existing CT classifications (e.g., Marshall Classification and Rotterdam Score) predict overall prognosis, but have not been validated for predicting PTCI. We aimed to identify early CT signs as risk factors of PTCI. A prospective convenience controlled cohort study enrolled 131 adult patients with sTBI. CT scans were evaluated retrospectively for the presence of secondary infarcts, third ventricular compression, contralateral ventricular compression in relation to primary mass lesion, intra-ventricular hemorrhage, basal and cortical subarachnoid hemorrhage in patients with and without secondary infarcts. Fifteen of 131 patients (11.4%) developed secondary infarcts. Third ventricular compression and contralateral ventricular compression on initial CT scan was seen more frequently in patients with PTCI: 14/15 vs 55/116 (OR = 15.5; 95%CI 1.98-121.98 $p < 0.01$) and 10/15 vs 20/ 116 (OR = 9.6; 95%CI 2.96-31.14 $p < 0.01$), respectively. Contralateral and 3rd ventricular compression were found to correlate with the development of PTCI. These CT signs can be considered as surrogate markers of CSF volume loss, an early compensatory step in intracranial swelling often seen in sTBI. Subsequent rise in ICP can lead to herniation, vessel compression and ultimately secondary infarcts. Identification of these early CT signs may lead to intensified treatment and to reduced risk of secondary infarcts.

4406. Rabb, C. H. (1995). "Options for cerebral protection after penetrating head injury." Neurosurgery clinics of North America **6**(4): 643-656.

The medical management of secondary brain injury is entering a new era in which the fruits of labor in the laboratory are paying off in the form of legitimate agents for use in human trials. As more about pathophysiology of traumatic-ischemic brain injury becomes known, more effective means for pharmacologic intervention and neuronal salvage will emerge, and optimism is high that we are approaching an era that will witness improvements in functional survival that have been heretofore unwitnessed.

4407. Rabbani, C. C., et al. (2020). "The association of weather, temperature, and holidays on pediatric maxillofacial trauma." Laryngoscope Investigative Otolaryngology **5**(5): 846-852.

Objective: To evaluate the association of weather, seasons, months and holidays on the frequency and pattern of pediatric facial fractures. Methods: Retrospective review of pediatric patients treated for facial fractures at two Level I

trauma centers in a midsize Midwestern US city over a 5-year period. Patients were included only if presentation was within 3 hours of inciting trauma, transfers from other facilities were excluded. Demographic characteristics, fracture patterns, operative interventions, weather data, and local public school schedules were acquired and associations were analyzed with unpaired t tests, χ2, multivariate and binomial regression model analyses. Results: Two hundred and sixty patients were included. The average age (SD) was 11.8 (5.0) years, with 173 males and 87 females. The highest distribution of presentations occurred in the summer season (35.0%), on weekends and holidays (58.1%), and when the weather was described as clear (48.5%). The most common mechanisms of injury were motor vehicle collisions (25.8%), followed by sports—(21.5%) and assault—(16.5%) related injuries. Mechanisms were significantly associated with certain fracture patterns. Older age was associated with fewer orbital fractures (P <.01). Seventy-five patients (28.8%) required operative intervention. Age was found to impact the likelihood of operative intervention (Exp(β) = 1.081, P =.03) while weather, temperature, and mechanism did not. Conclusion: Pediatric facial fractures are linked to warmer weather with clear skies and warmer season. Age predicts some fracture patterns and need for operative intervention. These results can be used to inform public health interventions, policymaking, and trauma staffing. Level of Evidence: Level 2b (retrospective cohort).

4408. Rabinovich, Y., et al. (2005). "Survival with intact cerebral function after gunshot injury to both internal carotid arteries." Journal of vascular surgery **42**(3): 567-569.

A 24-year-old man was admitted after sustaining a single gunshot wound to the neck with an expanding hematoma on the left. Computed tomography angiography demonstrated bilateral internal carotid artery pseudoaneurysms, with disruption of flow on the left and a carotid-jugular fistula on the right. At operation, transection of the left internal carotid artery necessitated ligation of the artery. No injuries to the trachea or larynx were found, but the pharynx was lacerated and was repaired. The patient was transferred to the angiography suite where a stent graft was placed in the right internal carotid artery. This served to close the pseudoaneurysm and the arteriovenous fistula while preserving distal flow. The patient recovered with intact cerebral function and with mild paresis of the tongue related to hypoglossal nerve injury. He was discharged home after 7 days.

4409. Rabinowitz, M. P. and S. M. Goldstein (2013). "Diesel fuel injury to the orbit." Ophthalmic plastic and reconstructive surgery **29**(1): e31-33.

A 48-year-old man was seen in the Wills Eye Institute emergency room for pain and decreased vision after having a diesel engine fuel cylinder explosion in his face. Clinical examination showed proptosis, decreased extraocular motility, and increased intraocular pressure; CT scan imaging revealed hypodense areas within the orbit. His orbital signs rapidly worsened despite aggressive antibiotics, steroids, and surgical intervention. Two orbitotomies revealed diesel fuel infiltration of the intraconal and extraconal spaces that proved impossible to evacuate completely. The patient ended up losing vision from an intense chemical cellulitis with subsequent orbital compartment syndrome and optic neuropathy. This case highlights the severity of orbital chemical injuries and their variable prognoses despite aggressive management.

4410. Rabiu, T. (2011). "Posttraumatic seizures in a new rural neurosurgery service: Patterns and risk factors." Epilepsia **52**: 133.

Purpose: Traumatic brain injury (TBI) is a well recognized risk factor for seizures. Whereas TBI is a common occurence in Nigeria, a developing economy, there is paucity of literature on posttraumatic seizures (PTS) in the Nigerian population with TBI. We have recently pioneered a rural neurosurgical service in a Nigerian tertiary health centre in the country. This study provides our preliminary report on the profile and pattern of PTS in TBI patients. Method: A prospective observational study of TBI patients was carried out between November 2010 and March 2011. Patients demographics, nature of TBI, type of seizure (early or late), seizure semiology and cranial computerized tomography (CT) findings were assessed. Simple descriptive data analysis was done. Result: Forty-five patients were managed for TBI within the study period. Of these, 39(86.7%) were males while 6 (13.3%) were females. Eight (17.8%) of the patients were children. There were 25 (55.5%), 8 (17.8%), and 12 (26.7%) cases of mild, moderate and severe head injury respectively. Three (6.7%) patients had open depressed skull fracture while 2 (4.4%) had gunshot wound to the head (GSWH). There were 4 (8.9%) cases of early PTS and these were in patients with severe head injury, 3 (75%) of whom had acute subdural hematoma on CT scan while the fourth had GSWH. Seizure occured in three of them within 24 h of

trauma while it occured on the 5th day posttrauma in the other. Only two of them required anticonvulsant therapy because of recurrence but none progressed to late PTS. One patient who was managed for mild head injury a year previously presented with late posttraumatic seizures that were well-controlled with anticonvulsant. Conclusion: Most cases of PTS are associated with severe TBI, acute subdural hematoma and GSWH. Progression of early to late PTS is rare.

4411. Rabl, W., et al. (1998). "Ballistic aspects of tandem-loaded cartridges of identical caliber." International journal of legal medicine **112**(1): 58-61.

Tandem loading of a cartridge of the same caliber is possible only if the diameter of the barrel is sufficiently wide. This requirement is met by the .22 long shot Anschutz miniature clay pigeon gun. Ballistic experiments with tandem-loaded cartridges of the same caliber as those loaded in the normal way showed the bullet of the regularly loaded cartridge to impact the muzzle-loaded cartridge. On firing a shot, the bullet of the posterior cartridge penetrates the anterior one, expanding the case of the first cartridge to the diameter of the barrel and disintegrating the bullet. Regardless of whether the muzzle-loaded cartridge is ignited or not, the discharge speed of the projectiles (v0) is considerably below that of single shots. Calculations yielded a theoretical reduction by about 60%. In accordance with the formula E=1/2*m*v2, in terms of the energy released, the elevated mass of the projectile is of secondary importance compared with the reduction of v0. Although the "projectile" mass is more than twice the normal rate, the energy density is significantly reduced and the biological effect is attenuated. This also became apparent in the failed suicide attempt of a 43-year-old male who used a miniature clay pigeon gun to shoot himself in the forehead at a range of a few centimeters. He had inserted a second cartridge, base to head with the first cartridge, in the factory-bored barrel of the gun. The leading cartridge was destroyed by the regularly loaded one. The pierced and expanded case of the leading cartridge was found nearby the injured man and was at first taken to be the jacket of a larger-caliber bullet.

4412. Racadio, J. M., et al. (2006). "Three-dimensional rotational angiography of neurovascular lesions in pediatric patients." AJR. American journal of roentgenology **186**(1): 75-84.

OBJECTIVE: In this pictorial essay, we review the 3D rotational angiography (RA) studies of six pediatric patients; in these cases, the information obtained with 3D RA was uniquely beneficial in diagnosis and treatment planning., CONCLUSION: Three-dimensional RA is an excellent tool for the evaluation of a number of intracranial lesions in pediatric patients: There is less total radiation exposure from a single rotational run than from CT or a conventional angiography examination that involves more than one view and the study is quick, with data acquisition requiring less than 8 sec and fully rendered 3D reconstructions generated within 180 sec.

4413. Racette, S. and A. Sauvageau (2008). "Suicide by drowning after two gunshots to the head: a case report." Medicine, science, and the law **48**(2): 170-172.

Differentiation between suicide and homicide can be problematic for forensic pathologists, especially when a complex method of suicide is used by the victim. Multiple gunshot suicides have been previously reported in the forensic literature. However, multiple gunshots combined with other suicidal methods are rare. In this article the authors report the unusual case of a floating body recovered from a river, with two gunshot wounds to the head. The autopsy showed that both gunshot wounds were nonlethal and the cause of death was attributed to drowning. Though homicide was strongly suspected at first, the manner of death was later established as suicide.

4414. Radabaugh, H., et al. (2022). "HARMONIZING DATA ACROSS OPERATION BRAIN TRAUMA THERAPY IDENTIFIES DISTINCT, BIOMARKERPROJECTED MULTIMODAL PROFILES OF THREE TYPES OF EXPERIMENTAL TRAUMATIC BRAIN INJURY." Journal of neurotrauma **39**(11-12): A75.

The multi-center Operation Brain Trauma Therapy (OBTT) consortium generated a large dataset comparing outcomes across animal models. We explored the potential utility of harmonizing data from 531 male rats subjected to one of three TBI models (fluid percussion injury [FPI], controlled cortical impact [CCI], and penetrating ballistic-like brain injury [PBBI]) and the predictive value of bloodbased biomarkers. One-month of testing including blood biomarkers (glial fibrillary acidic protein [GFAP] and Ubiquitin carboxy-terminal hydrolase-L1 [UCH-L1]), behavior, and histology followed injury. Applying common data elements, variables from each center were harmonized. The stats and syndRomics R

packages were used for analysis and interpretation. We observed associations between biomarkers, behavior, and histology explaining 96.2% of the variance. PC loadings found these associations to be injury-type dependent. The best behavior and least severe histological measures exhibited an exaggerated GFAP 4h response dissipating by 24h. UCH-L1 impact was near-zero. Rats in the middle of behavioral and histological severity showed increased UCH-L1 (both time points) and increased GFAP at 24h. The most impaired behavior and severe histology were associated with both UCH-L1 time points but never GFAP. Plotting each rat across PC1 and PC2 revealed these profiles corresponded to FPI, CCI, and PBBI, respectively. We report successful harmonization of data across OBTT, demonstrating that TBI models yield identifiably distinct injuries. This work also emphasizes the importance of data sharing and interoperability approaches to identify phenotypebiomarker associations and develop innovative data-driven strategies for precision medicine in TBI.

4415. Radford, G. E., et al. (2016). "Simulating backspatter of blood from cranial gunshot wounds using pig models." International journal of legal medicine **130**(4): 985-994.

Few studies have examined the biomechanical basis for backspatter from cranial gunshot wounds. Backspatter is material which travels against the direction of fire following ejection from a gunshot entrance wound. Our paper focuses on the use of animals for reconstructing this phenomenon. Five live pigs and several slaughtered pigs were shot using either 9 x 19 mm, 115 grain, full metal jacketed ammunition or .22 long rifle, 40 grain, lead, round-nose ammunition. A high-speed camera was used to record the entrance wound formation and backspatter. A small amount of backspattered material was produced with all targets, and blood backspatter was seen in a few cases. However, we conclude that our model provides an understanding of the phenomenon of backspatter and the physical mechanisms associated with it. The various components of the mechanism of backspatter formation are complex and overlap. The principle mechanism observed in pig cranial gunshots was the high-speed impact response of the skin overlying the skull bone. This study has also produced evidence supporting the view that backspatter can result from the splashing of superficial blood if it is already present on the skin. Subcutaneous gas effects have been demonstrated for backspatter from contact shots. There has been no clear evidence of the role of the collapse of a temporary cavity within the brain.

4416. Radu, A. and M. P. Horan (2017). "Implant success rate in head and neck pathology patients reconstructed with a free flap graft." Journal of oral and maxillofacial surgery **75**(10): e372-e373.

Patients treated for head and neck pathology often undergo extensive treatment including surgical resection of the mandible/maxilla, reconstruction with free flap grafts, chemotherapy and radiation therapy. Following their treatment, these patients, albeit disease free, find themselves unable to perform basic functions, such as speaking or chewing. Therefore, restoring these patients to full function and esthetics is an equally important aspect of treating them. The reconstruction of maxillomandibular defects following ablation for tumors or osteoradionecrosis with free flaps has been demonstrated to be a reliable technique1. The purpose of this study was to analyze the success rate for dental implants in sites that have been altered through surgery or radiation therapy. It was hypothesized that there is no difference in the success rate for dental implant placement between patients with free flap reconstruction and patients with dental implants placed in native maxillofacial bones. This is an IRB approved study that retrospectively investigates the success rate of implant placement in free flap grafts in patients who were reconstructed for either benign or malignant pathology. We analyzed records from the Oral and Maxillofacial Surgery department at the Cleveland Clinic in Cleveland, OH starting from January 2012 to January 2017. The data was analyzed using Microsoft Excel data analysis tool pack. Also, descriptive statistics were used to evaluate the qualitative aspect of the data. The medical record data was obtained through chart review of the electronic medical record. The primary study aims were to determine the success rate of dental implants in patients with free flap reconstruction in a single institution over the past 5 years, to investigate the reasons for failure of implants that were deemed unsuccessful in patients with free flap reconstruction, and to understand the differences in surgical procedures between placing implants in patients with native mandibular or maxillary bone vs free flap grafts. Ten patients were included in this investigation, 5 females (50%) and 5 males (50%), with the average age of 65 (range 14-72). For each patient, the demographic information was gathered (age, gender, race) together with the medical and surgical history. One patient (10%) had a anteriolateral free flap, one patient (10%) has a radial free flap, and 8 patients (80%) had a free fibula flap reconstruction. One patient (10%) was reconstructed after suffering a gun shot wound to the face, one patient (10%) suffered from a benign neoplasm, and 8 patients (80%) suffered from malignant neoplasms. Fifty four implants were placed in the osseous segment of the free flap, with 12 implants (22.2%) placed in the maxilla and 42 implants (77.8%) placed in the mandible. Ten implants (18.5%) in three patients (33.3%) were removed due to lack of osseointegration. The success rate was calculated to be 80.5% which is

lower than the 94.5% success rate2 reported in previous studies in this patient population. Besides implant failure, the most common complication experienced was the persistence of hyperplastic soft tissue that had to be removed in 4 patients (40%) prior to delivery of the prosthesis. Based on this study, it was concluded that restoring patients with dental implants in vascularized bone grafts is a reliable method to restore function and esthetics.

4417. Rafaels, K. A., et al. (2015). "Injuries of the head from backface deformation of ballistic protective helmets under ballistic impact." Journal of forensic sciences **60**(1): 219-225.

Modern ballistic helmets defeat penetrating bullets by energy transfer from the projectile to the helmet, producing helmet deformation. This deformation may cause severe injuries without completely perforating the helmet, termed "behind armor blunt trauma" (BABT). As helmets become lighter, the likelihood of larger helmet backface deformation under ballistic impact increases. To characterize the potential for BABT, seven postmortem human head/neck specimens wearing a ballistic protective helmet were exposed to nonperforating impact, using a 9 mm, full metal jacket, 124 grain bullet with velocities of 400-460 m/s. An increasing trend of injury severity was observed, ranging from simple linear fractures to combinations of linear and depressed fractures. Overall, the ability to identify skull fractures resulting from BABT can be used in forensic investigations. Our results demonstrate a high risk of skull fracture due to BABT and necessitate the prevention of BABT as a design factor in future generations of protective gear.

4418. Rafique, M. B., et al. (2008). "Difficult airway due to sprinkler spike in the head." Paediatric anaesthesia **18**(9): 903-904.

4419. Ragab, T., et al. (2018). "Pattern and outcomes of head injuries in egypt: A study of the egyptian revolution." Indian Journal of Forensic Medicine and Toxicology **12**(3): 25-30.

Like many other traumas, head injuries is a growing health problem and is attributed to deaths among the young and productive population. The intention of this study was to compare the difference in the pattern and outcome of head injuries between year 2010 versus 2011. A retrospective comparative study carried out based upon data collected from medical records of patient with head injuries admitted to emergency room, El-Demerdash, Ain Shams University Hospitals starting from January 2010 to December 2011. Socio-demographic, full history, clinical examination and criteria of severity were collected from the sheets for the study. During the study period, the total number of head injured cases received by EL-Demerdash hospital was 1020; 407 in 2010 and 613 in 2011.Due to in-completed sheets 206 of the head injured patients were discarded from the study, 72 in 2010 and 134 in 2011, out of the 134 cases 69 were head gunshots. So the actual numbers of cases subjected to this study were 335 cases in 2010 and 479 in 2011. The male percentage was higher than female in both years. In 2011, the mean age was 24.63 ± 19.19. In 2010, Post-concussion state was in 82.4% of patients, while poly-trauma were present in only 17.6% and no cases of head gunshot were present. In 2011, poly-trauma were 53.03%, while post-concussion were present in 34.86% and head gunshots in 12.11% of cases. In 2010, fall 37.6% followed by motor car accidents (28.4%).

4420. Ragel, B. T., et al. (2010). "Wartime decompressive craniectomy: technique and lessons learned." Neurosurgical focus **28**(5): E2.

OBJECT: Decompressive craniectomy (DC) with dural expansion is a life-saving neurosurgical procedure performed for recalcitrant intracranial hypertension due to trauma, stroke, and a multitude of other etiologies. Illustratively, we describe technique and lessons learned using DC for battlefield trauma., METHODS: Neurosurgical operative logs from service (October 2007 to September 2009) in Afghanistan that detail DC cases for trauma were analyzed. Illustrative examples of frontotemporoparietal and bifrontal DC that depict battlefield experience performing these procedures are presented with attention drawn to the L.G. Kempe hemispherectomy incision, brainstem decompression techniques, and dural onlay substitutes., RESULTS: Ninety craniotomies were performed for trauma over the time period analyzed. Of these, 28 (31%) were DCs. Of the 28 DCs, 24 (86%) were frontotemporoparietal DCs, 7 (25%) were bifrontal DCs, and 2 (7%) were suboccipital DCs. Decompressive craniectomies were performed for 19 penetrating head injuries (13 gunshot wounds and 6 explosions) and 9 severe closed head injuries (6 war-related explosions and 3 others)., CONCLUSIONS: Thirty-one percent of craniotomies performed for trauma were DCs.

Battlefield neurosurgeons use DC to allow for safe transfer of neurologically ill patients to tertiary military hospitals, which can be located 8-18 hours from a war zone. The authors recommend the L.G. Kempe incision for blood supply preservation, large craniectomies to prevent brain strangulation over bone edges, minimal brain debridement, adequate brainstem decompression, and dural onlay substitutes for dural closure.

4421. Ragel, B. T. and R. R. McCafferty (2008). "Indirect gunshot wound to the head." Acta neurochirurgica **150**(12): 1311-1312.

BACKGROUND: An Afghani man presented to a U.S. military facility in Afghanistan with a 3-month history of clear fluid from his left naris and frequent sinusitis. Eleven years earlier, he had been struck in the forehead by an object falling from the sky., MATERIALS AND METHODS: Neurologic examination revealed decreased sensation in V1 and V2 on the left side. Imaging revealed a large bullet lodged in the left maxillary sinus., FINDINGS: The bullet was removed via sublabial incision and opening of the anterior bony wall of the maxillary sinus., CONCLUSIONS: In Afghanistan, indirect gunshot wounds to the head are not uncommon because of the constant war conditions since the invasion by the former Soviet Union in 1979 and the tradition of firing rounds into the air during cultural celebrations.

4422. Rahamimov, N., et al. (2010). "Cerebrospinal fluid leakage and pneumocephalus secondary to spine stab wounds." Journal of orthopaedics and traumatology : official journal of the Italian Society of Orthopaedics and Traumatology **11**(1): 57-59.

Cerebro-spinal fluid leakage from a spinal stab wound is rare, and usually not a life-threatening injury. Pneumocephalus, a possible rare complication of traumatic cerebro-spinal fluid leakage, can potentially lead to intracranial hemorrhage and death. We describe two cases of spinal stab wounds complicated by cerebro-spinal fluid leakage, one of them developing into severe pneumocephalus. Both patients recovered completely with the following treatment protocol: (a) trendelenburg positioning of the patient, (b) insertion of a continuous-drainage cerebro-spinal fluid catheter into the lumbar thecal sac, (c) primary suture of the leaking skin wound, (d) IV antibiotic therapy.

4423. Rahimi, R., et al. (2015). "A fire death with a rare finding: anthracosis or soot embolism?" The Malaysian journal of pathology **37**(1): 57-61.

Charred human remains were found in the smoking ambers of a dying fire in an oil palm plantation in Selangor, Malaysia in the midnight of January 28, 2013. Investigations showed that palm fronds and rubber tires were used to light and sustain the blaze. At least four to five tires were estimated to be used based on the residual burnt metal wires at the site. The remains were brought to the Department of Forensic Medicine, Hospital Sungai Buloh, Selangor for post-mortem examination. Pre-autopsy imaging showed a fractured skull with presence of a bullet in the head. The body belonged to a male with unrecognizable facial features, pugilistic attitude, and reduced body size caused by fire damage with sparing of the posterior surface. A large fracture was present at the skull vault. An entry gunshot wound was observed on the left side of the body of mandible, which was associated with base of skull fracture. Heat-related fractures were also noted on the right side of the frontal bone. A projectile was retrieved from the right side of the occipital lobe. Further examination showed presence of soot and hyperaemic larynx, trachea, main bronchi, and oesophagus. Black spots measuring 1 to 2 mm were present on the surface and parenchyma of the heart, liver, pancreas and kidneys. Histopathology examination showed black particles within the vessels in the affected organs. We report this rare finding in a charred body and present a discussion based on published literature on this issue.

4424. Rahimi-Movaghar, V., et al. (2013). "Lessons learned from war: a comprehensive review of the published experiences of the Iranian neurosurgeons during the Iraq-Iran conflict and review of the related literature." World neurosurgery **79**(2): 346-358.

BACKGROUND: This study sought to review the articles published by Iranian neurosurgeons regarding their experiences during the Iraq-Iran conflict and compare them with reports from other conflicts., METHODS: We searched databases (MEDLINE and 2 Iranian databases, namely IranMedex and Scientific Information Database, up to December 2011) and references for relevant studies. The search terms included Iran, Iraq, conflict, battle, war, traumatic aneurysm (TA), posttraumatic epilepsy (PTE), brain infection, penetrating head wound (PHW), cerebrospinal fluid (CSF) leakage, spine injury, and peripheral nerve injury., RESULTS: Twenty-eight articles were found that presented PHW, development

of TA, infections, PTE, and peripheral nerve injuries. There were 2 different protocols for management of PHWs: radical surgery and minimal debridement protocol. The overall central nervous system infection rate was 10%. The cumulated incidence of TA was 6%., CONCLUSIONS: Conservative minimal debridement of the wounds is indicated in patients with small entrance wounds, or those with Glasgow Coma Scale score >= 8 and no progressive neurological deficit. To diagnose TA before rupture, angiography is indicated in patients who have shells or bone fragments pass through the crowded vasculature, or have large/delayed hematoma, or if the surgeon has high index of suspicion based on neuroimaging and early debridement surgery. Surgery in a well-equipped nearby hospital after quick and safe evacuation of the victims by trained salvaging ancillary groups and the administration of broad-spectrum antibiotics and proper antiepileptics decrease the morbidity and mortality of casualties after PHW in war situations. The biases of the case selection, data collection, and confounders, and decreasing biases by conducting blinded controlled clinical trials, are discussed.

4425. Rahimizadeh, A. (2019). "Intracranial Migration of a Broken Rod After Orbitocranial Injury in an Adult." World neurosurgery **121**: 232-238.

BACKGROUND: Craniocerebral injuries due to the induction of sharp objects are relatively rare and are nearly always observed in the pediatric rather than the adult population. Orbitocranial injuries involving a piece of smooth steel rod are extremely rare and to our knowledge have yet to be reported in previous publications. When this particular category of injury does occur, the invading intracranial foreign body usually remains lodged within its entry position. This is most often near the entry point and within the frontal lobe after penetrating the orbit. Migration of the penetrating object far from the initial entry point is quite rare and has been historically confined to low-velocity bullet wounds., CASE DESCRIPTION: An adult man was injured on the right eyelid by a section of steel rod. The rod had entered the cranium through the right orbital roof and was lodged within the corresponding right frontal lobe. An initial plain radiograph showed that the rod was within the right frontal lobe. However, computed tomographic angiography of the brain performed during the second day of admission demonstrated displacement of the rod to the left hemisphere. This finding was clearly demonstrated through subsequent imaging. As a result of the migration, the rod could be distracted fairly easily through a left parasagittal and interhemispheric approach. Postoperatively, the patient made a full recovery., CONCLUSIONS: Migration of traumatically introduced intracranial foreign bodies far from their initial entry places should be suspected in objects possessing sufficient weight and a smooth surface. This means that a correct assessment of the final position of such objects is necessary before surgery, even while the patient is on the operating table.

4426. Rahimizadeh, A., et al. (1987). "Traumatic cerebral aneurysms caused by shell fragments. Report of four cases and review of the literature." Acta neurochirurgica **84**(3-4): 93-98.

Traumatic aneurysms of the cerebral arteries of penetrating origin are rare but a well recognized entity and their development in military practice have not been adequately discribed. In the review of the literature we encountered only 24 cases of traumatic aneurysms after penetrating brain wounds. In view of their rarity, we are adding four new cases. The need for routine angiography in the evaluation of the vascular state in penetrating brain wounds as well as the necessity of their prompt surgical intervention is emphasized.

4427. Rahman, N. U., et al. (1997). "Orbito-cranial injury caused by penetrating metallic foreign bodies: report of two cases." International ophthalmology **21**(1): 13-17.

Two cases of orbito-cranial injury caused by foreign bodies (FBs) penetrating the lateral wall and roof of the orbit are described. In the first patient, a long rusted nail acted as a missile and was only detected by X-rays and CT scan. The nail penetrated the orbit, the eyeball, the lateral orbital wall, and the temporal lobe of the brain. Lodged partly in the orbit and partly in the brain, this nail caused leakage of cerebrospinal fluid (CSF) through eye and led to orbital cellulitis and localized meningitis. The foreign body (FB) was removed through an extradural pterional approach with rapid resolution of orbital cellulitis and meningitis. In the second patient, large metallic FB, having penetrated the orbital roof was lodged intracranially above the chiasma. This was removed via frontal craniotomy. Mechanism of such injuries and appropriate surgical approaches are described as well.

4428. Rahmat, H., et al. (1984). "Pulsating unilateral exophthalmos due to traumatic aneurysm of the intraorbital ophthalmic artery. Case report." Journal of neurosurgery **60**(3): 630-632.

A case of pulsating unilateral exophthalmos is presented. It was caused by a traumatic aneurysm of the intraorbital ophthalmic artery, secondary to missile injury. Evolution of the aneurysm was observed clinically, by angiography, and by computerized tomography. The differential diagnosis of pulsating exophthalmos and the pathogenesis of such aneurysms are briefly discussed.

4429. Rahmathulla, G., et al. (2022). "PENETRATING BRAIN INJURIES - EVALUATION OF PATIENT OUTCOMES AND A CARE ALGORITHM FROM A LEVEL 1 TRAUMA CENTER." Journal of neurotrauma **39**(11-12): A42-A43.

Penetrating Brain injuries are less prevalent than closed head injury but carry a worse prognosis. Management of these complex injuries continues to present controversies and challenges as outcomes are variable and there are no specific recommendations to guide practice. Material & methods: At our institution , University of Florida, Jacksonville , a level 1 trauma center , we performed an IRB approved retrospective study of patients with penetrating head trauma treated since 2013. Data from 139 patients was collected. The type of penetrating injury, correlation with radiological findings, neurological presentation at admission and long term outcome are discussed Results: 139 patients have been brought to the emergency department at UF Health Jacksonville after suffering penetrating brain injuries (PBIs). Mean age at presentation was 31.3 years (4 - 95) with male (n = 109) and females (n = 30). Outcomes are correlated with degree of injury and GCS at presentation with a possible scoring system to enable determination of outcomes and survival Conclusion: penetrating brain injury patients have to be treated individually as one size does not fit all patients. A majority of these patients are young male and can benefit from surgical intervention and intensive management resulting in satisfactory to good outcomes.

4430. Rahmatullah, M. I., et al. (2021). "Unintentional penetrating brain injuries caused by air rifles in teenagers: Two case report." Interdisciplinary Neurosurgery: Advanced Techniques and Case Management **25**.

Pellet guns are non-powder guns but their related injuries have been reported worldwide. They represent a significant cause of injury especially among children and teenagers. We present two cases of non-powder firearms. First case was a 13-year old male with a chief complaint of headache following gunshot accident towards his head. The bullet's entry point was from the buccal region, going upwards fracturing the orbital roof, hitting the inner table of the frontal skull and ricocheted towards the parietal region. Second case was a 14-year old male who presented with cerebrospinal leakage, pulsating at the bullet's entry point in the frontal area. Despite several opinions existed for these type of injuries, aggressive management for surgical extraction of the foreign body is the largely accepted treatment. The leaded bullet had to be extracted to avoid future damage from the metal's known neurotoxicity. Often under-appreciated, we found difficulties in our experience for increasing the understanding and awareness for potentially fatal outcome regarding the gunshot wound brain injury. This obstacle often hinders the patient of consenting to surgical intervention in our population.

4431. Rahpeyma, A. and S. Khajehahmadi (2016). "Nasolabial flap in maxillofacial gunshot trauma: A case series." Archives of Trauma Research **5**(1).

Introduction: The nasolabial flap (NLF) has many advantages in oromaxillary reconstruction, but the majority of cases are reconstructions after pathologic resections. Its usage in trauma surgery, especially in the management of gunshot wounds, is rarely mentioned. Case Presentation: Three cases involving gunshot injuries to the face are presented: one for reconstruction of the nasal ala, another for bone graft coverage in mandibular reconstruction, and the third for the repair of premaxillary hard and soft tissue avulsive defects. Conclusions: The NLF is a thin, pliable flap and is useful for intraoral and facial reconstruction of trauma patients with small to moderate soft tissue loss.

4432. Rahpeyma, A. and S. Khajehahmadi (2018). "Reconstruction of lateral mandibular defects with soft tissue loss: The role of the submental flap." Iranian Journal of Otorhinolaryngology **30**(4): 203-207.

Introduction: Mandibular continuity defects after pathologic resections or traumatic events are difficult cases for reconstruction. Defects involving both hard and soft tissue loss are more challenging, because of problems in soft tissue coverage. The role of the submental flap in this regard is presented. Materials and Methods: In a retrospective study

from the archived files of Ghaem Hospital, Mashhad, Iran between 2007-2016, lateral mandibular defects that were managed with submental flap for soft tissue coverage were selected. Results: Ten patients had been treated, of whom four cases were due to trauma/gunshot events and six cases were defined as pathologic resection; five patients with malignant lesions and one with benign intraosseous pathology, but with soft tissue invasion. There was one complication overall, concerning orocutaneous fistula formation. Conclusion: Submental flap is indicated for coverage of the reconstruction plate when the lateral mandible is resected/avulsed with soft tissue loss limited to the oral cavity or due to through and through defects in the lower third of the face.

4433. Rai, A., et al. (2012). "Comparative assessment between eyelet wiring and direct interdental wiring for achieving intermaxillary fixation: a prospective randomized clinical study." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **70**(8): 1914-1917.

PURPOSE: The intention of this study was to compare the efficacy of eyelet wiring and direct interdental (Gilmer) wiring for achieving intermaxillary fixation (IMF)., MATERIALS AND METHODS: This study was a prospective randomized clinical trial. The study sample was derived from the population of patients who underwent IMF at the Department of Oral and Maxillofacial Surgery, Sharad Pawar Dental College, Wardha, India, between October 2008 and September 2010. The time required for placement and removal (in minutes) was compared between the eyelet wiring and direct interdental wiring techniques. Postoperative stability after achieving IMF was analyzed in the 2 groups. The plaque accumulation in both groups was evaluated using the Turesky-Gilmore-Glickman modification of the Quigley-Hein plaque index. Complications in the form of soft tissue injury, glove puncture, and trauma to the operator's finger were also recorded. Statistical analysis was performed with SPSS statistical software for Windows, version 8.0 (SPSS, Chicago, IL) using the chi(2) test and Student t test., RESULTS: The mean working time for placement and removal of eyelet wiring (group I) was 18.00 minutes and 9.67 minutes, respectively. For direct interdental wiring (group II), it was 30.50 minutes and 23.12 minutes, respectively. The mean plaque index values were 1.78 and 2.54 for groups I and II, respectively, which signifies a higher plaque deposition in group II. No occlusal disturbance was seen in either group. The incidences of glove perforation, soft tissue trauma, and trauma to the operator's finger were higher in group II., CONCLUSIONS: Eyelet wiring is preferable to direct interdental wiring as evidenced by fewer complications, and requires a shorter operating time in patients with minimally displaced fractures.

4434. Rai, J. K., et al. (2013). "Embolization in post-traumatic vascular injury in head and neck region." Cardiovascular and interventional radiology **36**: S284.

Background: Head and neck injuries are most commonly secondary to road traffic accidents; however, they are also associated with penetrating injuries and surgery. Interventional therapy for head and neck trauma could be embolization or stent grafting (e.g., carotid blow out) Embolization could be performed with coils/particles/liquid agents depending on the lesion. Clinical Findings/Procedure: Twenty-four patients who presented with active bleeding in the head and neck region following trauma were studied. All patients underwent digital subtraction angiography of the internal/external carotid system and/or vertebral arteries. The culprit vessels were embolized after studying the collateral supply. Microcatheters are used whenever a distal single vessel is the culprit or external and internal carotid artery communication is seen. Coils are not preferred in external carotid artery bleeders because extensive collateralization may cause re-bleeding. Further, in ECA territory bleeding, particle embolization of bilateral vessels may sometimes be required. Period of study: 20 years; total number of cases: 24; etiology: noniatrogenic trauma, 19; iatrogenic, 5; post-tonsillectomy, 2; post-maxillary surgery, 1; post-CA tongue radical dissection, 1; dental extraction in a polycythemic patient, 1. Embolization material used: particles, 16; coils, 4; coils and glue, 1; coils and particles, 3; technical success, 100%. Complications: 1 patient had a puncture site complication (hematoma), 5 patients had transient neck pain. Conclusion: Exploratory angiography and therapeutic embolization is an excellent modality in the treatment of post-traumatic vascular injuries of the head and neck.

4435. Rai, K. M., et al. (2004). "Treatment of casualties in a forward hospital of Indian Army: Nine year experience." Medical Journal Armed Forces India **60**(1): 20-24.

Background: To analyze the outcome of the management of casualties in a level II trauma centre of a forward hospital of Armed Forces over a nine year period. Retrospective analysis of all casualties received in a single forward

hospital of Indian Army was carried out. Method: During 9 years (1990-1998), a total of 5737 casualties were received in a single level II zonal hospital of the Army in a forward area. Majority of the injuries were caused by bullets, or by fragments of improvised explosive devices. A policy of aggressive resuscitation and early primary repair of injuries was followed. General surgeons routinely performed craniotomies, thoracotomies, laparotomies, stabilization of fractures by fixators and repair of vascular injuries. Result: 38% of patients had injuries to several body parts (polytrauma), resulting in a total of 8578 injuries. Region-wise distribution of injuries was as follows : 14.2% head and neck injuries, 13.3% chest wounds, 13.5% abdominal injury and 59% extremity wounds. The overall mortality rate was 3.6%. The complication rate was about 7% with infection as the major complication. The results of primary repair of colonic injuries were similar to those of staged repairs. The results after primary closure of war wounds were better than those treated with delayed primary closure in selected cases. Conclusion: Prompt evacuation, speedy resuscitation and early definitive repair of war injuries results in low mortality and morbidity. A motivated and dedicated team and adequate availability of blood and ancillary services adds to the excellent outcome. The policy of primary repair of colonic and selected soft tissue injuries appears justified in selected cases.

4436. Raimondi, A. J. and G. H. Samuelson (1970). "Craniocerebral gunshot wounds in civilian practice." Journal of neurosurgery **32**(6): 647-653.

4437. Rainov, N. G. and W. L. Burkert (1994). "An unusual suicide attempt using a circular saw." International journal of legal medicine **106**(4): 223-224.

The case of a suicide attempt of a depressed male using a circular saw is reported and discussed. There was a hesitation injury that is seldom described in this type of power tool suicide. A deviation in the position of the superior sagittal sinus allowed the life of the victim to be saved by a neurosurgical operation.

4438. Raiteb, M., et al. (2021). "Neglected ballistic trauma of the face in a young subject: A case report." Annals of medicine and surgery (2012) **70**: 102852.

Injuries by ballistic projectiles concern nowadays more and more frequently civilian populations. If the vital prognosis is rarely put at risk, the functional after-effects are frequent and important. The management of these injuries follows specific rules that must be known because they are sometimes different from the usual traumatology. However, it is important for any surgeon to understand the basic principles of ballistic injury. Indeed, the knowledge of the trajectory of the bullet and its final location allows to consider the potential injuries and to evaluate the management of the patient. CT is the examination of choice for penetrating foreign bodies, allowing for viewing of the entry site, bullet trajectory, possible scattered fragments, and, most importantly, a possible skull base breach, as well as providing useful information for planning the surgical procedure and, generally, for prognosis. The primary surgery must ensure an early and rigorous trimming associated with antibiotic therapy because the quality of the initial trimming significantly influences the final result, so this approach to the removal of the foreign body depends on its size, its anatomical location, the structures involved and the preference of the surgeon.

4439. Ralph, J. K. and T. Lowes (2009). "Neurointensive care." Journal of the Royal Army Medical Corps **155**(2): 147-151.

The majority of neurological admissions to military Intensive Care will be for Traumatic Brain Injury (TBI). These injuries will be either penetrating from fragmentation or missiles or blunt due to blast or impact. Intensive Care management of TBI is focused on the prevention of secondary brain injury due to insults such as hypoxia, hypotension and low Cerebral Perfusion Pressure. This management is based largely on comprehensive evidence based guidelines produced by the Brain Trauma Foundation. The most significant dilemma faced by UK military intensivists is whether we should be measuring Intracranial Pressure in patient with severe TBI in the deployed setting; and if so what technique should be used.

4440. Ram, E., et al. (2019). "Improved long-term outcomes after heart transplantation utilizing donors with a traumatic mode of brain death." Journal of cardiothoracic surgery **14**(1): 138.

BACKGROUND: The donor's mode of brain death (BD), being associated with impairment of myocardial function and hemodynamic performance, impacts the prognosis of the heart transplantation (HTx) recipient., METHODS: All patients who underwent HTx between 1996 and 2017 were categorized according to donor's BD mechanism: traumatic BD (TBD) versus non-traumatic BD (NTBD)., RESULTS: The TBD group included 105 recipients, and the NTBD group, 85 recipients. Kaplan-Meier survival analysis showed that overall survival was significantly higher for recipients of TBD hearts (10-year survival 58.1 vs. 37.6%, p = 0.044). Consistently, multivariate analysis showed that TBD was independently associated with a significant 43% reduction in mortality [95% confidence interval (CI) 0.42-0.75, p = 0.033]. Rejection rate was lower in the TBD group (total rejection score 0.44 +/- 0.32 vs. 0.51 +/- 0.38, p = 0.04; any rejection score 0.38 +/- 0.26 vs. 0.45 +/- 0.31, p = 0.030), and freedom from cardiac allograft vasculopathy (CAV) was significantly higher in recipients of traumatic vs. non-traumatic donors (10 years: 82.9 vs. 62.4%, log-rank p-value = 0.024). Multivariate analysis showed a significant 42% reduction in CAV [hazard ratio (HR) = 0.58, 95% CI 0.51-0.85, p = 0.022)., CONCLUSION: Mode of brain death significantly impacts HTx outcomes, with TBD being associated with reduced mortality, rejections and CAV.

4441. Ramasamy, A., et al. (2009). "Penetrating missile injuries during the Iraqi insurgency." Annals of the Royal College of Surgeons of England **91**(7): 551-558.

INTRODUCTION: Since the invasion of Iraq in 2003, the conflict has evolved from asymmetric warfare to a counter-insurgency operation. This study investigates the pattern of wounding and types of injuries seen in casualties of hostile action presenting to a British military field hospital during the present conflict., PATIENTS AND METHODS: Data were prospectively collected on 100 consecutive patients either injured or killed from hostile action from January 2006 who presented to the sole coalition field hospital in southern Iraq., RESULTS: Eighty-two casualties presented with penetrating missile injuries from hostile action. Three subsequently died of wounds (3.7%). Forty-six (56.1%) casualties had their initial surgery performed by British military surgeons. Twenty casualties (24.4%) sustained gunshot wounds, 62 (75.6%) suffered injuries from fragmentation weapons. These 82 casualties were injured in 55 incidents (mean, 1.49 casualties; range 1-6 casualties) and sustained a total 236 wounds (mean, 2.88 wounds) affecting a mean 2.4 body regions per patient. Improvised explosive devices were responsible for a mean 2.31 casualties (range, 1-4 casualties) per incident., CONCLUSIONS: The current insurgency in Iraq illustrates the likely evolution of modern, low-intensity, urban conflict. Improvised explosive devices employed against both military and civilian targets have become a major cause of injury. With the current global threat from terrorist bombings, both military and civilian surgeons should be aware of the spectrum and emergent management of the injuries caused by these weapons.

4442. Rambo, W. M. and R. K. Simpson (1993). "Carotid-cavernous sinus fistula complicating shotgun injuries to the head." Neurochirurgia **36**(3): 96-100.

Two cases of carotid artery injury due to shotgun blast are presented, one of which resulted in a carotid-cavernous sinus fistula. The diagnosis, natural history, and treatment of this condition is discussed, with emphasis on patient management.

4443. Ramirez-Ferrer, E., et al. (2022). "Cerebrospinal fluid leak following penetrating trauma to the spine without neurological deficit: A case report." Surgical neurology international **13**.

Background: Posttraumatic spinal cerebrospinal fluid leak (CSFL) without neurological deficit is a rare entity. Historically, the first-line treatment is a nonsurgical approach, which includes Trendelenburg positioning, carbonic anhydrase inhibitor (acetazolamide), and subarachnoid catheter, with a high successful rate of leak correction. However, in some cases, this first-line treatment could fail, being necessary the surgical approach. Case Description: A 23-year-old male with a recent stab wound to his lumbar region, complained of positional headache and fluid outflow through his wound. On physical examination, an active CSFL was detected without evidence of neurologic deficit. Imaging studies showed a CSF collection extending from the right L4 lamina to the subcutaneous tissue. CSF studies revealed bacterial meningitis. The treatment with carbonic anhydrase inhibitors, Trendelenburg position, lumbar subarachnoid catheter, and antibiotics was initiated. Failure of conservative measures prompted a surgical treatment to resolve the CSFL. Intraoperatively, a dura mater defect was identified, and an autologous paravertebral muscle flap was used for water-tight closure of the defect. The patient recovered without further complications and with CSFL resolution. Conclusion: Even though the nonsurgical approach is the first-line of treatment of traumatic CSFL cases, failures can occur. The

evidence of a CSF trajectory in imaging studies could be a predictor of treatment failure of the nonsurgical treatment. The surgical treatment as second-line treatment has outstanding results regarding CSFL correction and should be considered when the prediction rate to nonsurgical approach failure is high.

4444. Rammo, R. A., et al. (2012). "Management of migrating intracranial bullets: lessons learned from surviving an AK-47 bullet through the lateral brainstem." World neurosurgery **77**(3-4): 591.e519-524.

OBJECTIVE: Survival after a gunshot wound (GSW) to the head is becoming more common, with an accompanying increase in spontaneous migration of these intracranial bullet fragments. This phenomenon is well described in current literature and is a potentially life-threatening delayed complication of GSW to the head., METHODS: We present the case of a 17-year-old boy who survived a penetrating GSW to the cranium and cerebellum after an accident involving an AK (Automatic Kalashnikov)-47 (7.62 mm)., RESULTS: Following initial attempts to remove the bullet and associated hematoma from the cerebellar hemisphere, intraoperative fluoroscopy revealed that the bullet had migrated to lie within the right middle cerebellar peduncle with the development of intraoperative cardiac arrhythmia. The bullet could not be retrieved without risk of damage to the superior and inferior cerebellar arteries. The patient then developed bacterial meningitis, and further imaging revealed the bullet had again migrated under the cerebellar cortex to an accessible location. The infection was treated with aggressive antibiotic therapy and the bullet was removed from the posterior fossa, thus preventing recurrence of infection and further migration. The patient regained full motor, speech, and proprioceptive function within months after injury., CONCLUSION: The potential for spontaneous migration exists with any penetrating brain injury involving a retained foreign body. When a retained intracranial foreign body is unable to be safely extracted during initial debridement, close clinical evaluation is essential and plain-film or computed tomographic imaging should be considered in order to enhance the early detection of delayed-onset life-threatening deterioration, such as meningitis and occlusion of cerebrospinal fluid drainage, because of spontaneous migration.

4445. Ramneesh, G., et al. (2014). "A retrospective audit of hundred patients of orbitozygomatic fractures with brain injury." Journal of Clinical and Diagnostic Research **8**(7): NC04-NC06.

Background: Orbitozygomatic fracture that most commonly accompanies craniofacial injury is a challenge for medical science to reduce complications and to attain aesthetically satisfying results. Objective: To summarize our experiences with the optimum management of orbito-zygomatic fractures Materials and Methods: This retrospective study was aimed at investigating indications and surgical approaches for orbito-zygomatic fractures with clinical follow-up, particularly with regard to postoperative complications. Since 2010, 100 cases with facio-maxillary injury were assessed for Orbitozygomatic fractures with the help of physical examination, non-invasive investigations including computed tomography of the orbit. Patients were retrospectively analysed for data, such as mechanism of injury, classification of fracture, and complications. Results: Amongst 100 consecutive patients with orbito-zygomatic fractures an overwhelming majority were males (n=83). In the age distribution a great majority (45%) were in 30-45 years age group, followed by 15-30 years (22%) and 45-60 years (18%). So in the productive age group i.e. 15-60 years age group were affected mostly (85%) in our series. Among different injury mechanism, Road traffic accident affected most (69%) that landed up in orbito-zygomatic fractures followed by altercations (22%). We preferred Open reduction and internal fixation (ORIF) for 68% of the patients with orbito- zygomatic fractures, followed by closed reduction (12%). Conclusion: Ophthalmology consultation is recommended for all patients presenting with orbitozygomatic fractures, and is essential for patients with orbital blowout fractures, based on the high incidence of clinical ocular findings and injuries in this subgroup of patients.

4446. Ramos, J. G., et al. (2013). "Craniocerebral gunshot wounds in pediatric population." Child's Nervous System **29**(9): 1776.

Objective: There has been an increase in civilian gun violence since the last decade, with a disproportionately high increase occurring the pediatric population. The objective of this study is to describe and analyze a series of pediatric patients who underwent surgery for craniocerebral gunshot wounds. Material and method: The study is a retrospective review of the clinical charts of patients with cranial gunshot injuries at Hospital de Pediatria “Prof Dr Juan P Garrahan”. Neurological and radiological findings were studied as well as the outcome of the patients. Results: Fifty one patients were admitted and 48 were operated on always with general anesthesia.Mean age of the children was 7

years. Thirty five patients were male and sixteen female. Thirteen children sustained transhemipheric injuries, thirteen extradural injuries, 11 tangential injuries, 6 bihemipheric injuries and 4 transventricular injuries, 2 posterior fossa injuries. Child's age or gender, the mode of injury and the presence of extracerebral injuries were not found to be significantly associated with deaths. Mortality rate was 21% with a mean follow-up of 48 months. Conclusion: The pediatric population tends to demonstrate more favorable outcomes following intracranial gunshot injury when compared with the adult population. We conclude that almost all cranial gunshot patients should initially receive aggressive surgical therapy with a previous CT scan.

4447. Ramos P, J. P., et al. (2021). "First trauma registry in Chile. 2 years analysis in a public hospital." Revista de Cirugia **73**(1): 59-65.

Introduction: Trauma represents a real challenge for health systems because is a major public health problem. In Chile, the management of polytrauma patients is unknown. Aim: Describe the results of the first online trauma registry; in patients treated at the Dr. Sótero del Río Hospital during the first two years of implementation. Materials and Method: Prospective information is collected in a network registry, about trauma victims, admitted to Dr. Sótero del Río Hospital for two years. These variables involve the entire clinical care process from admission to discharge or death. Results: 3.515 admissions of trauma victims are registered in two years. Among these, 81.3% are men. 27% suffered penetrating trauma and 59% closed. They emphasize larger injuries by firearm than by bladed weapon. 18.4% of admitted patients have ISS greater than 15 points. 34 patients enter cardio-respiratory arrest and 7.3% make it hypotensive. 1,856 CT scans are performed and 54.4% require emergency surgery. They admitted 692 thoracic trauma, 654 abdominal, 1550 limb, 687 skull injuries and 190 cervical trauma. The massive transfusion protocol is activated at 3.1% of the admissions. 8.3% use the critical patient unit and mortality is 2.9%, with cranial brain trauma as the first cause and hemorrhagic shock as a second cause. Conclusions: Our hospital has a high incidence of trauma. The RT implementation allows us to know the dimension and assess the care process about the trauma patient. It is necessary to direct resources and implement training in high-volume trauma centers, as well as continuing with the extension of the tool as a multi-center monitoring strategy.

4448. Ramos, R., et al. (2017). "Penetrating head trauma injury with an excellent outcome." BMJ case reports **2017**.

4449. Ran, Y., et al. (2010). "Anatomic distribution of bullet head injuries in combat fatalities." The Journal of trauma **69**(3): 541-543.

BACKGROUND: Gun-shot wound head injury comprises a substantial fraction of combat injuries and a major cause of death in the battlefield. Current shielding gear is totally ineffective against bullets, because bullet-proof materials are too heavy to be worn on the head. The aim of this work was to describe the anatomic distribution of bullet entry wounds to the head in combat fatalities and to discern whether distribution is random (null hypothesis) or not., METHODS: We retrospectively examined the forensic external examination reports of all Israeli Defense Forces combat fatalities during the years 2000 to 2004, the Second Lebanon War (2006), and Operation Cast Lead (2009) and mapped the exact anatomic location of all bullet entry wounds to the calvaria., RESULTS: We found 76 gun-shot entry wounds to the heads of 49 fatalities. Among these wounds, the occipital and anterior-temporal regions were found to be hit significantly more often than expected compared with their relative surface area ($p < 0.001$ and $p < 0.001$, respectively). Fifty-five percent of all injuries occurred within 15% of the surface area of skull., CONCLUSIONS: These findings imply that gun-shot entry wounds to the head are unevenly distributed. A partially bullet-proof protective helmet may prevent a substantial fraction of injuries (and fatalities) without a significant weight addition to the helmet.

4450. Rana, M., et al. (2014). "Management of comminuted but continuous mandible defects after gunshot injuries." Injury **45**(1): 206-211.

INTRODUCTION: Firearm injuries continue as a major public health problem, contributing significant morbidity, mortality, and expense to our society. There are four main steps in the management of patients with gunshot wounds to the face: securing an airway, controlling haemorrhage, identifying other injuries and definitive repair of the traumatic facial deformities. The objective of this study was to determine late outcome of two treatment options by open reduction and internal fixation versus closed reduction and maxillomandibular fixation (MMF) in the treatment of

gunshot injuries of the mandible., METHODS: Sixty patients of gunshot injury were randomly allocated in two groups. In group A, 30 patients were treated by open reduction and internal fixation and in group B, 30 patients were treated by closed reduction and maxillomandibular fixation. Patients were discharged as the treatment completed and recalled for follow up. Up to 3 months after injury, fortnightly complications like infection, malocclusion, malunion of fractured fragments, facial asymmetry, sequestration of bone and exposed plates were evaluated and the differences between two groups were assessed. The follow-up period ranged from 3 months to 10 months., RESULTS: Patients treated by open reduction tended to have less complications as compared to closed reduction., CONCLUSION: Based on this study open reduction and internal fixation is the best available method for the treatment of gunshot mandible fractures without continuity defect.

4451. Rana, M., et al. (2014). "Management of comminuted but continuous mandible defects after gunshot injuries." Injury **45**(1): 206.

INTRODUCTION: Firearm injuries continue as a major public health problem, contributing significant morbidity, mortality, and expense to our society. There are four main steps in the management of patients with gunshot wounds to the face: securing an airway, controlling haemorrhage, identifying other injuries and definitive repair of the traumatic facial deformities. The objective of this study was to determine late outcome of two treatment options by open reduction and internal fixation versus closed reduction and maxillomandibular fixation (MMF) in the treatment of gunshot injuries of the mandible., METHODS: Sixty patients of gunshot injury were randomly allocated in two groups. In group A, 30 patients were treated by open reduction and internal fixation and in group B, 30 patients were treated by closed reduction and maxillomandibular fixation. Patients were discharged as the treatment completed and recalled for follow up. Up to 3 months after injury, fortnightly complications like infection, malocclusion, malunion of fractured fragments, facial asymmetry, sequestration of bone and exposed plates were evaluated and the differences between two groups were assessed. The follow-up period ranged from 3 months to 10 months., RESULTS: Patients treated by open reduction tended to have less complications as compared to closed reduction., CONCLUSION: Based on this study open reduction and internal fixation is the best available method for the treatment of gunshot mandible fractures without continuity defect.

4452. Rana, T. M., et al. (2016). "Pneumocephalus and neurologic deficit due to neck stabwound in a twenty nine-year-old man." Razavi International Journal of Medicine **4**(4).

Introduction: The presence of air within the intracranial cavity, due to the entry of air secondary to an abnormal communication after a dural tear, is defined as pneumocephalus and intraventricular pneumocephalus also known as pneumoventricle. Obviously, common etiologies of pneumocephalus are head injury and cranial surgery. Also, less common non-traumatic causes of pneumocephalus are neoplasm or from a gas-forming organism infection. Although pneumocephalus after spinal penetrating injuries is rare,it was reported. The object of this report is to describe the case of patient with pneumoventricle after neck spinal stab wound. Case Presentation: A 29-year-old man presented to ED with complaint of two stab wounds, one of them was located at the right back chest and the other at the midline neck. Because of the respiratory distress and decreased breath sounds, after taking a chest X-ray, we realized hemothorax in right hemithorax and placed the chest tube in ED. In addition, in requested neck CT scan, there was a defuse air in neck spine that spread to his brain. Furthermore, neurologic examination showed weakness in left leg motor function and loss of pain and temperature sensation in the other leg, which was based on brown-sequard syndrome. Mentioned patient admitted in neurosurgery department for further follow-up. Conclusions: Pneumoventricle is rare but it can be established after spinal trauma. By awareness of such possibility, accurate diagnosis by clinical examination and imaging is essential for these types of injuries.

4453. Randhawa, G. (1998). "Procuring organs for transplantation -- a European perspective." European journal of public health **8**(4): 299-304.

4454. Rangaraju, S., et al. (2017). "Preclinical and clinical efficacy of entrectinib in primary and metastatic brain tumors harboring NTRK, ROS1, or ALK gene fusions." Neuro-Oncology **19**: iii106.

Targeted therapies that effectively cross the blood-brain barrier to treat primary and metastatic brain tumors represent a critical unmet medical need in neuro-oncology. NTRK, ROS1, and ALK gene fusions are seen in over 40 primary solid tumor histologies, many of which may be complicated by brain metastases. An inhibitor with demonstrated brain tumor efficacy could be beneficial for these patient populations. Entrectinib (RXDX-101), an orally available, selective and potent kinase inhibitor of TRK, ROS1, and ALK, is specifically designed to cross the blood-brain barrier and is being developed in part to address this need. STARTRK-2 (Studies of Tumor Alterations Responsive to Targeting Receptor Kinases-2) (NCT02568267) is an open-label, multi-center, global phase 2 pivotal basket study of oral entrectinib in adult patients with locally advanced or metastatic solid tumors, including primary and secondary brain lesions, harboring a gene fusion in NTRK, ROS1, or ALK. While NTRK, ROS1, or ALK gene fusions are rare in non-small cell lung cancer (NSCLC), colorectal cancer, and primary brain tumors, NTRK fusions are more frequent in rare cancers such as infantile fibrosarcoma, secretory breast cancer and mammary analog secretory carcinoma (MASC) of the salivary gland. We report the activity of entrectinib against metastatic brain lesions in preclinical models and clinical subjects bearing these gene fusions. Entrectinib demonstrated a CNS penetration with a brain/blood ratio of 0.4 in mouse, 0.6-1.0 in rat, and 1.4-2.2 in dog. In a mouse model of intracranial ALK-fusion-driven lung cancer, entrectinib led to a survival benefit of 57 days vs. 34 days ($p < 5x10e-4$), after 10 days of oral treatment. In phase 1 clinical studies of entrectinib, a total of 119 patients have been treated with entrectinib (as of March 7, 2016). In the subpopulation of 24 patients positive for NTRK, ROS1, or ALK gene fusions who were naïve to prior TRK-inhibitor treatment specific for their respective fusion, effective therapeutic dosing of entrectinib resulted in a 79% response rate, with a well-tolerated safety profile. Regression of primary and metastatic brain tumors was demonstrated in 100% of NTRK fusion positive patients with CNS disease (3/3). In an NSCLC patient with SQSTM1-NTRK1 gene fusion, entrectinib treatment led to a rapid and sustained clinical response systemically and in 15-20 secondary brain lesions. In multiple ROS1-rearranged NSCLC patients, entrectinib treatment also resulted in robust regression of metastatic brain lesions. Finally, compassionate use of entrectinib in a young patient with infantile fibrosarcoma harboring an ETV6-NTRK3 fusion led to a confirmed RECIST response of multiple CNS metastases. Together, these data provide compelling evidence to identify patients with primary or metastatic brain tumors harboring NTRK, ROS1, or ALK fusions for enrollment in the STARTRK-2 trial.

4455. Rangeard, O., et al. (2007). "Relationship between procalcitonin values and infection in brain-dead organ donors." Transplantation proceedings **39**(10): 2970-2974.

BACKGROUND AND AIMS: An association between the inflammatory reactions estimated by several biomarkers and organ dysfunction has been reported in brain-dead organ donors (BDOD). Procalcitonin (PCT), a biomarker of inflammation due to bacterial infection, is increased among BDOD. However, is not known whether infection changes PCT values in BDOD., MATERIALS AND METHODS: We retrospectively analyzed 82 BDOD including several demographic and clinical parameters, bacterial culture results, antibiotics prescription, and plasma values of PCT measured before organ harvesting. Infection was diagnosed to be either a positive bacterial culture (restricted definition) and/or prescription of antibiotics (extended definition)., RESULTS: The median PCT value was 1.5 (interquartile range [IQR], 0.4 to 6.9; range, 0 to 526 ng/mL; n=82). Thirty-eight (46%) and 24 (29%) patients had PCT values>2 ng/mL and >5 ng/mL, respectively. Median PCT values among infected (1.18; IQR, 0.27 to 6.55 ng/mL) versus noninfected (1.57; IQR, 0.53 to 7.15 ng/mL) BDOD (restricted definition) were not different (P=.36). The area under the receiver operating characteristic curve using PCT to predict infection (restricted definition) was 0.52. Specificity of PCT to predict infection was above 80% at PCT values>9 ng/mL., CONCLUSION: Our results confirmed PCT values are increased in BDOD, suggesting that this was not related to an infectious cause (whatever definition was used) unless PCT values are high.

4456. Rankow, R. M. and F. V. Mignogna (1978). "Ankylosis of the temporalis-coronoid complex of the mandible." Annals of plastic surgery **1**(3): 280-285.

Ankylosis of the temporalis-coronoid complex is a clinical entity. The etiology is usually direct trauma to the temporalis muscle or coronoid process of the mandible. It is difficult to differentiate diagnostically from ankylosis of the adjacent temporomandibular joint, and should always be considered in the differential diagnosis of inability to open the mouth. The treatment is always surgical and the intraoral approach is favored. The cure rate with this modality of therapy has been gratifying.

4457. Rao, L. P., et al. (2014). "A 'pen' in the neck: an unusual foreign body and an unusual path of entry." Indian journal of dental research : official publication of Indian Society for Dental Research **25**(1): 111-114.

Penetrating injuries to head and neck region with varying objects have been reported in the literature. Majority of these injuries occur in interpersonal violence or bomb blasts or road traffic accidents. Despite the improvement in imaging technologies and surgical methods, penetrating injuries to head and neck with impacted foreign bodies are very challenging due to the proximity to vital structures and/or difficulties in accessing them for the removal. Following injury the normal anatomy could be altered because of edema or tissue destruction, which makes the diagnosis or retrieval more difficult. Parapharyngeal or prevertebral space is an unusual place for lodgment of foreign bodies and in these cases the usual point of entry is the oral cavity, cheek or neck. Here, we report a case of a ball point pen extending to the prevertebral region at the level of C1-C2 vertebrae from point of entry at the suprazygomatic region in the temporal fossa.

4458. Rao, P. M., et al. (1995). "Open extremity fracture penetrating the skull." Emergency radiology **2**(5): 303-304.

We present a case in which an open fracture of the ulna penetrated the skull and caused a comminuted, depressed skull fracture with a large intraparenchymal hematoma containing bone fragments.

4459. Rao, V. J. and C. V. Wetli (1988). "The forensic significance of conjunctival petechiae." The American journal of forensic medicine and pathology **9**(1): 32-34.

Conjunctival petechiae were mentioned in 227 (4.5%) of 5,000 consecutive autopsy reports of the Dade County Medical Examiner Department. They were most frequently observed in those who had died natural deaths (particularly due to cardiovascular disease), followed by those who had died from asphyxia, head injury, and central nervous system disorders. The incidence of conjunctival petechiae in victims of homicidal asphyxiation was 78%. These data suggest that conjunctival petechiae most often are the result of hypoxia coupled with an acute increase in cephalic vascular pressure. The latter factor may be the consequence of mechanical vascular obstruction or acute right heart failure.

4460. Raphael, B., et al. (2010). "[Repair of nose, lips and chin mutilations. The customary repairs versus allografts]." Reparation des mutilations du triangle nasolabio-mentonnier. Plasties conventionnelles versus allogreffes. **55**(4): 267-271.

Central-facial mutilations, located within the nose lips and chin triangle, require great quality repairs regarding morphology and function. Plastic surgery history affords the ideas evolution in this field crossing over nose and lips reconstructions, which were the subject of successive reports within our society, in 1994 (nose reconstruction) and 2002 (lips reconstruction). Now a day, following this progress, the plastic surgeon has a large choice of reliable techniques. His choice is dictated by a precise evaluation of the limits of the substance loss to repair, according to a (mapping) classification of the nose-lip and chin triangle. This classification defines three units (nose-labial, bilabial and chin-labial) as reflexion bases to the therapeutic indications. This anatomical and surgical approach was built starting from a retrospective study of 195 central-facial mutilations caused by ballistic damage and dog bites. The results evaluation makes possible to carry out a reflexion on the potential indications regarding allograft as a therapeutic alternative to the traditional reconstructions of this territory.

4461. Rapkiewicz, A. V., et al. (2014). "Fatal wounds sustained from "falling bullets": maintaining a high index of suspicion in a forensic setting." Journal of forensic sciences **59**(1): 268-270.

Celebratory gunfire injuries from "falling bullets" occur when guns are fired into the air during celebrations without realizing that this can cause serious injuries or even fatalities. Fatal celebratory gunfire injury is an uncommonly reported event in the continental United States. Our electronic database was queried for homicides occurring within days of July 4th and December 31st over a 14-year period. We describe two cases of fatal gunfire injury due to celebratory gunfire occurring during New Year's Eve in Southern Florida. The relevant literature is reviewed. These case reports illustrate that fatal gunfire injuries sustained from "falling bullets" may pose as an unexpected mimic to sudden natural deaths especially in patients with prior medical history. A high index of suspicion to recognize such injury is required particularly during holidays.

4462. Rapoport, B. I., et al. (2014). "Cranial neuropathy due to intradural disc herniation." Neurosurgery **74**(5): E561-565.

BACKGROUND AND IMPORTANCE: Herniated intervertebral disc fragments rarely penetrate the thecal sac, and intracranial hypotension attributable to such penetrating fragments is even more unusual. We describe the first reported case of a cranial neuropathy due to intradural herniation of a disc fragment, in which intracranial hypotension from a resulting cerebrospinal fluid leak caused bilateral abducens palsies., CLINICAL PRESENTATION: A 45-year-old man presented with a positional headache after having experienced a "popping" sensation in his back while lifting a heavy object. He also reported blurred vision and was noted to have lateral gaze palsies bilaterally. Magnetic resonance imaging (MRI) of the brain revealed bilateral subdural collections, abnormal pachymeningeal enhancement, and cerebellar tonsillar herniation, suggesting intracranial hypotension. T2-weighted MRI of the spine revealed extrusion of the T12-L1 disc and suggested the presence of a disc fragment in the intradural space, displacing the caudal nerve roots. A myelogram demonstrated a filling defect extending into the subarachnoid space adjacent to the disc herniation, consistent with a free disc fragment in the intradural space. A diagnosis of intracranial hypotension due to a cerebrospinal fluid leak resulting from an intradural herniated disc was made. The diagnosis was confirmed intraoperatively., CONCLUSION: Surgical removal of the herniated disc fragment and repair of the dural defect resulted in complete resolution of the cranial neuropathy. This rare etiology of a cranial neuropathy, arising from pathology in the thoracolumbar spine, illustrates the clinical teaching that the sixth cranial nerve is highly sensitive to deformation induced by intracranial hypotension.

4463. Rappaport, Z. H., et al. (1984). "Computerized tomography in combat-related craniocerebral penetrating missile injuries." Israel journal of medical sciences **20**(8): 668-671.

Our experience in the use of computerized tomography (CT) in the evaluation and treatment of combat-related penetrating missile injuries of the head in 12 cases is summarized. Advantages observed in the use of CT include accurate delineation of in-driven bony and metallic fragments, the relation of hematomas to the missile tract and detection of brain abscesses. The availability of a CT scanner for use in military medicine may further reduce the mortality and morbidity due to combat-related cranial missile injuries.

4464. Rashid, B. A., et al. (2010). "Analysis of 3794 civilian craniocerebral missile injuries - Results from 20 years of Kashmir conflict." Pan Arab Journal of Neurosurgery **14**(1): 24-32+140.

An analysis of 3794 craniocerebral missile injuries managed, monitored and treated by the Sher-i-Kashmir Institute of Medical Sciences (SKIMS), India, over a period of 20 years from September 1988 - December 2008 was analyzed. It revealed an overall mortality of 88% (3327 out of 3794) and a good survival of 5% (176 out of 3794). Most of the deaths occurred within 30 minutes of the patient's arrival to the hospital and only 694 patients lived beyond one hour of arrival. All patients with an admission Glasgow Coma Scale (GCS) of 3 and the majority of those with 4 died. No deaths occurred in the group of patients with GCS score 9 - 15. Poor and delayed mode of transportation accounted for up to 90% of deaths. Predictors of poor outcome were low admission GCS score, fixed and dilated pupils, poor and delayed mode of transportation, haemodynamic instability, abnormal breathing at admission, coagulopathy and disseminated intravascular coagulation, CT visualisation of subarachnoid haemorrhage, ventricular haemorrhage, midline shift, bihemispheric and multilobar injuries and scalp wounds at occipital, temporal and frontal areas. However, retained missile and bone fragments were less harmful than retained wooden (pulped mulberry stem) and cardboard wads and pneumocephalus in causing infections, cortical atrophy and seizures in the long run.

4465. Rashid, B. A., et al. (2010). "Comparative outcome of non-metallic and metallic craniocerebral missile injuries." Current Neurobiology **1**(2): 151-160.

We ought to sought the comparative outcome related to 694 non-metallic and metallic cra-niocerebral missile injuries who lived at 2 hours and beyond the time of injury in a retrospective and prospective analysis in the Department of Neurosurgery at Sher-I-Kashmir Institute of Medical Sciences (SKIMS) Kashmir, India, over a period of 21 years from September 1988 to March, 2010. The study revealed an overall mortality of 32.70% (227 out of 694). A total of 664 adults and 30 children (mostly teenagers) were studied. The 79.1% (549 out of 694) patients were metallic missile (metal

bullets, grenade, bomb and improvised explosive device (IED) blasts, shrapnels, bolts, splinters and pellets used by shotgun etc) injuries whereas 20.8% (145 out of 694) patients were non-metallic missile injuries. The non-metallic missile injury group mostly (72.4% i.e.; 105 out of 145) had low GCS (Glasgow Coma Scale) score and overall worse prognosis with zero good-recovery, 47.5% disabilities and 52.4% mortality as compared to the metallic missile injury group. The non-metallic group comprised of 60% (18 out of 30) children which resulted in only one death. The metallic missile injury deaths amounted to 21.75% (151 out of 694 patients) and non-metallic missile injuries accounted for 10.95% (76 out of 694 patients) of total deaths. Predictors of poor outcome were low admission GCS score, non-metallic penetrating injury due to tear-gas cartridges, rubber bullets and stone-bullets, perforating metallic missile injuries and delayed and maltransportation. Most complications i.e. 287 complications in only 145 patients, mostly infective were found in non-metallic missile injuries with worst outcome. The common non-metallic missiles used were stone balls (stone-bullets) and spherical glass balls (locally Buanta) fired by Gulail (modified catapult) or slingshot, red rubber bullets, plastic tear gas shells and cartridges, wooden (pulped mulberry stem) and card-board wads used in shotguns (pellet-guns). The stone pelting, throwing stone projectiles (stone-bullets and glass-bullets) by Gulail and manually has become a common way to inflict head and eye injuries in Kashmir. The non-metallic missiles are not less-lethal and have high disabling, killing and infective.

4466. Raska, G. M., et al. (2007). "Management of penetrating trauma to the soft palate: a case report." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **65**(7): 1279-1285.

4467. Rasouli, J., et al. (2012). "Attenuation of interleukin-1beta by pulsed electromagnetic fields after traumatic brain injury." Neuroscience letters **519**(1): 4-8.

Traumatic Brain Injury (TBI) is a major cause of morbidity and mortality in civilian and military populations. Interleukin-1beta (IL-1beta) is a pro-inflammatory cytokine with a key role in the inflammatory response following TBI and studies indicate that attenuation of this cytokine improves behavioral outcomes. Pulsed electromagnetic fields (PEMF) can reduce inflammation after soft tissue injuries in animals and humans. Therefore, we explored whether PEMF signals could alter the course of IL-1beta production in rats subjected to closed-head contusive weight-drop injuries (Marmarou method) and penetrating needle-stick brain injuries. Protein levels, measured by the Biorad assay, were not altered by injuries or PEMF treatment. In addition, we verified that IL-1beta levels in cerebrospinal fluid (CSF) were proportional to injury severity in the contusion model. Results demonstrate that PEMF treatment attenuated IL-1beta levels up to 10-fold in CSF within 6h after contusive injury and also significantly suppressed IL-1beta within 17-24h after penetrating injury. In contrast, no differences in IL-1beta were seen between PEMF-treated and control groups in brain homogenates. To the authors' knowledge, this is the first report of the use of PEMF to modulate an inflammatory cytokine after TBI. These results warrant further studies to assess the effects of PEMF on other inflammatory markers and functional outcomes.

4468. Ratcliff, G. (1979). "Spatial thought, mental rotation and the right cerebral hemisphere." Neuropsychologia **17**(1): 49-54.

4469. Ratcliff, G. and F. Newcombe (1973). "Spatial orientation in man: effects of left, right, and bilateral posterior cerebral lesions." Journal of neurology, neurosurgery, and psychiatry **36**(3): 448-454.

Men with chronic, penetrating missile wounds of the brain were examined with two `spatial' tasks: a visually-guided stylus maze and a locomotor map-reading task. Men whose lesions involved the posterior part of the right cerebral hemisphere were significantly worse than those with left posterior lesions at stylus maze-learning. On the locomotor task, however, a highly significant deficit was found in the group of men with bilateral posterior cerebral lesions, while those with unilateral lesions of either hemisphere and those with bilateral frontal lesions were unimpaired. The contributions of the two cerebral hemispheres to the analysis of spatial information are discussed in the light of these results and it is suggested that, while the right hemisphere has a special role in the perception of space, it does not bear exclusive responsibility for the maintenance of spatial orientation.

4470. Rathore, F. A., et al. (2012). "Pneumorrhachis of thoracic spine after gunshot wound." Journal of the College of Physicians and Surgeons--Pakistan : JCPSP **22**(8): 529-530.

Air in the spinal canal (Pneumorrhachis) is a rare complication of traumatic spinal injuries reported at various levels of the spinal canal. Pneumorrhachis resolves spontaneously most of the times. Rarely, it may cause cord compression. It is important to rule out potentially serious causes like basilar skull fracture, injury to lungs, mediastinum, mastoid air cells, frontal sinuses or intestine. We present a case of pneumorrhachis in a young soldier who sustained gunshot wound in neck, resulting in spinal cord injury, He was managed conservatively and pneumorrhachis resolved spontaneously without complications. Pathogenesis along with review of relevant literature is presented.

4471. Ratilal, B. and L. C. Vara (2004). "Moving bullet syndrome." Neurology India **52**(3): 407.

4472. Ratilal, B. O., et al. "Antibiotic prophylaxis for preventing meningitis in patients with basilar skull fractures." (4).

Background, Basilar skull fractures predispose patients to meningitis because of the possible direct contact of bacteria in the paranasal sinuses, nasopharynx or middle ear with the central nervous system (CNS). Cerebrospinal fluid (CSF) leakage has been associated with a greater risk of contracting meningitis. Antibiotics are often given prophylactically, although their role in preventing bacterial meningitis has not been established., Objectives, To evaluate the effectiveness of prophylactic antibiotics for preventing meningitis in patients with basilar skull fractures., Search methods, We searched CENTRAL (2014, Issue 5), MEDLINE (1966 to June week 1, 2014), EMBASE (1974 to June 2014) and LILACS (1982 to June 2014). We also performed an electronic search of meeting proceedings from the American Association of Neurological Surgeons (1997 to September 2005) and handsearched the abstracts of meeting proceedings of the European Association of Neurosurgical Societies (1995, 1999 and 2003)., Selection criteria, Randomised controlled trials (RCTs) comparing any antibiotic versus placebo or no intervention. We also identified non-RCTs to perform a separate meta-analysis in order to compare results., Data collection and analysis, Three review authors independently screened and selected trials, assessed risk of bias and extracted data. We sought clarification with trial authors when needed. We pooled risk ratios (RRs) for dichotomous data with their 95% confidence intervals (CIs) using a random-effects model. We assessed the overall quality of evidence using the GRADE (Grades of Recommendation, Assessment, Development and Evaluation) approach., Main results, In this update we did not identify any new trials for inclusion. We included five RCTs with 208 participants in the review and meta-analysis. We also identified 17 non-RCTs comparing different types of antibiotic prophylaxis with placebo or no intervention in patients with basilar skull fractures. Most trials presented insufficient methodological detail. All studies included meningitis in their primary outcome. When we evaluated the five included RCTs, there were no significant differences between antibiotic prophylaxis groups and control groups in terms of reduction of the frequency of meningitis, all-cause mortality, meningitis-related mortality and need for surgical correction in patients with CSF leakage. There were no reported adverse effects of antibiotic administration, although one of the five RCTs reported an induced change in the posterior nasopharyngeal flora towards potentially more pathogenic organisms resistant to the antibiotic regimen used in prophylaxis. We performed a subgroup analysis to evaluate the primary outcome in patients with and without CSF leakage. We also completed a meta-analysis of all the identified controlled non-RCTs (enrolling a total of 2168 patients), which produced results consistent with the randomised data from the included studies., Authors' conclusions, Currently available evidence from RCTs does not support prophylactic antibiotic use in patients with basilar skull fractures, whether there is evidence of CSF leakage or not. Until more research is available, the effectiveness of antibiotics in patients with basilar skull fractures cannot be determined because studies published to date are flawed by biases. Large, appropriately designed RCTs are needed.

4473. Ratiu, P. and I.-F. Talos (2004). "Images in clinical medicine. The tale of Phineas Gage, digitally remastered." The New England journal of medicine **351**(23): e21.

4474. Ratiu, P., et al. (2004). "The tale of Phineas Gage, digitally remastered." Journal of neurotrauma **21**(5): 637-643.

The injury of Phineas Gage has fueled research on and fascination with the localization of cerebral functions in the past century and a half. Most physicians and anatomists believed that Gage sustained a largely bilateral injury to the

frontal lobes. However, previous studies seem to have overlooked a few less obvious, but essential details. This has led us to reanalyze the injury using three-dimensional reconstruction and quantitative computer-aided techniques and to propose a new biomechanical model, in order to determine the location and extent of the injury and explain Gage's improbable survival. Unlike previous studies on this subject, our findings are based on computer-generated three-dimensional reconstructions of a thin-slice computed tomography scan (CAT) of Phineas Gage's skull. The results of our image analysis were corroborated with the clinical findings, thoroughly recorded by Dr. Harlow in 1848, as well as with a systematic examination of the original skull specimen. Our results show that the cerebral injury was limited to the left frontal lobe, did not extend to the contralateral side, did not affect the ventricular system, and did not involve vital intracranial vascular structures. Although modern neuroscience has perhaps outgrown the speculations prompted by this famous case, it is still a living part of the medical folklore and education. Setting the record straight based on clinical reasoning, observation of the physical evidence, and sound quantitative computational methods is more than mere minutia and of interest for the broad medical community.

4475. Rau, A., et al. (2018). "The mechanics of corneal deformation and rupture for penetrating injury in the human eye." Injury **49**(2): 230-235.

Penetrating eye injuries are surgical emergencies with guarded visual prognosis. The purpose of the current study was to determine the force required to rupture the cornea with a penetrating object, and to study how this force is affected by the object geometry. Thirty-six human cadaveric eyes from donors of various ages were characterized for diameter, axial length, and pre-test intraocular pressure. In order to investigate the effects of specimen storage time on the tissue response, half of the specimens were tested within two weeks of donor expiration, and half of the specimens were stored at -4degreeC for 12-18 months. Indenters of three different diameters (1.0, 1.5, and 2.0mm) were lowered into the apex of the cornea until rupture. Resistance to displacement (stiffness), displacement at failure, and the force at failure were determined. Multi-variable regression analysis was used to determine associations of the input variables (indenter size, test speed, and tissue postmortem time) on the mechanics of the tissue response. Twenty-nine of the 36 specimens failed at the indenter location in the cornea, four failed at the limbus, and three failed in the sclera near sites of muscle attachment. The average force at failure caused by the 1.0mm, 1.5mm, and 2.0mm indenters increased from 30.5+/-5.5N to 40.5+/-8.3N to 58.2+/-14.5N, respectively ($p<0.002$). The force at failure was associated with the donor age ($p<0.001$), and globe diameter ($p<0.041$), but was not associated with pre-test intraocular pressure, tissue postmortem time, axial length, or speed of the indenter. This study has quantified the force-displacement and failure response of a large series of human cadaveric eyes subjected to penetrating indentation loads on the cornea. The results provide useful data for characterizing the relationship between corneal rupture and the geometry of a penetrating object.

4476. Raul, J.-S., et al. (2002). "Penetration of a piece of World War II rifle grenade initially suspected as a stab wound." The American journal of forensic medicine and pathology **23**(3): 277-280.

The authors report the case of a 58-year-old man found dead by his son in the forest where he had gone to cut wood for winter. Initial examination showed an upper left laterocervical wound compatible with a stab wound. Radiography and autopsy performed the next day showed a piece of metal located in the left part of the occipital bone, associated with a half-ring fracture of the occipital bone and consequent diffuse subarachnoid hemorrhage. Death was attributed to a spinal shock after impact at the cervicocephalic junction. Investigators returned to the scene and found a few more metal elements and also a 20-cm deep and 40-cm wide crater underneath a fire the deceased had set. Army experts concluded that the metal pieces belonged to an ATM 9 antitank rifle grenade used by the U.S. Army during World War II. Death was considered accidental, the deceased having unfortunately set a fire over the grenade.

4477. Raul, J.-S., et al. (2007). "A finite element model investigation of gunshot injury." International journal of legal medicine **121**(2): 143-146.

Multiple gunshot suicide can be a controversial subject mainly because of wrong opinions concerning immediate incapacitation or alleged backwards hurling. For the last 20 years, experts in medicine and physics have tried to demonstrate what really happens during a gunshot wound. Different methods have been used to achieve this aim such as basic physics or the use of empirical evidence. In this paper, using a finite element model of the human head, we

demonstrate that no incapacitation or backwards hurling can occur from a gunshot fired between the eyes which did not enter the cerebrum.

4478. Raulin, C. and T. Emonds (1998). "[Removal of dirt tattooing with Q-switched laser]." Entfernung von Schmutztatowierungen durch gutegeschaltete Laser. **69**(11): 1270-1274.

In present times treatment of traumatic tattoos with Q-switched laser systems is an alternative to conventional therapy. In our study, 19 patients were treated with the Q-switched ruby laser, including 4 patients with explosive trauma and 2 after pointed pencil penetration. One patient was treated with the Q-switched Nd:YAG-laser, while we tried both systems on another one. Pigmentation after abrasive trauma is easily removed or improved. Deeper penetration of foreign bodies demands more intensive and more frequent therapy. Immediate removal of foreign bodies after an accident is the best treatment.

4479. Rautio, J. and P. Paavolainen (1988). "Afghan war wounded: experience with 200 cases." The Journal of trauma **28**(4): 523-525.

The injuries seen in 200 Afghan war wounded in the International Committee of the Red Cross (ICRC) hospital in Quetta are reported. Evacuation took several days and no proper initial first aid was available. Therefore few of those reaching us had serious multiple injuries. The anatomic distribution of wounds was remarkably similar to that seen in other conflicts: 38% of the injuries were caused by bullets, 50% by fragmentation weapons, and 10% by mines. Two thirds of the patients had limb injuries. Of all wounded, patients with fractures of long bones needed the greatest number of repeated operations and the longest hospitalization time. Twenty-five patients had abdominal or perineal wounds and 12 needed laparotomy. Of 25 with head injuries 14 had penetrating brain trauma. Thoracic, vascular, and burn injuries were rare. The eight patients with spinal cord injury could fortunately be referred to the ICRC rehabilitation center in Peshawar within a week. Wound sepsis was the major problem due to the extraordinarly long delay in the initiation of treatment. In spite of the often grossly infected wounds, radical debridement usually led to good recovery for most patients, with a hospital mortality rate of only 2.5%.

4480. Raveenthiran, V. (2004). "Comment on "Penetrating head injury caused by bear claws: case report"." The Journal of trauma **57**(5): 1141.

4481. Ravelli, V., et al. (1987). "Unusual penetrating craniocerebral injuries. Report of three cases." Journal of neurosurgical sciences **31**(3): 153-156.

Three cases of penetrating cranio-cerebral injuries are reported. Two were caused by steel hooks shot by rotating blades: in one of these, the foreign body penetrated the brain through the eye-ball and in the second case the main injury was caused by a careless of extraction. In the third case, the foreign body, a key, penetrated the left parasagittal rolandic area following an under-water injury. All three patients were submitted to surgery and had good neurological recovery without complications of infection or seizures.

4482. Ravindra, K., et al. (2010). "Deceased donor utilization in hand transplantation: A single center experience." American Journal of Transplantation **10**: 417.

Background: With increasing success in solid organ transplantation, donor criteria have become far more liberal over the past decade. There is data to support the use of organs from extended criteria donors. Composite tissue allotransplantation (CTA) is still in infancy and there has been little discussion about donor quality and the risks of utilizing donors considered to be high risk or extended criteria in solid organ transplantation. Methods: Between 1999 and 2009, 5 patients underwent hand transplantation at the University of Louisville. We retrospectively analyzed the donor data in these patients and looked at factors considered in donor selection. Results: All the 5 donors were white men with ages 18, 20, 27, 49 and 59 respectively. Size (including X-ray for bone dimensions) and color matching played a significant role. All were brain dead donors; the cause of death being gunshot injury in 3 and drug overdose in 2. The only one with a medical illness was the 59 year old with hypertension. None had positive HIV or hepatitis serology. CMV mismatch was noted in 2 donor: recipient pairs; but was not a contraindication for donor selection. All required the use

of vasopressors for hypotension including 2 agents in 2 donors. The warm ischemia time ranged from 17 to 28 minutes and UW solution was used to preserve the graft. Brachial artery was also procured for utilization as vascular conduits at implantation in the last 2 donors. The transplant was successfully performed in all and the initial graft function was excellent. The reasons for turning down potential donors included history of hypertension requiring two or more drugs, Hepatitis B core antibody positivity and high risk status by CDC criteria. Conclusions: As the clinical volumes in CTA grow in the next decade, there will be greater need for using extended criteria donors. This is particularly relevant to CTA as the donation rates for hand or face will be lower than internal organs.The established criteria for solid organ transplant donation work well in CTA. There is a need for further research to address unanswered questions such as 1) the extent of warm ischemia tolerated by CTA, 2) the ideal perfusion solution, 3) the impact of age and systemic disease (hypertension, diabetes) on quality of CTA graft, 4) the risk of transmission of Hepatitis B with HB core antibody positive donors in CTA and 5) the role of non-heart beating and high risk donors (by CDC criteria) in CTA.

4483. Ravindra, V. M., et al. (2017). "Management of Penetrating Cerebrovascular Injuries in Pediatric Trauma: A Retrospective Multicenter Study." Neurosurgery **81**(3): 473-480.

BACKGROUND: Blunt cerebrovascular injury is uncommon in the pediatric population; penetrating cerebrovascular injuries are even rarer and are thus poorly understood., OBJECTIVE: To describe the diagnosis and management of penetrating cerebrovascular injuries and describe outcomes of available treatment modalities., METHODS: Clinical and radiographic data were collected retrospectively from a multicenter trauma registry for children screened for cerebrovascular injury during 2003 to 2013 at 4 academic pediatric trauma centers., RESULTS: Among 645 pediatric patients evaluated with computed tomography angiography with blunt cerebrovascular injury, 130 also had a penetrating trauma indication. Seven penetrating cerebrovascular injuries were diagnosed in 7 male patients (mean age 12.4 years, range 12-18 years). Focal neurological deficit and concomitant intracranial injury were each seen in 2 patients. There were 2 intracranial carotid artery injuries, 4 extracranial carotid artery injuries, and 1 vertebral artery injury. The majority of injuries were higher than grade I (5/7; 71%): 2 were grade I, 1 grade II, 2 grade III, and 2 grade IV. The 2 patients with grade III injuries required open surgery, and 1 patient with a grade IV injury underwent endovascular treatment. Two patients suffered immediate stroke secondary to the penetrating cerebrovascular injury. There were no delayed neurological deficits from the penetrating injuries, and no patients died as a result of the injuries., CONCLUSION: This is the largest series of penetrating cerebrovascular trauma in the pediatric literature. Although rare, penetrating cerebrovascular injuries can be high-grade injuries that require urgent recognition and may require aggressive endovascular and/or open surgery for treatment.

4484. Ray, B. R., et al. (2013). "Anaesthetic management of maxillofacial trauma." Trends in Anaesthesia and Critical Care **3**(5): 231-237.

Maxillofacial trauma, alone or as part of polytrauma, can pose a significant challenge to the anaesthesiologist in the emergency department, in the operating room and in the intensive care unit as it may hamper effective airway management in these patients. Detailed knowledge of maxillofacial and airway anatomy can help in understanding the mechanism, diagnosing the extent and severity of injury and formulating a proper airway management plan. Basic principles of trauma care should be followed at every step. Moreover, the presence of experienced personnel with adequate airway expertise is essential. Anaesthetic drugs and techniques should be optimally tailored to ensure maximal patient safety.

4485. Ray, J. M. (2013). "The treatment of maxillofacial trauma in austere conditions." Atlas of the oral and maxillofacial surgery clinics of North America **21**(1): 9-14.

Caring for severely injured patients, whether they be in the theater of combat or after natural disasters, can be a rewarding and even life-changing experience for all involved. Sound surgical principles and an attempt to achieve a high standard of care should still guide the treating surgeon. The surgical team undoubtedly face numerous obstacles, but with careful and considerate planning, many of these can be minimized.

4486. Rayess, N., et al. (2015). "Spectral-domain optical coherence tomography features of bilateral chorioretinitis sclopetaria." Ophthalmic surgery, lasers & imaging retina **46**(2): 253-255.

The authors report a case of bilateral chorioretinitis sclopetaria in a 31-year-old man who sustained a perforating gunshot trauma. On presentation, best corrected visual acuity was light perception in the right eye and counting fingers at 5 feet in the left eye. Funduscopic examination demonstrated bilateral peripapillary fibrogliotic lesions with associated pigmentation in the posterior pole. Spectral-domain optical coherence tomography scans revealed bilateral full-thickness hyperreflectivity consistent with chorioretinal disruption. The patient was closely monitored, and his vision remained stable at 6-week follow-up. Copyright 2015, SLACK Incorporated.

4487. Raymond, D., et al. (2009). "Tolerance of the skull to blunt ballistic temporo-parietal impact." Journal of biomechanics **42**(15): 2479-2485.

Less-lethal ballistic projectiles are used by police personnel to temporarily incapacitate suspects. While the frequency of these impacts to the head is low, they account for more serious injuries than impacts to any other body region. As a result, there is an urgent need to assess the tolerance of the head to such impacts. The focus of this study was to investigate the tolerance of the temporo-parietal skull to blunt ballistic impact and establish injury criteria for risk assessment. Seven unembalmed isolated cadaver heads were subjected to fourteen impacts. Specimens were instrumented with a nine-accelerometer array as well as strain gages surrounding the impact site. Impacts were performed with a 38 mm instrumented projectile at velocities ranging from 18 to 37 m/s. CT images and autopsies were performed to document resulting fractures. Peak fracture force for the seven resulting fractures was 5633+/-2095 N. Peak deformation for fracture-producing impacts was 7.8+/-3.2 mm. The blunt criterion (BC), peak force and principal strain were determined to be the best predictors of depressed comminuted fractures. Temporo-parietal tolerance levels were consistent with previous studies. An initial force tolerance level of 2346 N is established for the temporo-parietal region for blunt ballistic impact with a 38 mm diameter impactor.

4488. Raymont, V., et al. (2008). "Demographic, structural and genetic predictors of late cognitive decline after penetrating head injury." Brain : a journal of neurology **131**(Pt 2): 543-558.

We examined the relationship of pre-injury intelligence, demographic variables, lesion location, brain tissue volume loss and a number of genetic markers to long-term cognitive decline in a group of Vietnam veterans with predominantly penetrating head injury (PHI) suffered more than 30 years ago. Using linear and stepwise regression procedures, we found that those with PHI demonstrated a greater degree of cognitive decline overall during the years following recovery from injury compared with a control group of uninjured Vietnam veterans. This became increasingly significant later in life. We also found that pre-injury intelligence was the most consistent predictor of cognitive outcome across all phases of potential recovery and decline after such injuries. While laterality of lesion was not a factor, we did find some associations between atrophy and specific regions of tissue loss and long-term cognitive functioning. Finally, we found evidence for an association between level of cognitive decline following PHI and the possession of certain genetic markers that have been linked with brain injury and neurodegeneration. Thus exacerbated decline does occur in Vietnam veterans with PHI and it is apparently unrelated to dementia and is determined by multiple factors (most notably pre-injury intelligence).

4489. Raymont, V., et al. (2010). "Correlates of posttraumatic epilepsy 35 years following combat brain injury." Neurology **75**(3): 224-229.

BACKGROUND: The Vietnam Head Injury Study (VHIS) is a prospective, longitudinal follow-up of 1,221 Vietnam War veterans with mostly penetrating head injuries (PHIs). The high prevalence (45%-53%) of posttraumatic epilepsy (PTE) in this unique cohort makes it valuable for study., METHODS: A standardized multidisciplinary neurologic, cognitive, behavioral, and brain imaging evaluation was conducted on 199 VHIS veterans plus uninjured controls, some 30 to 35 years after injury, as part of phase 3 of this study., RESULTS: The prevalence of seizures (87 patients, 43.7%) was similar to that found during phase 2 evaluations 20 years earlier, but 11 of 87 (12.6%) reported very late onset of PTE after phase 2 (more than 14 years after injury). Those patients were not different from patients with earlier-onset PTE in any of the measures studied. Within the phase 3 cohort, the most common seizure type last experienced was complex partial seizures (31.0%), with increasing frequency after injury. Of subjects with PTE, 88% were receiving anticonvulsants. Left parietal lobe lesions and retained ferric metal fragments were associated with PTE in a logistic regression model. Total brain volume loss predicted seizure frequency., CONCLUSIONS: Patients with PHI carry a high

risk of PTE decades after their injury, and so require long-term medical follow-up. Lesion location, lesion size, and lesion type were predictors of PTE.

4490. Raza, S. and D. A. Redelmeier (2018). "Gunshot to the Head." The American journal of medicine **131**(1): e7-e8.

4491. Raza, S. S., et al. (2021). "A peculiar case of a gunshot wound to the abdomen." Journal of Investigative Medicine **69**(2): 480.

Case Report Discussion The prevalence of penetrating trauma is only seen in 3/100,000 live births. In these rare cases, the mainstay management of pregnant patients with trauma is to stabilize the mother to increase fetus viability. The primary assessment of hypovolemic shock required 2 large-bore IVs to administer a total of 6 units of PRBCs, 2 L of crystalloid, and 3 units of FFP. Pt's airway was secured, breathing noted as symmetric, and no disability appreciated. These measures were instrumental to stabilize the patient for surgery and limit organ hypoperfusion. Furthermore, immediate ultrasound of the fetus and HR monitoring is required; hence, the OB/Gyn team was consulted to assess fetal viability. In terms of management of trauma in pregnancy, bleeding needs to be localized and limited. With a uterine injury, it was beneficial to deliver the fetus, ligate the uterine arteries, and apply continuous uterine massage. REBOA was utilized to provide adequate circulation to vital organs. Zone 1 placement allowed initial stabilization and blood flow to the heart and brain. Shifting the REBOA to Zone 3 allowed for preserved circulation to the kidneys and liver. Focused approaches to restrict bleeding and provide adequate circulation eventually stabilized the patient and were imperative in recovery.

4492. Razek, T., et al. (2000). "Issues in potential organ donor management." The Surgical clinics of North America **80**(3): 1021-1032.

The shortage of organ donors has become a serious problem in modern medicine. Room for improvement exists in our ability to convert potential donors to actual donors based on the available numbers and a significant amount of recent research. A significant percentage of the potential donors represent head-injured patients, so a significant amount of responsibility falls on surgeons to optimize the opportunity for donation. There are clear steps along the pathway from potential to actual donor where physicians can have a significant effect on the rate of successful donation: 1. Identify all potential donors and institute a review system to verify that all potential donors are being identified in your area. 2. Establish an acceptable method to rapidly and accurately determine brain death in potential donors using the local available services. 3. Approach all potential donor families for consent, decouple death notification and consent request, use a member of the hospital team and an OPO representative to approach the family, and make the request in a private setting. 4. Use an aggressive, proactive approach to the medical management of the potential donor using the techniques described to limit the number of medical failures and maximize the number of organs donated per donor. Institute a review process to evaluate any medical failures that occur. Given the difference between the numbers of potential versus actual donors, the authors' significant contact with potential donors, and the clear opportunities for improvement in their approach, the surgical community must address these issues surrounding the optimal management of potential donors and their families.

4493. Rebić, J. and D. Charoulis (2019). "Biological base recoupment and implantoprosthetic treatment after a gunshot wound in the lateral mandible-a case report." Acta Stomatologica Croatica **53**(4): 394-395.

Vertical ridge augmentation represents one of the major challenges in modern implant dentistry and it can be solved with different techniques and with different materials. Hard and soft tissue diversity enables us to select the proper technique and material for each case individually. Furthermore, it affects the selection of the implant system that is to be used, whose characteristics can influence the long-term success of the rehabilitation. With today's broad spectrum of techniques, materials and implant systems our therapy plan must be assessed systematically in every detail. We will show a case with ridge augmentation and the following implantoprosthetic rehabilitation of insufficient bone volume 25 years after the patient suffered a gunshot wound in the mandibular region. Patient underwent several rehabilitation attempts using unilateral mobile devices which all failed due to the lack of underlying bony structure. Regarding the complexity of solving this kind of edentulism we were obliged to use all known concepts in order to obtain peri-implant tissues, as well as to ensure long term success of the therapy. Soft tissue management represents the core

of the long-term success from the aspect of hygiene maintenance and cortical bone preservation. Along with the bone augmentation, we will explain the importance of implant system se lection in it's surgical as well as prosthetic part. Methodology of the donor site, implant system and material selection will be explained through the presentation.

4494. Redd, K. T., et al. (2019). "Incidence and prevalence of headache in cranio-cervical artery dissection patients." Stroke **50**.

Introduction: Spontaneous craniocervical artery dissection (CeAD) occurs commonly in healthy individuals without known risk factors for stroke, whereas traumatic CeAD varies widely from penetrating trauma to motor vehicle crashes to minor movements of the neck. Headache (HA) and cervical pain occur in up to 75% of patients with CeAD. Yet, there are limited data on the incidence of new HA in CeAD patients after diagnosis. Methods: All patients from January 2015 to May 2017 consecutively identified by an electronic medical record-based application were enrolled in this prospective longitudinal registry. CeAD was confirmed by imaging during acute hospital visits. Patients were consented and followed for 12 months for HA status and HA Impact Test-6 (HIT-6) score (little to no impact: 49 or less, some impact: 50-55, substantial impact: 56-59, severe impact 60+). Results: The cohort included 111 CeAD patients (age 53 ± 15.9 years, 56% Caucasian, 50% female). Prevalence of reported HA at baseline was 40% (n=44) of enrolled patients; yet, there was no reportable difference between HA and no HA based on dissection location (carotid n=62; vertebral n=41; or basilar n=2; p=0.445). At baseline, 43% of patients categorized their HA as severely impacting their lives based on HIT-6. At the 3-month follow up, there was an incidence of 16% (n=11) who now reported HA but had no HA at baseline. At 3 months, 57% of patients categorized their HA as severely impacting on their life. At the 12-month follow up, there was an incidence of 7% (n=4) who now reported HA but no previous HA at baseline or 3 months. At 12 months, 58% of patients were classified into the severe impact category determined using HIT-6 calculations. HA status was not found to be associated with stroke or traumatic brain injury from CeAD (p = non-significant). Conclusions: We report the incidence and prevalence of HA within the CeAD population over a 12-month period. A high prevalence level was observed (40%) within the baseline history of CeAD diagnosis, with incremental incidence of new HA (16% and 7%) reported at 3 months and 12 months, respectively. There was no association found between HA status and stroke, dissection location or traumatic brain injury.

4495. Reddi, S. P., et al. (1999). "Hydroxyapatite cement in craniofacial trauma surgery: indications and early experience." The Journal of cranio-maxillofacial trauma **5**(1): 7-12.

BACKGROUND AND OBJECTIVES: Reconstruction of the nonstress-bearing portions of the craniofacial skeleton has recently utilized several alloplastic compounds. One such recent compound is hydroxyapatite cement (HAC)--a calcium-phosphate-based product. Its chemical structure consists primarily of calcium phosphate, as does human bone, and this similarity in the mineral structure renders it biocompatible., METHODS AND MATERIALS: Based on clinical indications for HAC, the authors have classified acquired craniofacial defects into four types. This article presents 5 clinical cases with craniofacial fractures, sustained in various accidents, in which hydroxyapatite cement was used to prevent cranial deformities or to reinstate contour., RESULTS AND/OR CONCLUSIONS: Complications were encountered in some of these cases, but all patients healed without any secondary complications. While the short-term experience using hydroxyapatite cement in craniofacial trauma surgery has been favorable, long-term studies in humans are required to validate the safety and efficacy of this product.

4496. Reddy, A. K., et al. (2014). "Survivors of self-inflicted gunshot wounds to the head: characterization of ocular injuries and health care costs." JAMA ophthalmology **132**(6): 730-736.

IMPORTANCE: Suicides and attempted suicides are major public health issues in the United States and around the world. Self-inflicted gunshot wounds (SIGSWs) are a common method of attempting suicide, the head being the most commonly injured body region; however, the literature lacks an overview of the orbital and ocular injuries as well as outcomes associated with SIGSWs., OBJECTIVES: To characterize the ocular and orbital injuries and outcomes of patients presenting with SIGSWs and to examine the cost associated with these injuries., DESIGN, SETTING, AND PARTICIPANTS: Retrospective medical record review was performed of all patients who presented to the University of Iowa Hospitals and Clinics between 2003 to 2013 with the admitting diagnosis of self-inflicted injuries via firearms. Patients with no periorbital or ocular injuries and/or those who did not survive for at least 2 months following the incident were excluded., MAIN OUTCOMES AND MEASURES: Ocular injuries and outcomes and health care costs and

reimbursements, which were generated by a financial report obtained from the hospital finance department that included data from both the hospital billing and cost accounting systems., RESULTS: All patients in this study (n = 18) were men with a mean age of 47.2 years. Eight patients (44.4%) displayed submental missile entry points, 7 (38.9%) displayed intraoral entry points, and 3 (16.7%) displayed pericranial entry points. Patients with pericranial entries sustained more severe ocular injuries and had poorer ocular outcomes. Seven patients (38.9%) were found at final follow-up to have visual acuity of 20/40 or better in each eye and all showed missile trajectories in the sagittal plane. The mean cost of treatment of these patients totaled $117,338 while the mean reimbursement amount was $124,388., CONCLUSIONS AND RELEVANCE: Data regarding ocular injuries and outcomes may assist ophthalmologists in the treatment of patients with SIGSWs in the future. Many patients had extremely functional vision at final follow-ups, which highlights the importance of specialists conducting examinations and reconstructive procedures promptly, carefully, and thoroughly. Cost and reimbursement data suggest that while these cases place a large financial burden on society, they may not burden hospital systems in the same way.

4497. Redell, J. B., et al. (2007). "Acutely increased cyclophilin a expression after brain injury: a role in blood-brain barrier function and tissue preservation." Journal of neuroscience research **85**(9): 1980-1988.

Blood-brain barrier (BBB) compromise is a significant pathologic event that manifests early following traumatic brain injury (TBI). Because many signaling cascades are initiated immediately after the traumatic event, we were interested in examining acute differential protein expression that may be involved in BBB function. At acute time points postinjury, altered protein expression may result from altered translation efficiency or turnover rate rather than from a genomic response. The application of tandem 2-D gel electrophoresis and mass spectrometry analysis is a powerful approach for directly screening differential protein expression following TBI. Using comparative 2-D gel analysis, we selected candidate protein spots with apparent altered expression and identified them by mass spectrometry. Cyclophilin A was selected for further analysis because it has been implicated in endothelial cell activation and inflammation, and studies have suggested cyclosporine A, an inhibitor of all cyclophilin isoforms, might be beneficial after TBI. We examined if altered expression of cyclophilin A in the brain vasculature might play a role in BBB function. We found significantly increased cyclophilin A levels in isolated brain microvessels 30 min following injury. Postinjury administration of cyclosporine A significantly attenuated BBB permeability measured 24 hr postinjury, suggesting cyclophilin activity after TBI may be detrimental. However, direct injection of purified recombinant cyclophilin A attenuated both BBB permeability and tissue damage in a stab wound model of injury. These findings suggest that increased expression of cyclophilin A may play a protective role after TBI, whereas other cyclophilin isoforms may be detrimental.

4498. Reeves, C., et al. (2019). "Spatiotemporal dynamics of PDGFRbeta expression in pericytes and glial scar formation in penetrating brain injuries in adults." Neuropathology and applied neurobiology **45**(6): 609-627.

AIMS: Understanding the spatiotemporal dynamics of reactive cell types following brain injury is important for future therapeutic interventions. We have previously used penetrating cortical injuries following intracranial recordings as a brain repair model to study scar-forming nestin-expressing cells. We now explore the relationship between nestin-expressing cells, PDGFRbeta+ pericytes and Olig2+ glia, including their proliferation and functional maturation., METHODS: In 32 cases, ranging from 3 to 461 days post injury (dpi), immunohistochemistry for PDGFRbeta, nestin, GFAP, Olig2, MCM2, Aquaporin 4 (Aq4), Glutamine Synthetase (GS) and Connexin 43 (Cx43) was quantified for cell densities, labelling index (LI) and cellular co-expression at the injury site compared to control regions., RESULTS: PDGFRbeta labelling highlighted both pericytes and multipolar parenchymal cells. PDGFRbeta LI and PDGFRbeta+ /MCM2+ cells significantly increased in injury Zones at 10-13 dpi with migration of pericytes away from vessels with increased co-localization of PDGRFbeta with nestin compared to control regions ($P < 0.005$). Olig2+ /MCM2+ cell populations peaked at 13 dpi with significantly higher cell densities at injury sites than in control regions ($P < 0.01$) and decreasing with dpi ($P < 0.05$). Cx43 LI was reduced in acute injuries but increased with dpi ($P < 0.05$) showing significant cellular co-localization with nestin and GFAP ($P < 0.005$ and $P < 0.0001$) but not PDGFRbeta., CONCLUSIONS: These findings indicate that PDGFRbeta+ and Olig2+ cells contribute to the proliferative fraction following penetrating brain injuries, with evidence of pericyte migration. Dynamic changes in Cx43 in glial cell types with dpi suggest functional alterations during temporal stages of brain repair.

4499. Reeves, P., et al. (2016). "Analysis of pediatric trauma in a combat zone to inform high-fidelity simulation training." Critical care medicine **44**(12): 466.

Learning Objectives: The military uses 'just in time' training for medical personnel to refresh skills to prior to deployments. Pre-deployment training for pediatric care has been extremely limited. Pediatric patients have been shown to account for over 10% of bed-days in Role 3 facilities. The goal of this study is to utilize both Role 3 and Role 2 patient records to enable the data-driven development of high-fidelity simulation training for the management of pediatric patients in the combat zone. Methods: Retrospective reviews were performed on the Department of Defense Joint Trauma Registry for Role 3 patients and the Role 2 Registry of pediatric patients (<18 years) from 2001-2014. Three sub cohorts were determined using commercially available models: Group 1: <1 year, Group 2: 1-8 years, Group 3: >8 years. The groups were analyzed according to demographic data and were further sub-stratified based on management. Comparative analyses included: T-Test for continuous data; Chi Squared for dichotomous data. Results: 6045 patients were analyzed: 8.9 years±4.58, 76% male, Glasgow Coma scale 11 ± 5, 8% overall mortality. Injury type: Penetrating (55%), Blunt (31%), Burn (12%). Group 1 patients (n=115, 2%) were admitted for Traumatic Brain Injury (TBI) (30%), Penetrating Abdomen (23%). Field care: intravenous fluids (IVF) (11%), 15% transfused. Surgical procedures: orthopedic (15%), laparotomy (10%), and neurosurgery (4%). Group 2 patients (n=2617, 43%) were admitted for Penetrating abdomen (38%), TBI (37%). Field interventions: IVF (16%), c-collar (7%), 22% transfused. Surgical procedures: orthopedic (43%), laparotomy (32%), and neurosurgery (19%). Group 3 patients (n=3313, 55%) were admitted for Penetrating abdomen (45%), TBI (26%), penetrating extremities (25%). Field interventions: IVF (18%), c-collar (9%), 27% transfused. Surgical procedures: orthopedic (68%), laparotomy (38%), neurosurgery (16%). Conclusions: Operations in Middle East over past 15 years demonstrate the importance of pediatric trauma care in combat zone. This data will help design high-fidelity simulations for pre-deployment training of providers.

4500. Regasa, L. E., et al. (2018). "Mortality Following Hospital Admission for US Active Duty Service Members Diagnosed With Penetrating Traumatic Brain Injury, 2004-2014." The Journal of head trauma rehabilitation **33**(2): 123-132.

OBJECTIVE: To examine mortality among active duty US military service members (SMs) with the diagnosis of penetrating traumatic brain injury (PTBI) and a hospital admission between 2004 and 2014., DESIGN: Data on SMs with PTBI and an admission to a military or civilian hospital were obtained from the 2004 to 2014 Military Health System data repository. After applying exclusion criteria, data on 1226 SMs were analyzed., MAIN MEASURES: The number of observed deaths per 100 identified patients with PTBI and time to death from admission were used as main measures., RESULTS: Approximately 25% of the 1226 patients with PTBI included in this study died following admission, with 44.6% of the all deaths occurring within a day following hospital admission and 75% occurring within the first week. Severe comorbid conditions and intentionally self-inflicted injuries are associated with higher mortality rate. SMs' gender, age, year of hospital admission, and service were significantly associated with likelihood of death following PTBI hospitalization. Males had a higher likelihood of dying following hospital admission compared with females (odds ratio = 2.7, confidence interval = 1.03-7.9). SMs in the 35- to 44-year-old and 45- to 64-year-old groups had up to a 2.6 times higher odds of death following their admission compared with the 25- to 34-year-old group. Age, admission year, service, and rank were significantly associated with SMs' time to death from hospitalization. Patients between the ages of 45 and 64 years were significantly more likely to die earlier than other age groups. Furthermore, cases in the Navy Afloat group had a higher fatality rate and were more likely to die earlier than patients in other services. PTBI comorbid conditions and injury type did not significantly affect time to death., CONCLUSION: This study quantifies case fatality rate among hospitalized US SMs with the diagnosis of PTBI. We report a 23.1% crude case fatality rate among the current cohort. Early intensive care for these patients may be the key to improving survival rates.

4501. Regev, E., et al. (1990). "Penetrating craniocerebral injury caused by a metal rod: an unusual case report." Injury **21**(6): 414-415.

4502. Reguera-Teba, A., et al. (2021). "Eight-year analysis of bullfighting injuries in Spain, Portugal and southern France." Scientific reports **11**(1): 16006.

Improving knowledge on the epidemiology and analysing the prognostic factors of severity for injuries caused by fighting bulls in Spain, Portugal and southern France. Observational retrospective study including 1239 patients with a

reported history of bull horn injuries between January 2012 and November 2019 in Spain, Portugal or southern France. A multiple logistic regression test was used to analyse the prognostic factors of severity and mortality rate of these lesions. The mean accident rate was 9.13% and the mortality rate was 0.48%. The most frequent mechanism of trauma was goring, and the commonest locations of the lesions were thigh and groin. Vascular lesion was found in 20% of thigh/groin gorings. Prognostic factors of severity were vascular lesion, head trauma, fracture, goring injuries and age of the animal. The most reliable prognostic factors of mortality were vascular lesion and goring in the back. Lesions caused by fighting bulls are common in the bullfighting events held in Spain, Portugal and southern France. Although the mortality rate is low, there is a higher morbidity rate, which is conditioned by vascular lesion. All medical teams should include a surgeon experienced in vascular surgery and an anaesthesiologist. Copyright © 2021. The Author(s).

4503. Regunath, K., et al. (2012). "Penetrating injury to the head: case reviews." The Medical journal of Malaysia **67**(6): 622-624.

Penetrating injury to the head is considered a form of severe traumatic brain injury. Although uncommon, most neurosurgical centres would have experienced treating patients with such an injury. Despite the presence of well written guidelines for managing these cases, surgical treatment requires an individualized approach tailored to the situation at hand. We describe a collection of three cases of non-missile penetrating head injury which were managed in two main Neurosurgical centres within Malaysia and the unique management approaches for each of these cases.

4504. Rehman, A., et al. (2014). "The human mandible shattered to a hundred pieces: A disastrous consequence of firearm injury." Journal of Pioneering Medical Sciences **4**(4): 171-173.

Firearm injuries can lead to grave consequences, especially if suffered to the facial region. Patients who survive these injuries have an enduring impact on their quality of life. In this article, we present a case of a 35-year-old police officer who suffered a firearm injury to his face after being attacked by bandits. He was subsequently managed at our hospital with multiple procedures. At one-year follow-up visit, he was found to have major depressive disorder, facial deformity, difficulty chewing chewing solid foods and inability to resume his job. We describe how firearm injuries in the facial region have profound psychological and socioeconomic implications for the patient, extending wider than the physical damage and are easily.

4505. Rehman, T.-U., et al. (2007). "Intracranial penetration of a TASER dart." The American journal of emergency medicine **25**(6): 733.e733-734.

4506. Reichert, L., et al. (2017). "Radial Artery Compression with Threatened Transection: Catfish Injury in a Pediatric Patient." Annals of vascular surgery **39**: 288.e281-288.e283.

Marine animal injuries are rare causes of emergency room visits and vascular injuries worldwide. Penetrating injuries from marine animals risk damage to vasculature, and physicians must be alert to such possibilities. We report a 7-year-old boy with penetrating trauma and retained foreign body in the forearm from a catfish injury. Initial imaging suggested transection of the radial artery, but on exposure in a controlled setting the foreign body was found to compress the artery without any vascular injury. No vascular repair was needed after foreign body removal. Copyright © 2016 Elsevier Inc. All rights reserved.

4507. Reid, A., et al. (2014). "Age at traumatic brain injury affects excitability and seizure susceptibility." Epilepsy Currents **14**: 315-316.

Rationale: Human studies suggest younger age at time of traumatic brain injury (TBI) is a risk factor for early post-traumatic seizures while older age may be a risk factor for post-traumatic epilepsy (PTE). We used lateral fluid percussion injury (LFPI) in rats to determine whether age at injury has an effect on the development of PTE or other electrical kindling-related measures of brain excitability and seizure susceptibility. Methods: Male rats underwent moderate-severe LFPI or sham injury at post-natal day 19 or as an adult. Recording and stimulating electrodes were implanted two months later. Baseline EEG was recorded for one week to detect spontaneous seizures. Rats with LFPI were then divided to TBI/PTE- or TBI/PTE+ groups. After-discharge threshold and duration (ADT and ADD) were

determined in response to callosal stimulation, then rats underwent 20 daily sessions of kindling. We studied kindling progression and the occurrence of secondary ADs (SAD), thought to originate from the hippocampus. Statistical analyses were performed on raw data to compare within Pup (P) or Adult (A) groups, and on data normalized to their respective Sham group to make comparisons across age. Results: Rats were divided into groups based on time of injury and baseline EEG: P/Sham; P/TBI/PTE-; P/TBI/PTE+; A/Sham; A/TBI/PTE-; and A/TBI/PTE+. Injury severity was not different in any TBI group (Table 1). P/TBI/PTE+ and A/TBI/PTE+ both had seizures originating from perilesional neocortex, but A/TBI/PTE+ had more frequent, longer duration seizures. Both P and A TBI/PTE+ had lower ADTs and longer ADDs versus their respective Shams and TBI/PTE- (Table 1). Normalized ADTs and ADDs were not different between PTE+ groups (Fig 1A, B). The number of stage 4/5 seizures during kindling was lower in PTBI/PTE+ versus P/Shams and P/TBI/PTE-, while A/TBI/PTE+ had more stage 4/5 seizures than A/Shams and P/TBI/PTE- (Table 1, Fig 1C). There were no differences between P groups in the latency to initial SAD, although A/TBI/PTE+ had a shorter latency to initial SAD than A/Shams and P/TBI/PTE+ (Table 1, Fig 1D). Conclusions: Some long term effects of LFPI on seizures and epilepsy are age-related, and appear to be linked to the development of PTE itself, not just TBI. LFPI at P19 or in adults caused PTE in the same proportion of rats, but seizures were more frequent and longer duration when injury occurred in adults. Injury at either age was associated with lower ADTs and longer ADDs, but the severity and progression of kindling-induced seizures increased in A/TBI/PTE+ and decreased in P/TBI/PTE+, suggesting younger brains have a greater capacity to withstand trauma-induced alterations that support PTE. The effect of LFPI on SADs only after adult injury suggests there may be hippocampal involvement with LFPI at an older age, supporting previous findings that the developing hippocampus is not as susceptible to injury. Future studies of the brain after LFPI may help lead to further understanding of the epileptogenic process occurring after TBI at different ages, and whether different interventions may be needed to prevent PTE in children versus adults. 316 All values are presented as Mean ± SEM Figure 1. A) ADT values for TBI/PTE- and TBI/PTE+ were normalized to their respective Shams. P/TBI/PTE+ and A/TBI/PTE+ had significantly lower ADTs compared with their Shams and TBI/PTE- (∗p<0.05). B) ADD values for TBI/PTE- and TBI/PTE+ were normalized to their respective Shams. P/TBI/PTE+ and A/TBI/PTE+ had significantly longer ADDs compared with their Shams and TBI/PTE- (∗p<0.05). C) The number of stage 4/5 seizures during kindling for TBI/PTE- and TBI/PTE+ was normalized to the respective Shams. P/TBI/PTE+ had significantly less stage 4/5 seizures than P/Sham and P/TBI/PTE- (∗p<0.05), while A/TBI/PTE+ had significantly more stage 4/5 seizures than A/Sham and P/TBI/PTE+ (#p<0.05). D) The number of the kindling session when the first SAD occurred for TBI/PTE- and TBI/PTE+ was normalized to the respective Shams. There were no difference between any of the Pu groups. The first SAD occurred significantly earlier in A/TBI/PTE+ compared with A/Sham and P/TBI/PTE+ (#p<0.05). (Table Presented)(Figure Presented).

4508. Reid, R. H., et al. (1990). "Cerebral perfusion imaging with technetium-99m HMPAO following cerebral trauma. Initial experience." Clinical nuclear medicine **15**(6): 383-388.

Thirteen patients with cerebral trauma were studied for cerebral perfusion by the use of Tc-99m HMPAO scanning. CT imaging was performed on nine patients. Because of their clinical condition, four patients were scanned only in the planar mode to help establish the diagnosis of brain death. Other indications for study included gunshot wound and blunt or sharp object trauma with or without skull fracture. In all cases, HMPAO scans showed defects with a quality equivalent to or greater than that demonstrated by CT. Our initial results suggest that HMPAO may predict the degree of permanent damage and which patients may develop post-traumatic headache. A diagnosis of brain death can be established without the withdrawal of medical therapy.

4509. Reid, T. D., et al. (2018). "Anatomic Location and Mechanism of Injury Correlating with Prehospital Deaths in Sub-Saharan Africa." World journal of surgery **42**(9): 2738-2744.

INTRODUCTION: Trauma is a large contributor to morbidity and mortality in developing countries. We sought to determine which anatomic injury locations and mechanisms of injury predispose to prehospital mortality in Malawi to help target preventive and therapeutic interventions. We hypothesized that head injury would result in the highest prehospital mortality., METHODS: This was a retrospective analysis of all trauma patients presenting to Kamuzu Central Hospital in Lilongwe, Malawi, from 2008 to 2015. Independent variables included baseline characteristics, anatomic location of primary injury, mechanism of injury, and severity of secondary injuries. Multivariable logistic regression was used to assess the effect of primary injury location and injury mechanism on prehospital death, after adjusting for confounders. Effect measure modification of the primary injury site/prehospital death relationship by injury mechanism (stratified into intentional and unintentional injury) was assessed., RESULTS: Of 85,806 patients, 701 died in transit

(0.8%). Five hundred and five (72%) of these patients sustained a primary head injury. After adjustment, head injury was the anatomic location most associated with prehospital death (OR 11.81 (95% CI 6.96-20.06, p < 0.0001). The mechanisms of injury most associated with prehospital death were gunshot wounds (OR 38.23, 95% CI 17.66-87.78, p < 0.0001) and pedestrian hit by vehicle (OR 2.62, 95% CI 1.92-3.55, p < 0.0001). Among head injury patients, the odds of prehospital mortality were higher with unintentional injuries., CONCLUSIONS: Head injuries are the most common causes of prehospital death in Malawi, while pedestrians hit by vehicles are the most common mechanisms. In a resource-poor setting, preventive measures are critical in averting mortality.

4510. Reider-Groswasser, I. I., et al. (2002). "Quantitive imaging in late traumatic brain injury. Part I: late imaging parameters in closed and penetrating head injuries." Brain injury **16**(6): 517-525.

OBJECTIVE: To ascertain the value of relatively simple quantitative radiologic measurements after head injury. Despite major advances in neuroradiology, analysis and reporting of imaging studies is based primarily on individual subjective and local experience, rather than on reproducible, standardized parameters; reliance on newer technologies can improve care, but also raises diagnostic costs., DESIGN: Blinded, retrospective, quantitative assessment of computerized tomography studies done some 14 years post-injury., OUTCOME MEASURES: Frontal horn width (FHW); septum-caudate distance (SCD); temporal horn width (THW); interuncal distance (IUD); third ventricle width (3VW); ventricular score (VS); sulcal width (SW); gray-white matter discriminability (GWMD) and subjective assessment of atrophy (SAOA)., RESULTS: Diffuse and frontal damage was noted in both closed (CHI) and penetrating (PHI) head injury groups. Enlargement of frontal lobe parameters (septum caudate distance and frontal horn width suggest frontal injury in both closed and penetrating traumatic brain injury (TBI). Temporal horn width and inter-uncal distance were related to VS, 3VW and FHW in closed, but not in penetrating head injury., CONCLUSIONS: Simple linear CSF space measurements are correlated with volumetric and parenchymal measures, and can represent valuable and reliable low-cost quantitative measures of long term brain damage after TBI.

4511. Reilly, P. M. and R. F. Sing (1996). "Does the potential for organ donation justify scene flights for gunshot wounds to the head?" The Journal of trauma **40**(4): 675.

4512. Reines, H. D., et al. (1980). "Neurogenic pulmonary edema and missile emboli." The Journal of trauma **20**(8): 698-701.

A case of missile emboli to a major intracranial vessel resulting in fulminant pulmonary edema is reported. A discussion of the etiology of neurogenic pulmonary edema (NPE) is presented. The cause is thought to be a marked increase in pulmonary artery pressure, due to a massive catechol release in the CNS, and possibly secondary to post-capillary sphincteric constriction. Missile emboli to the cerebral arteries should be removed in order to avoid distal embolization and infarction. The case reported appears to represent the first documented case of missile emboli causing NPE.

4513. Reinges, M. H., et al. (1998). "Minimally invasive bedside craniotomy using a self-controlling pre-adjustable mechanical twist drill trephine." Surgical neurology **50**(3): 226-230.

BACKGROUND: Craniotomy with a mechanical twist drill is a standard, minimally invasive procedure in neurosurgery, widely used for the drainage of chronic subdural hematomas and the placement of ventricular drains. Nevertheless, the use of a standard twist drill trephine bears the risk of causing cerebral lesions., METHOD: A commercially available mechanical twist drill system has been modified by a special self-controlling drill and a pre-adjustable distance holder that limits intracerebral penetration. After initial cadaver testing, the modified trephine has been used for 65 trephinations in patients (37 chronic subdural hematomas, 21 external ventricular drains, 6 frontal hygromas, 1 tumor cyst)., RESULTS: There were no complications related to the modified trephine; cerebral lesions caused by drilling too deeply or by uncontrolled penetration were safely prevented. In our series no procedure related infections occurred, and the drilling time was reduced significantly., CONCLUSION: The described modified mechanical twist drill enables fast, easy, and safe craniotomy without jeopardizing the advantages of a mechanical twist drill. Therefore, it can be recommended particularly for difficult emergency conditions.

4514. Reiss, M. (1999). "[An unusual eye injury]." Eine ungewohnliche Gesichtsverletzung. **129**(4): 138.

4515. Reiss, M. and E. Pilling (1996). "[Diagnostic and therapeutic problems in gunshot wounds]." Diagnostische und therapeutische Probleme bei Schussverletzungen. **75**(7): 426-432.

BACKGROUND: Bullet wounds are a rare occurrence during times of peace. Recently, however, there has been a general increase in the relative number and severity of this type of trauma. In times of peace, gunshot wounds may be mainly caused by suicide attempts, negligent handling of firearms and especially violent conflicts. Bullet wounds, in contrast to wounds caused by a blow or impact to the viscerocranium, are characterised by an irregular path, entry and exit wounds, as well as localised demolition of bones with the associated defects., PATIENTS: 30 patients with gunshot wounds were treated during the past 35 years. Basing on four case reports, problems of interdisciplinary treatment approach to gunshot wounds are discussed, as well as the diagnostic and therapeutic consequences., RESULTS AND CONCLUSIONS: The first case concerns a retained missile in the left fossa pterygopalatina. Intraoperative removal caused a rupture of the A. maxillaris. Preoperative angiography could have provided valuable information. In the second case, an injury caused by a shot from a blank cartridge pistol in the left facial area resulted in extensive wounds with several surgical revisions. The third case was a shot injury to the tongue with an unexpected wound and bleeding. The fourth case describes a child with a bullet in a hyperplastic adenoid tonsil. Primary careful treatment is of greatest significance for functional and cosmetic results due to extensive rupturing and wounds.

4516. Reiss, M., et al. (1998). "[Gunshot injuries in the head-neck area--basic principles, diagnosis and management]." Schussverletzungen im Kopf-Hals-Bereich--Grundlagen, Diagnostik und Versorgung. **87**(24): 832-838.

Bullet wounds are a rare occurrence during times of peace. Recently, however, there has been a general increase in the number and severity of this type of trauma in our case load. First, the possible firearms and the individual types of ammunition will be discussed. Based on this background, the possible types of wounds are presented. Principally, one distinguishes ricocheting shots from grazing ones, and those leaving bullets lodged in the body from those with perforating wounds. The extent of tissue damage depends on internal lacerations, on the compression of the tissue and on the temporary cavitation along the projectile path. In contrast to other types of injuries, which are caused by a blow or impact to the face or skull, gunshot traumas are characterized by an irregular path, as well as, by localized destruction of bones with associated effects. In this connection, the severity of the bullet wound also depends upon the extent of involvement of the viscerocranium. As causes of gunshot wounds during times of peace, suicidal intent, the negligent handling of firearms and especially brutal crimes are those which come into consideration first and foremost. The diagnostic aspect of firearm wounds, beside anamnesis, comprises comprehensive X-ray diagnostics for a complete picture. From the therapeutic side, tetanus serum and antibiotics as a prophylactic are recommended initially. The operative treatment should take place depending on the injury with the removal of a possible projectile. Bullet wounds always require an interdisciplinary approach to treatment.

4517. Reith, W. (2008). "[Traumatic lesions of the orbit]." Traumatische Lasionen der Orbita. **48**(12): 1150-1154.

Complex and sometimes severe lesions of the orbit can be caused by a variety of injury mechanisms, such as fractures, hemorrhages and foreign bodies. Imaging techniques play an extremely important role in the treatment of various diagnostic question marks, such as direct sequelae of trauma, localization of fractures and soft tissue damage.

4518. Remsen, K., et al. (1983). "Unusual presentations of penetrating foreign bodies of the upper aerodigestive tract." The Annals of otology, rhinology & laryngology. Supplement **105**: 32-44.

Only a small number of ingested foreign bodies perforate the esophagus and even a smaller fraction migrate extraluminally. Four such penetrating and migrating foreign bodies of the upper aerodigestive tract are presented. Review of the literature revealed 321 cases of penetrating ingested foreign bodies, of which 252 remained intraluminal and 43 were found extraluminally, with the status of the remainder indeterminate. Analysis revealed that an intraluminal penetrating foreign body carried a higher overall mortality than one that migrated extraluminally. Although intraluminal and extraluminal penetrating foreign bodies may remain quiescent for years before presenting a complication, no correlation existed between mortality and the duration of the foreign bodies' retention. The greatest

mortality was seen with vascular complications followed by diffuse and local suppurative processes. The overall mortality was significantly reduced in the post-antibiotic era.

4519. Ren, C., et al. (2008). "An ultrastructural study on indirect injury of dental pulp caused by high-speed missile projectile to mandible in dogs." Dental traumatology : official publication of International Association for Dental Traumatology **24**(6): 633-639.

The aim of this study was to evaluate the characteristics of indirect injury of dental pulp caused by high-speed missile projectile to mandible in dogs. Eighteen dogs aged 12-13 months were divided equally into six groups (n = 3 in each group) with random allocation, then a high-speed missile projectile (a ball bearing of stainless steel, phi6.0 mm, 0.88 g) was shot at right mandible body (the wound tract was below the fourth premolar, 1 cm or so to the root tips) of each dog, but the teeth were not wounded directly. The dogs were killed 6 h (n = 3), 24 h (n = 3), 3 days (n = 3), 7 days (n = 3), 2 weeks (n = 3) and 4 weeks (n = 3) after the wound, respectively; then ultrastructural change of dental pulp of the fourth premolar and the second premolar of right mandible, and the second premolar of left mandible was observed through transmission electron microscope. The results showed that mean initial velocity of projectiles was 778.0 +/- 33.2 m s(-1) and mean projection energy was 266.1 +/- 19.1 J, which were in conformity with parameters of gunshot wound. On the wound side, dental pulp of the fourth mandibular premolar was injured seriously and irreversible necrosis happened in the end; yet, dental pulp of the second mandibular premolar was injured less seriously, reversibly; on the opposite side, dental pulp of the second mandibular premolar was injured slightly and temporarily. It may be concluded that there are several characteristics in indirect injury of dental pulp caused by high-speed missile projectile to dogs' mandible: the injured area is relatively extensive; traumatic degree decreases progressively and sharply with the distance to the wound tract increasing; ultrastructural change of nerval damage takes place in early stage after wound, etc.

4520. Ren, Y. and C. You (2020). "Management strategy of a transorbital penetrating injury by a wooden stick." Neurology India **68**(2): 509-511.

4521. Renfrow, J. J., et al. (2017). "Evaluation of a Traumatic Vertebral Artery Occlusion." World neurosurgery **101**: 815.e813-815.e817.

Background Penetrating neck injury occurs in 5%–10% of all trauma cases and carries a significant burden of morbidity and mortality (15%). We describe the evaluation and management of a 25-year-old man shot in the neck with occlusion of the left vertebral artery from its origin to C6. This is a case report in which medical data were analyzed retrospectively with institutional review board approval. Case Description Neurologic examination revealed paresthesias and dysesthesias in a left C8 dermatomal distribution. Computed tomography angiography of the neck demonstrated no opacification of the left vertebral artery from its origin to C6. Magnetic resonance imaging of the cervical spine revealed an acute infarct in the left cerebellum. A cerebral angiogram highlighted hemodynamic compromise, and the patient was felt to be at significant risk of further cerebral infarction. Augmenting flow to the posterior circulation would mitigate that risk. The patient was taken to the operating room for a transposition of the vertebral artery to the common carotid artery. Conclusions The patient presented with silent cerebellar infarction due to a vertebral artery injury and impending vertebrobasilar insufficiency. This case demonstrates clinical evaluation of the posterior circulation and treatment with a bypass technique through mobilization of the vertebral artery from the boney vertebral foramen with anastomosis to the common carotid.

4522. Rengachary, S. S. (1981). "Surgical repair of cerebrospinal fluid fistula: a modified technique." The American surgeon **47**(6): 268-271.

4523. Rennert, R. C., et al. (2016). "Ventricular Tract Hemorrhage Following Intracranial Nail Removal: Utility of Real-time Endovascular Assistance." Frontiers in neurology **7**: 112.

Penetrating brain trauma commonly results in occult neurovascular injury. Detailed cerebrovascular imaging can evaluate the relationship of intracranial foreign bodies to major vascular structures, assess for traumatic

pseudoaneurysms, and ensure hemostasis during surgical removal. We report a case of a self-inflicted intracranial nail gun injury causing a communicating ventricular tract hemorrhage upon removal, as well as a delayed pseudoaneurysm. Pre- and post-operative vascular imaging, as well as intra-operative endovascular assistance, was critical to successful foreign body removal in this patient. This report demonstrates the utility of endovascular techniques for the assessment and treatment of occult cerebrovascular injuries from intracranial foreign bodies.

4524. Rennert, R. C., et al. (2016). "Ventricular tract hemorrhage following intracranial nail removal: Utility of real-time endovascular assistance." Frontiers in neurology **7**(JUL).

Penetrating brain trauma commonly results in occult neurovascular injury. Detailed cerebrovascular imaging can evaluate the relationship of intracranial foreign bodies to major vascular structures, assess for traumatic pseudoaneurysms, and ensure hemostasis during surgical removal. We report a case of a self-inflicted intracranial nail gun injury causing a communicating ventricular tract hemorrhage upon removal, as well as a delayed pseudoaneurysm. Pre- and post-operative vascular imaging, as well as intra-operative endovascular assistance, was critical to successful foreign body removal in this patient. This report demonstrates the utility of endovascular techniques for the assessment and treatment of occult cerebrovascular injuries from intracranial foreign bodies. Penetrating brain trauma is less common than closed head injury, with outcomes dependent on the penetrating object (1, 2). Gunshot wounds to the head comprise the majority of penetrating head traumas and are the most lethal due to their ballistic properties (1, 3). Accidental or intentional penetrating brain injuries from nail guns are a well-described phenomenon (4-8). Although nail guns are capable of firing projectiles at high speeds (up to 427 m/s), intracranial nails tend to act more like low-velocity missiles and cause only limited local injury (4). Aside from infection, a major concern with nail gun and other low-velocity penetrating head trauma is vascular injury. These situations necessitate detailed cerebrovascular imaging to evaluate the relationship of the missile to major vascular structures and to assess for traumatic pseudoaneurysms. We report here clinical and neuroimaging findings from a patient with an intracranial nail gun injury, a communicating ventricular tract hemorrhage upon nail removal, and a delayed pseudoaneurysm, whose treatment was augmented with neuroendovascular techniques.

4525. Renz, E. M., et al. (2012). "Image of the month. Send serum for coagulation studies and obtain computed tomographic imaging of the brain." Archives of surgery (Chicago, Ill. : 1960) **147**(4): 391-392.

4526. Rerolle, C., et al. (2015). "Contribution of Antemortem Computed Tomography Findings to Cause of Death Determination: An Unusual Fatal Stroke." Journal of forensic sciences **60**(4): 1095-1098.

In the case reported here, the antemortem computed tomography scan (CT scan) was essential in the forensic investigation. A 32-year-old man was found fully awake with a facial abrasion, after what seemed to be a car accident. He lost consciousness suddenly one hour after initial management. Successive CT scan showed a facial fracture and a metallic foreign body in the carotid canal associated with an occlusion/dissection of the left internal carotid, a pseudoaneurysm, and a carotid-cavernous fistula. The victim died from a stroke. Autopsy confirmed that the facial abrasion was a gunshot entrance wound, the metallic foreign body being a projectile. Intracranial vascular injuries linked with gunshot wounds are most of the time isolated and due to pelet embolism. The observed vascular injury association has never been described in the existing literature. The CT scan provided a better understanding of the chronology of events that led to death.

4527. Resnick, S., et al. (2017). "Early declaration of death by neurologic criteria results in greater organ donor potential." The Journal of surgical research **218**: 29-34.

BACKGROUND: Aggressive management of patients prior to and after determination of death by neurologic criteria (DNC) is necessary to optimize organ recovery, transplantation, and increase the number of organs transplanted per donor (OTPD). The effects of time management are understudied but potentially pivotal component. The objective of this study was to analyze specific time points (time to DNC, time to procurement) and the time intervals between them to better characterize the optimal timeline of organ donation., METHODS: Using data over a 5-year time period (2011-2015) from the largest US OPO, all patients with catastrophic brain injury and donated transplantable organs were retrospectively reviewed. Active smokers were excluded. Maximum donor potential was seven organs (heart, lungs [2],

kidneys [2], liver, and pancreas). Time from admission to declaration of DNC and donation was calculated. Mean time points stratified by specific organ procurement rates and overall OTPD were compared using unpaired t-test., RESULTS: Of 1719 Declaration of Death by Neurologic Criteria organ donors, 381 were secondary to head trauma. Smokers and organs recovered but not transplanted were excluded leaving 297 patients. Males comprised 78.8%, the mean age was 36.0 (+/-16.8) years, and 87.6% were treated at a trauma center. Higher donor potential (>4 OTPD) was associated with shorter average times from admission to brain death; 66.6 versus 82.2 hours, P = 0.04. Lung donors were also associated with shorter average times from admission to brain death; 61.6 versus 83.6 hours, P = 0.004. The time interval from DNC to donation varied minimally among groups and did not affect donation rates., CONCLUSIONS: A shorter time interval between admission and declaration of DNC was associated with increased OTPD, especially lungs. Further research to identify what role timing plays in the management of the potential organ donor and how that relates to donor management goals is needed.

4528. Reuhl, J., et al. (2000). "[Self-impalement after thoracic stab wound. An unusual method of suicide in psychotic symptomatology]." Selbst-Pfahlung nach Thoraxstichen. Eine ungewohnliche Suizid-Methode bei psychotischer Symptomatik. **205**(5-6): 152-161.

A 35 year-old male was found dead within a vast collection of garbage in his parent's house with 13 stab wounds of the thorax. 6 years before death he had suffered from a severe cerebral trauma with intracranial hemorrhage, after which an organic psychosis had ensued. At autopsy besides the stab wounds measuring 1-3.5 cm in length and partly exhibiting a so-called "fish-tail" formation a piece of wood was detected, having penetrated the fourth intercostal space along the sternal border and lacerated the pericardium, right pulmonary hilum and the pleura parietalis at the paravertebral line between the eight and ninth rib. There the leading part of the tool had apparently broken and bent to the left in a nearly 90 degrees angle, thus penetrating the left pleural cavity with a slight laceration of the lower lobe of the lung. From the forensic pathologist's point of view this case of multiple stabbing and additional impalement was at least remarkable and at first sight might have raised a suspicion of homicide due to the extent of the rib penetrations and especially the intrusion of the wooden device, which had been pushed by substantial force into an already existing wound. The police presupposed a suicide based on the personal history and situation at the site, where no traces suggesting an activity of somebody else could be ascertained. Reconstruction of the case and resulting differential diagnostic considerations are to be discussed.

4529. Rey, J. W., et al. (2015). "[Catch me if you can: endoscopic remove of a needle from the jejunum]." Catch me if you can: Endoskopische Bergung einer Sicherheitsnadel aus dem tiefen Dunndarm. **53**(8): 794-797.

INTRODUCTION: The ingestion of foreign bodies is a frequently observed problem in daily clinical practice. In order to avoid complications such as perforation, endoscopic removal of potentially penetrating foreign bodies should be attempted quickly. The use of various endoscopic techniques has been reported for this purpose. However, extraction of foreign bodies from the mid gastrointestinal tract has rarely been reported., CASE REPORT: We present the case of a patient who had swallowed a safety needle which could safely be removed from the jejunum by means of double-balloon enteroscopy (DBE). The combination of a thin p-type enteroscope with a thick t-type overtube was used in order to improve the manoeuvrability of the endoscope. The needle was pulled into the overtube which served as a protective shield during the retrieval of the endoscope., CONCLUSION: Our case report describes the potential of removing foreign bodies from the deep small bowel by pulling them into the overtube of a double-balloon enteroscope. If the suspicion of foreign body impaction in the small bowel is made, it may be advisable to primarily choose a balloon enteroscopy system. Through this, quick and deep insertion can be combined with a safe removal of the foreign body.

4530. Reychler, H. and R. Olszewski (2010). "Intracerebral penetration of a zygomatic dental implant and consequent therapeutic dilemmas: case report." The International journal of oral & maxillofacial implants **25**(2): 416-418.

This case report describes a unique intracerebral penetration of a zygomatic implant inserted in the pterygoid region. A 47-year-old female patient developed severe persistent headaches immediately after two zygomatic and two standard implants were inserted under general anesthesia. However, no additional treatment or radiologic assessment was performed at that time by the treating surgeon. The maxilla was rehabilitated with an implant-supported fixed denture 3 months after the implants were placed. An episode of acute left maxillary sinusitis occurred shortly after

insertion of the fixed denture. Treatment with antibiotics was insufficient, and the patient developed chronic left maxillary sinusitis. The patient presented herself to a neurologist with symptoms of chronic fatigue and severe headaches. Cerebral magnetic resonance imaging demonstrated the intracerebral penetration of a foreign body that resembled a dental implant. The authors sought to resolve the intracerebral penetration of the foreign body, along with the persistent maxillary chronic sinusitis with its concomitant risk of ascending cerebral infection. Computer-assisted preoperative planning associated with computer-assisted three-dimensional transfer should be used to avoid such a dangerous complication. Postoperative computed tomography assessment should be performed after zygomatic implant surgery. Finally, any neurologic impairment of the patient after pterygoid implantation should also be treated immediately.

4531. Reyes, C. and C. A. Solares (2015). "Endoscopic Repair of Frontal Sinus Cerebrospinal Fluid Leaks after Firearm Injuries: Report of Two Cases." Journal of neurological surgery reports **76**(1): e8-e12.

Objectives To describe two cases of cerebrospinal fluid (CSF) leak repair after gunshot wound to the head. Design Retrospective review of two cases. Settings A large regional tertiary care facility. Participants Two patients with gunshot wounds to the skull base. Main Outcome Measures Preoperative and postoperative physical and radiologic findings. Results Patients in this series underwent endoscopic surgery, debridement, and repair of CSF leaks after gunshot wounds to the head. To date, the patients are without CSF leak. Conclusions Endoscopic closure of anterior skull base CSF leaks in patients with gunshot wounds can be safe and effective. Treatment should be decided by the severity of neurologic deterioration throughout the emergency period and the existence or absence of associated intracranial lesions. Timing for surgery should be decided with great care and with a multidisciplinary approach.

4532. Reyes, S., et al. (2015). "Developments in intracerebral stem cell grafts." Cell Transplantation **24**(4): 770.

The field of stem cell therapy has emerged as a promising research area for brain repair. Optimizing the safety and efficacy of the therapy for clinical trials will require revisiting transplantation protocols. The cell delivery route stands as a key translational item that warrants careful consideration in facilitating the success of stem cell therapy in the clinic. Intracerebral administration, compared to the peripheral route, requires an invasive procedure to directly implant stem cells into the injured brain. Although invasive, intracerebral transplantation circumvents the prohibitive blood-brain barrier in allowing grafted cells when delivered peripherally to penetrate the brain and reach the discreet damaged brain tissues. In this presentation, we will highlight milestone discoveries in cell therapy for neurological disorders, with emphasis on intracerebral transplantation in relevant animal models and provide insights necessary to optimize the safety and efficacy of cell therapy for the treatment of Parkinson's disease, Huntington's disease, stroke, and traumatic brain injury. Despite scientific advances that led to limited clinical applications of cell therapy, the challenges of implementing large-scale stem cell therapy in the clinic remain, requiring transplant regimen optimization and investigations into mechanisms of action underlying this treatment. The cellular and molecular changes in the brain microenvironment that accompany the progression of the disease warrant a careful consideration of the cell delivery route that will facilitate enhanced regeneration of the injured brain. A review of experimental and clinical data is deemed critical in guiding scientists in finding the most effective and safe transplant methodologies in an effort to improve outcomes in both animal models and patients with neurological disorders.

4533. Reynolds, M. R., et al. (2018). "Transorbital intracranial penetrating trauma with carotid artery injury: a multidisciplinary approach to management." Journal of neurosurgical sciences **62**(1): 89-91.

4534. Rezae, L., et al. (2014). "Case report on the successful removal of an organic penetrating object into the orbit." Journal of injury & violence research **6**(1): 50-52.

The penetration of objects into the orbit can lead to blindness and even to the death of the patient. The penetration of organic objects longer than 7 cm into the eye is a rare phenomenon. In this study, we report a case in which a 6-year-old boy fell on a pencil which penetrated the upper side of his right eye orbit. Because of the agitation of the child and the lack of access, it was not possible to perform a brain or orbital computed tomography (CT) scan, but an X-ray showed that the object had gone directly into the retro-orbital space. As the result of a clinical diagnosis, it was possible to ascertain that the globe was severely hypertonic. Throughout this process the child was extremely agitated.

After consultation with the neurosurgery service, the patient was rushed to the operation room. After anesthesia and superanasal peritomy, the pencil was removed slowly from the orbit. Neurology and CT scans after surgery didn't show any ocular or brain symptoms. Once the patient's general condition had improved sufficiently and his visual acuity had returned to 10/10, he was discharged from the hospital. This case shows that even without specialized tests, such as CT scans, an organ can be saved.

4535. Rezai, A. R., et al. (1994). "Traumatic posterior cerebral artery aneurysm secondary to an intracranial nail: case report." Surgical neurology **42**(4): 312-315.

We present the case of a traumatic posterior cerebral artery aneurysm from a self-inflicted pneumatic nail-gun missile injury through the roof of the mouth. The patient presented to us in a coma with subarachanoid and intraventricular hemorrhage. Cerebral angiography revealed an aneurysm of the left posterior cerebral artery with no distal filling. The patient died 6 days after admission. At autopsy, a pseudoaneurysm of the posterior cerebral artery was seen. This aneurysm resulted from direct disruption of the arterial wall by the intracranial nail.

4536. Rezende-Neto, J., et al. (2008). "Damage control principles applied to penetrating neck and mandibular injury." The Journal of trauma **64**(4): 1142-1143.

4537. Rhatigan, M. C. and R. H. Taylor (1996). "A potentially life-threatening upper eyelid laceration." Injury **27**(3): 229-230.

4538. Rhea, A. H., et al. (1997). "Gunshot wounds to the head in Florence County." Journal of the South Carolina Medical Association (1975) **93**(3): 107-111.

4539. Rheinboldt, M., et al. (2014). "Terson syndrome in conjunction with ruptured intracranial aneurysm and penetrating intracranial injury: a review of two cases." Emergency radiology **21**(2): 215-218.

Terson syndrome, the presence of intraocular hemorrhage in the setting of acutely elevated intracranial pressure, was historically described in conjunction with acute subarachnoid hemorrhage; however, more recently, it has been associated with a gamut of intracranial pathophysiology ranging from blunt or penetrating injury to neurosurgical procedures. We describe two cases of profound intracranial injury, secondary to ballistic injury, and a ruptured intracranial aneurysm, in which posterior chamber ocular hemorrhage was noted on CT imaging. Though the outcome in such cases, as with ours, is often poor, the findings are germane to clinical care as the presence of Terson syndrome has been noted to be a negative prognostic factor in multiple clinical reviews. Additionally, clinical recovery can be impacted adversely by lasting visual deficits or retinal degradation in the absence of timely ophthalmologic intervention.

4540. Rhine, J. S. and B. K. Curran (1990). "Multiple gunshot wounds of the head: an anthropological view." Journal of forensic sciences **35**(5): 1236-1245.

A decomposed body was judged at the scene to have two gunshot wounds of the thorax and three of the head. Confirmed at autopsy, the condition of the remains precluded conclusions about the precise nature of the defects. Preparation and reconstruction of the skull disclosed seven large cranial defects and a series of fractures. This preparation allowed the application of well-known principles of gunshot wound analysis. Although the analysis of specific gunshot wound defects is well covered in the literature, there are few examples of the application of gunshot wound principles to complex wound cases. Three entrances and three exits were identified. A seventh defect resulted from bullet passage. Finally, the wounds were sequenced.

4541. Riabukha, N. P. (1992). "[The diagnosis and treatment of open craniocerebral trauma]." Diagnostika i lechenie otkrytoi cherepno-mozgovoi travmy. **148**(2): 197-202.

An analysis of findings of complex clinical examinations and treatment of 46 patients with open cranio-cerebral traumas was made. Specific features of clinical manifestations are shown which are substantially different from closed cranio-cerebral traumas. They are primary infection of the cranio-cerebral wound, haemorrhage, liquorrhea, foreign bodies in the cranial cavity. Curative measures for the first aid, indications and contraindications for early surgical treatment, its technique are elucidated.

4542. Ribeiro, C. J. N., et al. (2018). "Pain assessment of traumatic brain injury victims using the Brazilian version of the Behavioral Pain Scale." Avaliacao da dor de vitimas de traumatismo craniencefalico pela versao brasileira da Behavioral Pain Scale. **30**(1): 42-49.

OBJECTIVE: To evaluate the validity and reliability of the Brazilian version of the Behavioral Pain Scale (BPS-Br) in victims of traumatic brain injury., METHODS: Observational prospective study with paired and repeated measures conducted at two intensive care units (clinical and surgical) of a large general hospital. The convenience sample consisted of adult victims of moderate or severe penetrating or blunt craniocerebral trauma who were sedated and mechanically ventilated. A total of 432 paired observations were performed by independent evaluators simultaneously, prior to eye cleaning, during eye cleaning, during tracheal aspiration and after tracheal aspiration. Sociodemographic, clinical, trauma-related, sedoanalgesia and physiological parameter data (heart rate, systolic and diastolic blood pressure) were collected. The discriminant validity was tested using the Friedman and Wilcoxon paired tests. The intraclass correlation coefficient and Cohen's Kappa coefficient were used to evaluate the reliability. The Spearman correlation test was used to test the association between clinical variables and BPS-Br scores during tracheal aspiration., RESULTS: There was a significant increase in the physiological parameters during tracheal aspiration, but without correlation with the BPS-Br scores. Pain was significantly more intense during tracheal aspiration ($p < 0.005$). Satisfactory interobserver agreement was found, with an intraclass correlation coefficient of 0.95 (0.90 - 0.98) and Kappa coefficient of 0.70., CONCLUSION: Brazilian version of the Behavioral Pain Scale scores increased during tracheal aspiration. The Brazilian version of the scale was valid and reliable for pain assessment of traumatic brain injury victims undergoing tracheal aspiration.

4543. Ricci, M. R. (1999). "The arrow-head which went through the brain." East African medical journal **76**(7): 411-413.

An 18-year old man was admitted into hospital being fully conscious, with a thirteen centimetre long metal arrow-head entirely lodged intracranially, having entered through the right orbit. Pre- and post-operative neurological condition, treatment and investigations are described. The arrow-head was removed through a partial occipital craniectomy without any major haemorrhage. The patient not only survived the operation, but was also discharged in an astonishing improved neurological condition.

4544. Rice, M. W., et al. (2018). "Cannabidiol-rich hemp extract reduces edema following severe, penetrating brain injury." Journal of neurotrauma **35**(16): A217.

Cerebral edema following traumatic brain injury (TBI) results in higher rates of morbidity and mortality. Activation of the cannabinoid system shows promise in regulating brain edema following ischemia and mild to moderate brain injury, however, no investigation has yet examined the results of cannabinoid administration in a severe, penetrating TBI model. This study aimed to evaluate the efficacy of a hemp extract high in cannabidiol (CBD) for reducing edema in an animal model of penetrating ballistic-like brain injury (PBBI). Rats were randomly divided into four groups: PBBI-CBD 75mg/kg, PBBI-No Treatment, PBBIVEH (extra virgin olive oil), or Sham (no craniectomy). CBD and VEH treatments were administered via oral gavage beginning at 15 minutes post-injury and continuing for twice a day out to 72 hours post-injury. Within two hours following the final treatment, animals were euthanized with CO2 and rapidly decapitated. Brains were then placed in a brain-block device, cut into 4mm sections, and hemisected. Three blocks constituting the entirety of the ipsilateral side, as well as the block containing the middle portion of the contralateral side of the cortex were collected. Edema was measured as the difference in percent water content ([fresh weight - dry weight]/fresh weight) between fresh tissue blocks and those same blocks following exposure of the tissue to 607deg;C in a vacuum oven for seven days. Oral administration of the CBD high-content hemp oil resulted in a significant decrease in edema as compared to PBBI-No Treatment and PBBI-VEH animals in the anterior-ipsilateral portion of the brain, the entry site of our penetrating injury. However, treatment did not return edema to baseline levels. In mid-ipsilateral tissue blocks, a significant increase in edema between our PBBI groups as compared to Sham was observed, which was not

significantly ameliorated by the 75mg/kg CBD treatment. As expected, no significant differences in edema were observed among our groups at either the poster-ipsilateral or mid-contralateral portions of the brain. In summary, this investigation reveals that cannabinoids were able to reduce some aspects of brain swelling, warranting additional study. Further investigations into the neuropathology are upcoming and will be presented at the conference.

4545. Richards, R. D., et al. (1968). "Chorioretinitis sclopetaria." Transactions of the American Ophthalmological Society **66**: 214-232.

4546. Richardson, R., et al. (1992). "Neurologic consequences of cerebrovascular injury." The Journal of trauma **32**(6): 755-760.

Because of ongoing controversy, the issue of vascular repair or ligation for patients with cerebrovascular injuries and preoperative central neurologic deficits is frequently debated. A total of 133 patients with penetrating cerebrovascular injuries were analyzed. The frequency of preoperative neurologic deficit was 20% (27 patients). The common carotid and internal carotid arteries were the most frequently injured structures, with a 29% and 15% incidence of preoperative neurologic deficits, respectively. The results of carotid repair in all patients whose preoperative deficit was limited to weakness or paralysis were favorable (seven patients normal or improved, two patients unchanged). The results of repair in patients whose preoperative deficit was characterized by obtundation were variable (four patients improved, four patients worsened or died). The results of carotid ligation were also variable (one improved, one unchanged, three worsened or died). Limited numbers of patients with preoperative neurologic deficits and the retrospective nature of this review prohibit definite conclusions. Therefore a multicenter, prospective, randomized trial of ligation or vascular repair for comatose patients with cerebrovascular injuries is proposed.

4547. Rickert, C. H., et al. (1998). "A unique case of cerebral spleen." The American journal of surgical pathology **22**(7): 894-896.

We present the first case of cerebral splenosis, occurring in a 20-year-old man 15 years after posttraumatic splenectomy. He became symptomatic through seizures and was operated on for suspected meningioma of the right occipital pole. Histologic evaluation of the lesion revealed splenic tissue with matching immunohistochemical results. Because no penetrating head injuries were reported at the time of trauma, a hematogenous spread of splenic tissue has to be assumed.

4548. Rickman, J. M. and M. J. Smith (2014). "Scanning electron microscope analysis of gunshot defects to bone: an underutilized source of information on ballistic trauma." Journal of forensic sciences **59**(6): 1473-1486.

Recent years have seen increasing involvement by forensic anthropologists in the interpretation of skeletal trauma. With regard to ballistic injuries, there is now a large literature detailing gross features of such trauma; however, less attention has been given to microscopic characteristics. This article presents analysis of experimentally induced gunshot trauma in animal bone (Bos taurus scapulae) using full metal jacket (FMJ), soft point (SP), and captive bolt projectiles. The results were examined using scanning electron microscopy (SEM). Additional analysis was conducted on a purported parietal gunshot lesion in a human cranial specimen. A range of features was observed in these samples suggesting that fibrolamellar bone response to projectile impact is analogous to that observed in synthetic composite laminates. The results indicate that direction of bullet travel can be discerned microscopically even when it is ambiguous on gross examination. It was also possible to distinguish SP from FMJ lesions. SEM analysis is therefore recommended as a previously underexploited tool in the analysis of ballistic trauma.

4549. Ricks, W. A. and H. Alemayehu (2020). "Aspiration of a bullet after a gunshot wound to the face." Journal of Pediatric Surgery Case Reports **61**.

There are very few reports of penetrating injuries to the head and neck resulting in aspiration of and retained intrabronchial foreign bodies. We present a pediatric patient who sustained a gunshot injury to the face with

subsequent aspiration of the bullet. Removal of the retained bullet was achieved with flexible bronchoscopy. Additionally, we review the available literature on this rare injury pattern.

4550. Riefkohl, R., et al. (1986). "Chain saw injuries to the face." Annals of plastic surgery **16**(2): 87-89.

Chain saws may produce devastating facial injuries when the blade kicks back after striking a hard object. A review of experience with 12 male patients indicates that in addition to extensive ragged lacerations of skin and soft tissues, bone and teeth are frequently fractured. Eye injuries are rare, but the eyelids may be extensively damaged. Management includes debridement and exploration of the wounds, repair of soft tissues, removal of fractured roots, and application of arch bars if the jaw is fractured.

4551. Riepert, T., et al. (2001). "[Postmortem roentgen diagnosis of the skull]." Zur postmortalen Rontgendiagnostik des Schadels. **208**(3-4): 65-71.

In this prospective study, skulls of 164 dead bodies were x-rayed in two different planes. The findings were assessed independent to the results of the subsequent autopsy, however afterwards compared with the autopsy findings. In 86 cases (53.4%) x-ray findings were significant. Dislocated calvarium fractures were clearly visible on the x-rays, however non-dislocated calvarium fractures as well as fractures of the visceral cranium and skull base were difficult to detect. Gas and foreign bodies could easily be observed. Similar to the clinical assessment the indication for a post-mortem x-ray of the skull must consider the case history and the respective condition of the corpse (for example putrefaction, charred body).

4552. Riggs, J. E. (2014). "Reflections: neurology and the humanities. Like it or not." Neurology **82**(16): e136-137.

4553. Rikken, Q. G. H., et al. (2022). "Epidemiology of penetrating injury in an urban versus rural level 1 trauma center in the Netherlands." Hong Kong Journal of Emergency Medicine **29**(1): 38-45.

Background: Penetrating injury can encompass a large spectrum of injuries dependent on the penetrating object, the location of entry, and the trajectory of the object through the human body. Therefore, the management of penetrating injuries can be challenging and often requires rapid assessment and intervention. No universal definition of penetrating injury exists in the literature and little is known about the demographics and outcome of penetrating injury in the Netherlands. Objective: A research was carried out to ascertain the size and outcome of penetrating injuries in two level-one trauma centers in the Netherlands. Methods: Using the trauma registry of the Radboud University Medical Center in Nijmegen and VU University Medical Center in Amsterdam, all patients with penetrating injury were identified who were admitted to these level 1 trauma centers in the period between January 1, 2009, and January 1, 2014. Penetrating injury was defined as an injury that caused disruption of the body surface and extended into the underlying tissue or into a body cavity. Data concerning age, gender, mechanism of injury, Glasgow Coma Scale, number of injuries, type of injury, and Injury Severity Score were collected and analyzed. Patient results were stratified by Injury Severity Score. Results: In total, 354 patients were identified, making up around 2% of all admitted trauma patients 3.1% (VU Medical Center) and 1.6% (Radboud Medical Center). Patients were overwhelmingly male (83.1%) and median age was 36 years (range = 1–88 years). Most injuries were caused by stabbings (51.1%) followed by shootings (26.3%). Admission to the intensive care unit occurred in 41.1% of all patients. Median stay in the intensive care unit was 5.1 days (range = 1–96 days) and median total hospital stay was 8 days (range = 1–95 days). Mortality among these patients was 7.1%, ranging from 0% among patients with Injury Severity Score 1–8 to 100% in patients with Injury Severity Score > 34. High mortality figures were associated with injuries caused by firearms (19.4%), injuries to the head (27.9%), and alleged assaults (10.9%). Differences in demographics between the two centers were not significant. Conclusion: Penetrating injury is a relative rare occurrence in the Netherlands compared with other countries. It is associated with high mortality and substantial hospital costs. The incidence of penetrating injuries is higher in metropolitan areas than in rural areas. A universal definition of penetrating trauma should be agreed upon in order to ensure that future studies remain free of bias, and also to ensure that data remain homogeneous.

4554. Riley, J. P., et al. (2017). "The Role of Intraoperative Cerebral Angiography in Transorbital Intracranial Penetrating Trauma: A Case Report and Literature Review." World neurosurgery **97**: 761.e765-761.e710.

BACKGROUND: Transorbital intracranial penetrating trauma with a retained intracranial foreign body is a rare event lacking a widely accepted diagnostic and therapeutic algorithm. Intraoperative catheter angiography (IOA) has been advocated by some authorities to rule out cerebrovascular injury before and/or after removal of the object, but no standard of care currently exists., CASE DESCRIPTION: A 19-year-old man was involved in a construction site accident whereby a framing nail penetrated the left globe, traversed the lateral bony orbit, and terminated in the midtemporal lobe. No hematoma or injury to the middle cerebral arteries (MCAs) was apparent on noncontrast head computed tomography (CT) or CT angiography, respectively. The foreign body was removed in the operating room under direct visualization after a frontotemporal craniotomy without incident. No significant venous or arterial bleeding was encountered. All visualized MCA branches appeared intact. Indocyanine green videoangiography performed immediately after object removal showed adequate filling of the MCA branches. Given these uneventful clinical and radiographic findings, IOA was not performed. Postoperative head CT and CT angiography showed no obvious neurovascular injury. On postoperative day 2, the patient was noted to have an expressive aphasia. Cerebral angiography showed absent antegrade filling of the angular artery with some retrograde perfusion. Magnetic resonance imaging confirmed an ischemic infarction in the midtemporal lobe. The patient's expressive aphasia improved to near baseline during his hospitalization and he made an excellent clinical recovery., CONCLUSIONS: In transorbital intracranial penetrating trauma with a retained intracranial object, we advocate microsurgical removal of the object under direct visualization followed immediately by IOA. IOA should be strongly considered even in the setting of minimal intraoperative bleeding and normal findings on videoangiography (a course of action that was not followed in the present case). Given that CT angiography and intraoperative videoangiography may miss a potentially treatable traumatic arterial injury, IOA can help determine whether cerebral revascularization may be necessary.

4555. Rinaldi, A., et al. (2000). "Cranio-orbital missile wound and bullet migration. Case report." Journal of neurosurgical sciences **44**(2): 107-112.

An unusual case of craniocerebral missile injury, with orbital roof perforation and spontaneous bullet migration into the maxillary sinus, is reported. Emergency treatment consisted in wide craniectomy around the bullet entry point, blood and foreign bodies debridement. Subsequent procedures were necessary for abscess evacuation, transmaxillary bullet removal and later cranial vault reconstruction. Challenging aspects were the treatment of the infectious complications, following cerebrospinal fluid fistula through the wound, and the onset of post-traumatic epilepsy, scarcely responsive to common antiepileptic drugs. The treatment of the abscess by combined systemic and intracavitary antibiotic therapy and of the chronic seizures by progressive adjustment with new protocols of antiepileptic drugs under EEG and brain mapping revealed successful.

4556. Rincon, S., et al. (2016). "Imaging of head trauma." Handbook of clinical neurology **135**: 447-477.

Imaging is an indispensable part of the initial assessment and subsequent management of patients with head trauma. Initially, it is important for diagnosing the extent of injury and the prompt recognition of treatable injuries to reduce mortality. Subsequently, imaging is useful in following the sequelae of trauma. In this chapter, we review indications for neuroimaging and typical computed tomography (CT) and magnetic resonance imaging (MRI) protocols used in the evaluation of a patient with head trauma. We review the role of CT), the imaging modality of choice in the acute setting, and the role of MRI in the evaluation of patients with head trauma. We describe an organized and consistent approach to the interpretation of imaging of these patients. Important topics in head trauma, including fundamental concepts related to skull fractures, intracranial hemorrhage, parenchymal injury, penetrating trauma, cerebrovascular injuries, and secondary effects of trauma, are reviewed. The chapter concludes with advanced neuroimaging techniques for the evaluation of traumatic brain injury, including use of diffusion tensor imaging (DTI), functional MRI (fMRI), and MR spectroscopy (MRS), techniques which are still under development.

4557. Ringos Beach, P., et al. (2011). "Organ donation after circulatory death: vital partnerships." The American journal of nursing **111**(5): 32-40.

OVERVIEW: The authors present the case of a woman in her mid-50s who sustained extensive brain injury in an accident but wasn't declared brain dead. The case highlights some of the clinical and ethical considerations of organ donation after circulatory death (also known as non-heart-beating donation and donation after cardiac death). It also illustrates the interdisciplinary teamwork necessary for organ donation in such cases, involving nurses and other clinicians in the ICU, palliative care, and the local organ procurement organization, among others., KEYWORDS: cardiac death, circulatory death, donation after cardiac death, end-of-life care, ethics, non-heart-beating donation, organ donation, organ donation after circulatory death, organ transplantation, palliative care.

4558. Ripley, D., et al. (2016). "The physiological basis of fatigue after traumatic brain injury." Brain injury **30**(5-6): 713.

Objectives: Fatigue represents one of the most common complaints of individuals following traumatic brain injury (TBI). The complaint of fatigue following TBI differs from fatigue experienced by uninjured individuals, suggesting an underlying physiological cause. There have been many theories of the basis of fatigue, none of which fully explain the phenomenon. The objective of this study was to explore the association between physiological, psychological and physical factors contributing to fatigue in a small population of individuals following TBI, in order to determine foci for interventional trials. Methods: Twelve subjects who were between the ages of 18-65, with a prior hospitalization for non-penetrating moderate- to-severe TBI that occurred at least 1 year prior, underwent a week-long evaluation including brief neuropsychological assessment, evaluation of resting energy expenditure using indirect calorimetry, serum electrolyte and hormone screening, MRI including resting state fMRI, activity monitoring and sleep monitoring using actigraphy, diet and exercise logs, all compared to subjective fatigue, as measured by the fatigue sub-scale of the TBI-QoL. Results: Increased fatigue as measured by the fatigue sub-scale of the TBI-QoL was correlated with greater resting energy expenditure [REE] ($r = 0.6210$, $p = 0.0414$), increased Cortisol ($r = 0.63$, $p = 0.037$) and increased score on the Depression Sub-scale of the Neurobehavioural Functioning Inventory ($r = 0.721$, $p = 0.008$). Trends were observed towards correlations between duration of wakefulness after sleep onset (WASO) ($r = 0.5812$, $p = 0.0608$) and increased IGF-1 ($r = 0.57$, $p = 0.06$). We used LASSO (Least Absolute Shrinkage and Selection Operator) regularized linear regression, a method that automatically selects the variables in the model that contributes to the response (fatigue on TBI-QoL) through cross-validation. Contributing factors in this model that predicted Fatigue were serum Cortisol, Sleep Disturbance and the Depression Sub-scale score of the NFI. There was no association between physical activity and fatigue. Conclusions: Fatigue following TBI is a multifactorial phenomenon, with Cortisol, Emotional Status (increased depression) and Sleep Disturbance being important contributors. Although an association was seen between REE and fatigue, this did not contribute significantly in the final model. Neither did IGF-1, which was additionally found to have an opposite relationship than reported in prior studies. It is felt that Cortisol may be elevated due to Stress or Anxiety, which has been reported to be associated with fatigue in other studies. These results lead to the suggestion that emotional factors strongly drive subjective fatigue and actually may be related to the other variables, such as increased Cortisol due to endogenous stress, poorer sleep and higher resting energy expenditure. These results will need to be confirmed in a larger study and may form the basis for an interventional trial.

4559. Rish, B. L., et al. (1981). "Analysis of brain abscess after penetrating craniocerebral injuries in Vietnam." Neurosurgery **9**(5): 535-541.

A population of 1221 patients from the Vietnam War with penetrating craniocerebral trauma was analyzed. Thirty-seven cases of brain abscess were documented (incidence 3%). This sequela occurred more frequently in association with extensive, deep penetrating injuries; deep, prolonged coma; cerebrospinal fluid fistulas; wound infections; facio-orbital cranial/air sinus injuries; and retained bone fragments. The mortality rate was 54%, and, of the patients who survived, 82% had significant morbidity. This is the last large population study of brain abscess after penetrating craniocerebral trauma before the availability of computed tomographic scanning and more comprehensive coma care. It should serve as base line data against which we can measure improvement.

4560. Rish, B. L., et al. (1980). "Evolution of craniotomy as a debridement technique for penetrating craniocerebral injuries." Journal of neurosurgery **53**(6): 772-775.

A craniotomy debridement technique was recommended for penetrating craniocerebral injuries as early as 1940, in World War II. However, with due consideration for the bacterial contamination of penetrating injuries, the safety of this technique was questionable. The technique has been recommended in each succeeding war, but no data

substantiating the safety or eventual sequelae have been available. Analysis of the data from the large Head Injury Registry of Vietnam casualties indicates that, in properly selected cases, debridement by craniotomy technique can be safe and efficacious.

4561. Rish, B. L., et al. (1979). "Cranioplasty: a review of 1030 cases of penetrating head injury." Neurosurgery **4**(5): 381-385.

A total of 491 cranioplasties performed in a population of 1030 cases of penetrating head injury are reviewed. The morbidity rate was 5.5%, and the mortality rate was 0.2%. The clinical criteria of improving cosmetic defects and restoring craniocerebral protection are established, based on the location and size of the skull defect. Cranioplasty after penetrating head injury should be deferred for a minimum of 1 year to control morbidity. Complication of the original injury and surgical debridement increase the morbidity rate of cranioplasty. Post-traumatic epilepsy is not related to skull defects per se; neither is it affected by cranioplasty. Acrylic is an acceptable cranioplasty material if there is strict adherence to good surgical technique.

4562. Rish, B. L., et al. (1983). "Mortality following penetrating craniocerebral injuries. An analysis of the deaths in the Vietnam Head Injury Registry population." Journal of neurosurgery **59**(5): 775-780.

A population of 1127 men with penetrating craniocerebral injuries who were alive 1 week after their injuries has been followed for 15 years. During this time, 90 deaths (8%) occurred. Most of the deaths occurred early in the 1st year after trauma and were secondary to the direct effects of brain injury or the sequelae of coma. Complications, particularly infections, were significant mortality factors. Coma was the best prognostic guideline. Posttraumatic epilepsy was not related to mortality except for the risks accompanying each ictus. The population now appears to be approaching the actuarial norm of their peers.

4563. Risling, M., et al. (2012). "Alteration in bdnf and its receptors, fulllength and truncated TrkB and p75NTR following penetrating traumatic brain injury." Journal of neurotrauma **29**(10): A53-A54.

Introduction BDNF exerts multiple functions during CNS development and after injury. We have recently shown that the polymorphism of human BDNF gene predicts the cognitive recovery and outcome following penetrating TBI. In this study we have examined the expression of BDNF and its receptors in a rat model for penetrating TBI. Methods We used new model for penetrating TBI model in rat. The injury is produced by a controlled penetration of 2mm thick needle shaped object, which is accelerated with a bullet from air gun or a pendulum. We used in situ hybridization and investigated the mRNA expression of BDNF and its receptors, the full-length and the truncated TrkB and p75NTR, from 1 day to 8 weeks following penetrating TBI. In addition, the protein level of BDNF in cortex and hippocampus was measured following injury by reverse phase protein microarray (RPPM). Results The mRNA expression of BDNF and its receptors decreased in the penumbra zone ipsilateral to the injury while there was an increase in mRNA expression at the contralateral side of injury. The increase of BDNF mRNA expression in the hippocampus sustained for 2 weeks following injury. The most affected area was CA3. Furthermore, the protein analysis by RPPM showed increased levels of BDNF in the cortex and the hippocampus up to 2 weeks after TBI. At 8 weeks following injury the there was an intense labeling of the truncated TrkB receptor in the area surrounding the cavity. Also the mRNA expression of p75NTR was continuously increased around the cavity 8 weeks after injury. Conclusions Our study is the first report on the expression of BDNF and its receptors following penetrating TBI and suggests that their expression is altered long after the acute phase of injury. Further studies are needed to investigate if these late expressions of these receptors are beneficial or deleterious. In either case it raises the possibility to influence the recovery of brain injury during the chronic phase and the development of treatments that may improve TBI patients outcome.

4564. Ritchie, A. J. (1992). "Plastic bullets: significant risk of serious injury above the diaphragm." Injury **23**(4): 265-266.

A series of 123 patients who attended a district general hospital in Belfast over a 14-year period from 1975, sustained 126 plastic bullet injuries, resulting in one death and several serious injuries. This report shows the significant association of serious injury and/or death from plastic bullets in which the impact is above diaphragmatic level.

4565. Ritchie, E. C., et al. (1989). "Bullet in the brain: a case of organic psychosis." The Journal of neuropsychiatry and clinical neurosciences **1**(4): 449-451.

4566. Ritter, C. and G. Adebahr (1986). "[Stab injuries of the skull and brain]." Stichverletzung von Schadel und Gehirn. **96**(3): 229-234.

A few cases of skull and brain stab wounds are described and the clinicodiagnostic problems discussed. The injuries often remain unrecognized because the external wound often appears harmless, there are no neurological symptoms, or the clinical picture is interpreted as drunkenness, blunt injury or as another disease. The importance of a precise physical examination of the whole patient's head is pointed out. The refined methods used in modern radiodiagnostics of the skull are the most helpful in correctly recognizing these injuries; there are reports of patients with severe injuries who recovered when the correct diagnosis had been established.

4567. Riva, F., et al. (2021). "Practical application of synthetic head models in real ballistic cases." International journal of legal medicine **135**(6): 2567-2579.

In shooting crimes, ballistics tests are often recommended in order to reproduce the wound characteristics of the involved persons. For this purpose, several "simulants" can be used. However, despite the efforts in the research of "surrogates" in the field of forensic ballistic, the development of synthetic models needs still to be improved through a validation process based on specific real caseworks. This study has been triggered by the findings observed during the autopsy performed on two victims killed in the same shooting incident, with similar wounding characteristics; namely two retained head shots with ricochet against the interior wall of the skull; both projectiles have been recovered during the autopsies after migration in the brain parenchyma. The thickness of the different tissues and structures along the bullets trajectories as well as the incident angles between the bullets paths and the skull walls have been measured and reproduced during the assemblage of the synthetic head models. Two different types of models ("open shape" and "spherical") have been assembled using leather, polyurethane and gelatine to simulate respectively skin, bone and soft tissues. Six shots have been performed in total. The results of the models have been compared to the findings of post-mortem computed tomography (PMCT) and the autopsy findings.Out of the six shots, two perforated the models and four were retained. When the projectile was retained, the use of both models allowed reproducing the wounds characteristics observed on both victims in terms of penetration and ricochet behaviour. However, the projectiles recovered from the models showed less deformation than the bullets collected during the autopsies. The "open shape" model allowed a better controlling on the shooting parameters than the "spherical" model. Finally, the difference in bullet deformation could be caused by the choice of the bone simulant, which might under-represent either the strength or the density of the human bone. In our opinion, it would be worth to develop a new, more representative material for ballistic which simulates the human bone.

4568. Riva, F., et al. (2019). "Individual synthetic head models in wound ballistics - A feasibility study based on real cases." Forensic science international **294**: 150-159.

Synthetic models, also called "surrogates", are commonly used in wound ballistics in order to simulate human tissues. Despite several surrogates are worldwide accepted and used; some of them have not been yet fully validated and their limits for forensic reconstructions have not been deeply investigated yet. In this work we present a homicide/suicide case involving three gunshots to the head with bullets retained in the skull or beneath the scalp. Reconstruction of these cases was performed preparing three individual synthetic head models based on post-mortem computed tomography (PMCT) measurements. Ballistic soap, polyurethane plates and 10% ballistic gelatine at 4degreeC were used as simulants in individually adapted thickness. Ballistic tests were performed using the questioned firearm and ammunition type. The damages on the synthetic models have been compared to the findings in PMCT and autopsy of the victims. Although the results highlighted general similarities in terms of injury characteristics, some of the experimental shots overpenetrated. Furthermore, the bullets recovered in the synthetic models did not show the same quality of deformations as the questioned bullets. This lack of bullet deformation in the synthetic models might be mainly attributed to the physical difference between real bones and polyurethane surrogate.

4569. Rivara, F. P. (1983). "Epidemiology of violent deaths in children and adolescents in the United States." Pediatrician **12**(1): 3-10.

Injuries are the largest cause of death in children and adolescents after the first year of life. Injuries more than any other disease result in 3.5 million years of potential life lost. Poor children are particularly at risk of dying from trauma, particularly fires and drownings. The patterns of different types of childhood injuries are discussed, including motor vehicle occupants, pedestrian, bicycle and motorcycle injuries, fire and flame injuries, drownings and firearm deaths. For each of these, possible preventive strategies suggested by injury epidemiology are given. Intentional injuries from suicide and homicide are included because of similarities in epidemiology and prevention. The article also outlines areas where few effective strategies are available and where further research should be concentrated.

4570. Rivas, L., et al. (2022). "Early Chemoprophylaxis Against Venous Thromboembolism in Patients With Traumatic Brain Injury." The American surgeon **88**(2): 187-193.

INTRODUCTION: Timing to start of chemoprophylaxis for venous thromboembolism (VTE) in patients with traumatic brain injury (TBI) remains controversial. We hypothesize that early administration is not associated with increased intracranial hemorrhage., METHODS: A retrospective study of adult patients with TBI following blunt injury was performed. Patients with penetrating brain injury, any moderate/severe organ injury other than the brain, need for craniotomy/craniectomy, death within 24 hours of admission, or progression of bleed on 6 hour follow-up head computed tomography scan were excluded. Patients were divided into early (<=24 hours) and late (>24 hours) cohorts based on time to initiation of chemoprophylaxis. Progression of bleed was the primary outcome., RESULTS: 264 patients were enrolled, 40% of whom were in the early cohort. The average time to VTE prophylaxis initiation was 17 hours and 47 hours in the early and late groups, respectively (P < .0001). There was no difference in progression of bleed (5.6% vs. 7%, P = .67), craniectomy/-craniotomy rate (1.9% vs. 2.5%, P = .81), or VTE rate (0% vs. 2.5%, P = .1)., CONCLUSION: Early chemoprophylaxis is not associated with progression of hemorrhage or need for neurosurgical intervention in patients with TBI and a stable head CT 7 hours following injury.

4571. Rivera, G., et al. (2021). "Management of life-threatening post-traumatic otorrhagia." Clinical Case Reports **9**(1): 5-7.

Otorrhagia can be life-threatening, and acute control of the hemorrhage using easily accessible and practical techniques in the otolaryngology field such as Merocel packing and Kerlix gauze pressure dressing is essential to manage this complication.

4572. Rivera, G. A., et al. (2019). "A novel approach for controlling life-threatening post-traumatic otorrhagia." Otolaryngology - Head and Neck Surgery **161**(2): P183.

Objectives: To describe the presentation and acute management of severe life-threatening otorrhagia using an accessible and practical technique on the otolaryngology field. Methods: A case report and literature review are presented. Results: A 39-year-old man presented to the emergency room after suffering a gunshot wound to the left postauricular region over the mastoid bone. Initial otoscopic evaluation showed abundant soft tissue collapsing into the external auditory canal (EAC) with fresh bright red blood as well as blood clots within the canal without active bleeding. A nonabsorb-able hollow stent was placed in the EAC to maintain patency. A temporal bone imaging study demonstrated a complex temporal bone fracture extending to the carotid canal. A computed tomography angiogram showed a posttraumatic external carotid pseudoaneurysm. Soon after the study, the patient had a sudden onset of profuse uncontrollable left otorrhagia resulting in hemorrhagic shock. The EAC stent was removed, and hemostasis was successfully accomplished using a Merocel packing followed by a mastoid dressing. The neuroendovas-cular service proceeded to coil embolize the pseudoaneurysm controlling the hemorrhage. Conclusions: Otorrhagia will continue to be a common and self-limiting otolaryngology complaint. However, it can be life-threatening, and acute control of the hemorrhage using accessible otolaryngology equipment for novel cases can be crucial and a safe tool to manage this complication.

4573. Rivera-Lara, L., et al. (2010). "The “perfect storm” after nail gun penetration: Combined blast and vessel injury resulting in severe cerebral vasospasm." Neurocritical care **13**: S187.

Introduction Cerebral vasospasm (CVSP) is commonly seen after aneurysmal subarachnoid hemorrhage (SAH), but may also be seen after trauma. Vascular injury with SAH is the most intuitive etiology for traumatic CVSP. Blast injury - although a common cause for traumatic CVSP in the battle field - is rarely seen in civilians. We present a patient with a penetrating nail-gun brain injury in whom the blast and vessel injury combination lead to severe CVSP. Methods Case report. Results A 46 year-old man suffered a nail-gun induced penetrating brain injury through the foramen magnum. Head CT revealed two nails through the calvarium and left pons with tips in the left temporal lobe, SAH with intraventricular extension and a left temporal hematoma. A four-vessel angiogram (angio) revealed the nails adjacent to the left posterior cerebral artery (PCA) with PCA laceration and pseudoaneurysm formation. He underwent a successful craniotomy for removal of the two nails. On post-operative day (POD)# 6, his exam deteriorated. An angio revealed severe CVSP throughout, even in areas where no SAH was present, and intra-arterial nicardipine was given. NeuroICU treatment included nimodipine and hypervolemic but not hypertensive therapy because of a presumed increased risk of pseudoaneurysm rupture. On POD# 7, a repeat angio showed persistent CVSP, requiring intraarterial nicardipine and balloon angioplasty. To prevent rupture of the enlarging pseudoaneurysm, the left distal PCA was endovascularly occluded. A follow-up angio on POD# 10 revealed the resolution of CVSP. Four months after discharge, the patient was oriented, able to answer questions, walking with assistance, but was left with behavioral problems, several cranial nerve palsies and right arm weakness. Conclusions Although we do not know the exact mechanism of CVSP in this patient, we suspect that SAH alone could not explain the diffuse nature of the CVSP. Blast injury contributing to traumatic CVPS should be considered even in civilians when the vessel injury with SAH is remote from the CVPS vessel territories. When recognized early and treated aggressively, early death and severe disability may be prevented in traumatic CVSP.

4574. Rivers, J., et al. (2020). "Impact of a Devastating Brain Injury Pathway on Outcomes, Resources, and Organ Donation: 3 Years' Experience in a Regional Neurosciences ICU." Neurocritical care **33**(1): 165-172.

OBJECTIVE: To assess the impact of introducing a devastating brain injury (DBI) pathway on patient outcome, intensive care unit (ICU) resources, and organ donation practice in the first 3 years of implementation in a regional neurosciences ICU in the South West of England., METHODS: Patients with DBI admitted to our ICU between 2015 and 2018 were identified from our ICU database and their outcomes compared to those of non-DBI patients. Data were also obtained from the national potential donor audit to compare organ donation metrics before and after the introduction of the DBI pathway. Organ donation metrics in DBI patients and non-DBI patients were compared once the pathway had been implemented., RESULTS: We admitted 85 DBI patients (1.3% of all admissions), with a significantly shorter median length of ICU stay than in non-DBI patients, 1.14 versus 2.93 days ($p < 0.001$). Decisions for withdraw life-sustaining treatments (WLST) were made significantly earlier in DBI patients, median 26.2 versus 84.8 h ($p < 0.001$). Over 8% of DBI patients survived, while 31% progressed to brain death compared to 7.1% in the general population ($p < 0.001$), and 25% become solid organ donors compared to 1.3% of the general population ($p < 0.001$). There was an increase in the proportion of donors after brain death (DBD) to donors after circulatory death (DCD) in the 3 years following the introduction of the DBI pathway ($p = 0.024$). There was also an increased proportion of DBD donors to DCD donors of 76% versus 24% in the DBI group compared to 62% versus 38% ($p = 0,002$) in the non-DBI population. Prognostic scoring systems do not provide accurate estimates of survival rate in this population., CONCLUSIONS: Admitting patients with perceived DBI to ICU and avoiding the early WLST allows identification of unexpected survivors and gives families more time in decision making at the end of life. The DBI pathway increases the potential for organ donation and increases the proportion of DBD donors. These benefits outweigh the small impact of a DBI pathway on ICU resources.

4575. Rizwan, M., et al. (2016). "Pattern of maxilofacial trauma in patients reporting at Liaquat University Hospital Hyderabad." Medical Forum Monthly **27**(10): 65-67.

Objective: The aim of present study was to evaluate the pattern of maxillofacial trauma in patients reporting at Liaquat University Hospital Hyderabad. Study Design: Observational/descriptive/cross sectional study Place and Duration of Study: This study was conducted at the Oral and Maxillofacial Surgery Outpatient Department of Liaquat University Hospital from 01-01-2014 to 31-12-2015. Materials and Methods: This study was to analyze the age, gender and site of facial fracture of patients due to road traffic accidents, assault, falls, gunshot and sports injuries. Data relating to 136 patients was collected. The diagnosis of the maxillofacial trauma was done on the basis of history, clinical features and appropriate radiographs. All the relevant information was recorded on proforma. Results: Most prevalent age of trauma was 21-30 years teenagers, male 104 (76%) outnumbered the female 32 (24%) with ratio of 4:1. The most common fractured bone of midface was zygomatic bone n=52 (38.3%) and the most common region of mandibular fracture was

parasymphysis n=34(25.0%). Conclusion: Trauma is a main cause of fracture of facial bones especially in the young male population of Pakistan. Zygomatic bone fracture and parasymphseal regions are most common fracture site.

4576. Roa, J., et al. (2022). "USE OF RESPONSIVE NEUROSTIMULATION FOR TREATMENT OF REFRACTORY EPILEPSY AFTER TRAUMATIC BRAIN INJURY: A CASE SERIES." Journal of neurotrauma **39**(11-12): A77.

Introduction: Refractory post-traumatic epilepsy (RPTE) is a debilitating sequela of about 10% of traumatic brain injury (TBI) cases. RPTE refers to seizures that persist >1 week after TBI despite appropriate trials of two or more medications. Responsive neurostimulation (RNS), a closed-loop system that provides stimulation when epileptiform activity is detected, has shown promising results in refractory epilepsy. Objective: To assess outcomes of RNS in RPTE. Methods: Patients who underwent RNS for RPTE between 2014 and 2021 at our institution were included. TBI severity was classified as mild (loss of consciousness (LOC) <30min + normal neuroimaging), moderate (LOC >30 minutes and <24h +/- skull fracture), or severe (LOC >24h hours + contusion/hematoma). Outcomes were assessed using Engel classification and improvement in seizure frequency, duration, severity, post-ictal recovery, and medication reduction. Results: Six patients underwent RNS for RPTE. Mechanisms of TBI included motor vehicle accidents in three patients (2 severe, 1 moderate), one motor pedestrian collision (severe), one gunshot wound to the head (severe), and one assault (moderate). Seizure onset zones included bilateral temporal (3 cases), temporal plus (2 cases), and multilobar (1 case). After a year patients experienced 50% or higher improvement in all categories: 3 patients achieved Engel Class III (50-90% improvement), 2 with Engel Class II (90-99% improvement), and 1 with Engel Class I (seizure-free). No complications were reported. Conclusions: RNS is a safe and effective treatment for RPTE. Patients carefully selected by adequate characterization of the seizure onset zone may benefit from this technology.

4577. Robaei, D., et al. (2004). "Orbitocranial penetration by a fragment of wood." The Medical journal of Australia **181**(6): 329-330.

4578. Robakis, D., et al. (2015). "A case of “prodromal” huntington's disease with neuropathology." Neurology **84**.

OBJECTIVE: To present the first case of neuropathologically confirmed “prodromal” Huntington's disease (HD). BACKGROUND: HD is neurodegenerative disorder inherited in an autosomal dominant manner. The current diagnostic criteria based exclusively on motor signs have been questioned recently by Reilmann et al., who proposed new criteria that incorporate historical information including behavioral and cognitive changes, and drew a distinction between presymptomatic and prodromal cases. Perhaps biased by current definitions, clinicopathologic studies to date have examined either asymptomatic (presymptomatic) HD or manifest HD of several years duration, of which relatively few have grade 1 neuropathology (16 cases in total; Gomez-Tortosa et al, Myers et al, Pillai et al), but to our knowledge, no cases of “prodromal” HD have been published with neuropathology. DESIGN/METHODS: The patient was a brain donor to the New York Brain Bank at Columbia University. History was obtained post-mortem through family members. Neuropathologic grade was assigned according to the Vonsattel HD grading scale. RESULTS: A 29-year old male with a maternal history of HD presented to autopsy after suffering lethal gunshot wounds in an altercation. Two weeks prior to death a family member familiar with HD noted an unsteady gait, dropping of objects, and apathy. The patient had become unemployed several months prior. He was not aware of deficits, did not present to a neurologist, and was not tested for CAG-repeat length. Neuropathology revealed grade 1 HD. The head and body of the caudate nucleus were atrophic; there was mild atrophy in the putamen and external segment of the globus pallidus. CONCLUSIONS: 1) Brain donation pre-plans are essential to capturing unexpected deaths associated with early HD. 2) The clinical course presented here is consistent with our current understanding of HD, and supports the use of a “prodromal” diagnostic category 3) Prodromal HD may correlate with grade 1 disease neuropathologically.

4579. Robb, J. D. and J. G. Matthews (1971). "The injuries and management of riot casualties admitted to the Belfast hospital wards, August to October, 1969." The British journal of surgery **58**(6): 413-419.

4580. Roberson, J. B. and W. S. Rosenberg (1997). "Traumatic cranial defects reconstructed with the HTR-PMI cranioplastic implant." The Journal of cranio-maxillofacial trauma **3**(2): 8-13.

Titanium mesh, polymethyl methacrylate application, and autogenous bone grafting have been used to reconstruct traumatic cranial defects, with varying success. A more recent technique utilizing hard tissue replacement-patient matched implants (HTR-PMIs) involves the production of a cranioplastic implant using three-dimensional computed tomography imaging. It has proven less time-consuming and provides an excellent cosmetic result for the patient. The authors present two case reports using this technique to correct traumatic cranial defects. Both patients exhibited satisfactory results and no postoperative complications. The authors believe this relatively new technique represents an advance in the management of large cranial defects.

4581. Roberts, D. J., et al. (2009). "Effect of acute inflammatory brain injury on accumulation of morphine and morphine 3- and 6-glucuronide in the human brain." Critical care medicine **37**(10): 2767-2774.

OBJECTIVE: In animals, central nervous system inflammation increases drug accumulation in the brain partly due to a loss of central nervous system drug efflux transporter function at the blood-brain barrier. To determine whether a similar loss of active drug efflux occurs in humans after acute inflammatory brain injury., DESIGN: Observational human pharmacokinetic study., SETTING: Medical-surgical-neurosurgical intensive care unit at a university-affiliated, Canadian tertiary care center., PATIENTS: Patients with acute inflammatory brain injury, including subarachnoid hemorrhage (n = 10), intracerebral and/or intraventricular hemorrhage (n = 4), or closed head trauma (n = 2) who received morphine intravenously after being fitted with cerebrospinal fluid ventriculostomy and peripheral arterial catheters., INTERVENTIONS: We correlated the cerebrospinal fluid distribution of morphine, morphine-3-glucuronide, and morphine-6-glucuronide with the cerebrospinal fluid and plasma concentration of the proinflammatory cytokine interleukin-6 and the passive marker of blood-brain barrier permeability, albumin., MEASUREMENTS AND MAIN RESULTS: Acute brain injury produced a robust inflammatory response in the central nervous system as reflected by the elevated concentration of interleukin-6 in cerebrospinal fluid. Penetration of morphine metabolites into the central nervous system increased in proportion to the neuroinflammatory response as demonstrated by the positive correlation between cerebrospinal fluid interleukin-6 exposure and the area under the curve cerebrospinal fluid/plasma ratio for morphine-3-glucuronide ($r = .49$, $p < .001$) and morphine-6-glucuronide ($r = .51$, $p < .001$). In contrast, distribution of morphine into the brain was not linked with cerebrospinal fluid interleukin-6 exposure ($r = .073$, $p = .54$). Albumin concentrations in plasma and cerebrospinal fluid were consistently in the normal range, indicating that the physical integrity of the blood-brain barrier was likely undisturbed., CONCLUSIONS: Our results suggest that central nervous system inflammation following acute brain injury may selectively inhibit the activity of specific drug efflux transporters within the blood-brain barrier. This finding may have significant implications for patients with neuroinflammatory conditions when administered centrally acting drugs normally excluded from the brain by such transporters.

4582. Roberts, E., et al. (2012). "Anti-seizure prophylaxis is unnecessary after traumatic brain injury." Brain injury **26**(4-5): 318-319.

Objective: The purpose of this study was to examine the effectiveness of prophylactic antiepileptic drugs during the early post-injury period (first seven days after traumatic brain injury [TBI]) in preventing post-injury seizures. Methods: The records of adult (age>16) patients with TBI from Jan 2005 to Jan 2010 at a Level I trauma center were retrospectively reviewed using NTRACS. Admission GCS, mechanism of injury (blunt vs. penetrating TBI), age, ISS, AIS, computed tomography (CT) scan of the head, day of seizure, and type of prophylaxis (Dilantin (Phenytoin), Keppra (Levetiracetam), or none) were all reviewed. Statistical analysis was performed using mean, and Chi-square test, accepting $p<0.05$ as significant. Results: 2061 adult patients with CT scan positive TBI after blunt and penetrating mechanisms were identified of which only 14 (0.68%) patients had a seizure during the early post-injury period. Patients were divided into two groups based on anti-seizure prophylaxis: No Prophylaxis (NP) (1383) and With Prophylaxis (WP) (Dilantin and Keppra) (678). For blunt and penetrating TBI, comparing NP vs. WP groups, no significant difference in seizure rate occurred regardless of GCS: GCS (3-15) [0.65% vs. 0.74%, p=0.82], GCS (9-15) [0.73% vs. 0.69%, p=0.94], and GCS(≤8) [0.47% vs. 0.82%, p=0.58]. For just blunt TBI, comparing NP vs. WP groups, again no significant difference in seizure rate occurred regardless of GCS: GCS (3-15) [0.55% vs. 0.47%, p=0.83], GCS (9-15) [0.76% vs. 0.74%, p=0.97], and GCS (≤8) [0.57% vs. 0.88%, p=0.66]. For just penetrating trauma patients there were no seizures in both the NP (n=105) vs. WP (n=42) group (p=1). Conclusions: Significantly lower overall seizure rate was noted as compared to previously reported (0.68% vs. 4-25%). Regardless of mechanism of injury (blunt or penetrating) or severity of TBI, [GCS (3-15), GCS (9 - 15), or GCS (≤8)] no significant difference in the seizure rate was found between NP and P groups. Therefore, seizure prophylaxis may not be necessary during the early post-injury (first seven days) period after TBI.

4583. Roberts, I., et al. (2017). "Tranexamic acid in bleeding trauma patients: an exploration of benefits and harms." Trials **18**(1): 48.

BACKGROUND: The CRASH-2 trial showed that tranexamic acid (TXA) administration reduces mortality in bleeding trauma patients. However, the effect appeared to depend on how soon after injury TXA treatment was started. Treatment within 3 h reduced bleeding deaths whereas treatment after 3 h increased the risk. We examine how patient characteristics vary by time to treatment and explore whether any such variations explain the time-dependent treatment effect., METHODS: Exploratory analysis were carried out, including per-protocol analyses, of data from the CRASH-2 trial, a randomised placebo-controlled trial of the effect of TXA on mortality in 20,211 trauma patients with, or at risk of, significant bleeding. We examine how patient characteristics (age, type of injury, presence or absence of head injury, Glasgow coma scale (GCS), systolic blood pressure and capillary refill time) vary with time to treatment and use univariable (restriction) and multivariable methods to examine whether any such variations explain the time-dependent effect of TXA. If not explained by differences in patient characteristics, we planned to conduct separate prespecified subgroup analyses for the early benefit and late harm., RESULTS: There was no substantial variation in age or capillary refill by time to treatment. However, the proportion of patients with blunt trauma, the proportion with head injury and mean systolic blood pressure increased as time to treatment increased. Mean GCS decreased as time to treatment increased. Analyses restricted to patients with blunt trauma, those without head injury and those with a systolic blood pressure <100 mmHg showed that these characteristics did not explain the time-dependent treatment effect. In a multivariable analysis the interaction with time to treatment remained highly significant (p < 0.0001). Separate subgroup analyses that examine how the benefits of early TXA treatment and the harms of late TXA treatment vary by systolic blood pressure (⩽75, 76-89, >89 mmHg); GCS (severe 3-8, moderate 9-12, mild 13-15); and type of injury (penetrating versus blunt) showed no significant heterogeneity., CONCLUSIONS: The time-dependent effect of TXA in bleeding trauma patients is not explained by the type of injury, the presence or absence of head injury or systolic blood pressure. When given within 3 h of injury, TXA reduces death due to bleeding regardless of type of injury, GCS or blood pressure., TRIAL REGISTRATION: ClinicalTrials.gov, NCT00375258 . Registered on 11 September 2006.

4584. Roberts, I., et al. (2013). "The CRASH-2 trial: a randomised controlled trial and economic evaluation of the effects of tranexamic acid on death, vascular occlusive events and transfusion requirement in bleeding trauma patients." Health technology assessment (Winchester, England) **17**(10): 1-79.

BACKGROUND: Among trauma patients who survive to reach hospital, exsanguination is a common cause of death. A widely practicable treatment that reduces blood loss after trauma could prevent thousands of premature deaths each year. The CRASH-2 trial aimed to determine the effect of the early administration of tranexamic acid on death and transfusion requirement in bleeding trauma patients. In addition, the effort of tranexamic acid on the risk of vascular occlusive events was assessed., OBJECTIVE: Tranexamic acid (TXA) reduces bleeding in patients undergoing elective surgery. We assessed the effects and cost-effectiveness of the early administration of a short course of TXA on death, vascular occlusive events and the receipt of blood transfusion in trauma patients., DESIGN: Randomised placebo-controlled trial and economic evaluation. Randomisation was balanced by centre, with an allocation sequence based on a block size of eight, generated with a computer random number generator. Both participants and study staff (site investigators and trial co-ordinating centre staff) were masked to treatment allocation. All analyses were by intention to treat. A Markov model was used to assess cost-effectiveness. The health outcome was the number of life-years (LYs) gained. Cost data were obtained from hospitals, the World Health Organization database and UK reference costs. Cost-effectiveness was measured in international dollars ($) per LY. Deterministic and probabilistic sensitivity analyses were performed to test the robustness of the results to model assumptions., SETTING: Two hundred and seventy-four hospitals in 40 countries., PARTICIPANTS: Adult trauma patients (n = 20,211) with, or at risk of, significant bleeding who were within 8 hours of injury., INTERVENTIONS: Tranexamic acid (loading dose 1 g over 10 minutes then infusion of 1 g over 8 hours) or matching placebo., MAIN OUTCOME MEASURES: The primary outcome was death in hospital within 4 weeks of injury, and was described with the following categories: bleeding, vascular occlusion (myocardial infarction, stroke and pulmonary embolism), multiorgan failure, head injury and other., RESULTS: Patients were allocated to TXA (n = 10,096) and to placebo (n = 10,115), of whom 10,060 and 10,067 patients, respectively, were analysed. All-cause mortality at 28 days was significantly reduced by TXA [1463 patients (14.5%) in the TXA group vs 1613 patients (16.0%) in the placebo group; relative risk (RR) 0.91; 95% confidence interval (CI) 0.85 to 0.97; p = 0.0035]. The risk of death due to bleeding was significantly reduced [489 patients (4.9%) died in the TXA group vs 574 patients (5.7%) in the placebo

group; RR 0.85; 95% CI 0.76 to 0.96; p = 0.0077]. We recorded strong evidence that the effect of TXA on death due to bleeding varied according to the time from injury to treatment (test for interaction p < 0.0001). Early treatment (<= 1 hour from injury) significantly reduced the risk of death due to bleeding [198 out of 3747 patients (5.3%) died in the TXA group vs 286 out of 3704 patients (7.7%) in the placebo group; RR 0.68; 95% CI 0.57 to 0.82; p < 0.0001]. Treatment given between 1 and 3 hours also reduced the risk of death due to bleeding [147 out of 3037 patients (4.8%) died in the TXA group vs 184 out of 2996 patients (6.1%) in the placebo group; RR 0.79; 95% CI 0.64 to 0.97; p = 0.03]. Treatment given after 3 hours seemed to increase the risk of death due to bleeding [144 out of 3272 patients (4.4%) died in the TXA group vs 103 out of 3362 patients (3.1%) in the placebo group; RR 1.44; 95% CI1.12 to 1.84; p = 0.004]. We recorded no evidence that the effect of TXA on death due to bleeding varied by systolic blood pressure, Glasgow Coma Scale score or type of injury. Administering TXA to bleeding trauma patients within 3 hours of injury saved an estimated 755 LYs per 1000 trauma patients in the UK. The cost of giving TXA to 1000 patients was estimated at $30,830. The incremental cost of giving TXA compared with not giving TXA was $48,002. The incremental cost per LY gained of administering TXA was $64., CONCLUSIONS: Early administration of TXA safely reduced the risk of death in bleeding trauma patients and is highly cost-effective. Treatment beyond 3 hours of injury is unlikely to be effective. Future work [the Clinical Randomisation of an Antifibrinolytic in Significant Head injury-3 (CRASH-3) trial] will evaluate the effectiveness and safety of TXA in the treatments of isolated traumatic brain injury (http://crash3.lshtm.ac.uk/)., TRIAL REGISTRATION: Current Controlled Trials ISRCTN86750102, ClinicalTrials.gov NCT00375258 and South African Clinical Trial Register DOH-27-0607-1919., FUNDING: The project was funded by the Bupa Foundation, the J P Moulton Charitable Foundation and the NIHR Health Technology Assessment programme and will be published in full in Health Technology Assessment; Vol. 17, No. 10. See HTA programme website for further project information.

4585. Roberts, P. (2002). "Patterns of injury in military operations." Current Anaesthesia and Critical Care **13**(5): 243-248.

The predominant causes of injury in peace are markedly different from those occurring in times of conflict. In peace, the majority of injuries are caused by blunt trauma. In war, penetrating injuries are by far the most common with blunt, blast and thermal injuries also arising. Penetrating injuries may be caused not only by bullets but by fragments and the actual mortality depends to, a large extent, on the site which is hit, brain, mediastinum and abdomen carrying the highest rate of lethality. Of particular importance with any penetrating injury is the energy transfer from the missile to the tissue which it enters.This review examines all of these issues together with the various strategies of management and likely outcomes.

4586. Roberts, P. A., et al. (2005). "Pneumoperitoneum after percutaneous endoscopic gastrostomy: a case report and review." The Journal of emergency medicine **28**(1): 45-48.

A complication of percutaneous endoscopic gastrostomy (PEG) is perforation of a hollow viscus. This is typically detected by finding of pneumoperitoneum (PP) on radiographs. However, PP can occasionally be a benign finding. A review of the literature shows many causes for a benign PP, and it has been noted to occur frequently after PEG placement. In the absence of signs or symptoms of peritoneal inflammation, PP usually requires no further investigation or treatment.

4587. Roberts, R. M., et al. (2014). "Diffusion Tensor Imaging (DTI) findings following pediatric non-penetrating TBI: a meta-analysis." Developmental neuropsychology **39**(8): 600-637.

This study meta-analyzed research examining Diffusion Tensor Imaging following pediatric non-penetrating traumatic brain injury to identify the location and extent of white matter changes. Fractional anisotropy (FA) and apparent diffusion coefficient (ADC) data from 20 studies were analyzed. FA increased and ADC decreased in most white matter tracts in the short-term (moderate-to-large effects), and FA decreased and ADC increased in the medium- to long-term (moderate-to-very-large effects). Whole brain (short-term), cerebellum and corpus callosum (medium- to long-term) FA values have diagnostic potential, but the impact of age/developmental stage and injury severity on FA/ADC, and the predictive value, is unclear.

4588. Roberts, S. A. G., et al. (2016). "Decompressive craniectomy and cranioplasty: experience and outcomes in deployed UK military personnel." British journal of neurosurgery **30**(5): 529-535.

OBJECT: In recent conflicts, many UK personnel sustained head injuries requiring damage-control surgery and aeromedical transfer to the UK. This study aims to examine indications, complications and outcomes of UK military casualties undergoing craniectomy and cranioplasty from conflicts in Afghanistan and Iraq., METHODS: The UK military Joint Theatre Trauma Registry (JTTR) was searched for all UK survivors in Afghanistan and Iraq between 2004 and 2014 requiring craniectomy and cranioplasty resulting from trauma., RESULTS: Fourteen decompressive craniectomies and cranioplasties were performed with blast and gunshot wounds equally responsible for head injury. Ten survivors (71%) had an Injury Severity Score (ISS) of 75, normally designated as 'unsurvivable'. Most were operated on the day of injury. Seventy-one percent received a reverse question mark incision and 7% received a bicoronal incision. Seventy-nine percent had bone flaps discarded. Overall infection rate was 43%. Acinetobacter spp was the causative organism in 50% of cases. Median Glasgow Outcome Scale (GOS) at final follow-up was 4. All casualties had a GOS score greater than 3., CONCLUSIONS: Timely neurosurgical intervention is imperative for military personnel given high survival rates in those sustaining what are designated 'un-survivable' injuries. Early decompression facilitates safe aeromedical evacuation of casualties. Excellent outcomes validate the UK military trauma system and the stepwise performance gains throughout recent conflicts however trauma registers most evolving to have specific relevance to military casualties. In high-energy trauma with contamination and soft-tissue destruction, surgery should be conducted with regard for future soft tissue reconstruction. Bone flaps should be discarded and cranioplasty performed according to local preference. Facilities receiving military casualties should have specialist microbiological input mindful of the difficulties treating unusual microbes.

4589. Robertson, B. C. and P. N. Manson (1999). "High-energy ballistic and avulsive injuries. A management protocol for the next millennium." The Surgical clinics of North America **79**(6): 1489-xi.

This article discusses high-energy ballistic and avulsive injuries, which are a formidable challenge to the reconstructive surgeon. Management protocols are provided for the next millennium.

4590. Robertson, C. (1993). "Desaturation episodes after severe head injury: influence on outcome." Acta neurochirurgica. Supplementum **59**: 98-101.

The relationship of jugular venous desaturation and neurological outcome was examined in 116 patients with severe head injury. Seventy-six episodes of jugular venous desaturation were prospectively identified in 46 (40%) of the patients. The etiology of the desaturations varied, including both systemic and cerebral causes. A poor neurological outcome was strongly associated with the occurrence of jugular venous desaturation.

4591. Robertson, C. (1993). "Measurements of cerebral blood flow and metabolism in severe head injury using the Kety-Schmidt technique." Acta neurochirurgica. Supplementum **59**: 25-27.

Global cerebral blood flow (CBF) was measured serially for up to 10 days after severe head injury, and related to outcome. Twenty-five of the patients had a reduced CBF, 47 had a normal CBF, and 30 had an elevated CBF. Patients with a reduced CBF had a poorer outcome than patients with a normal or elevated CBF. There were no differences in the type of injury, initial GCS, severity of intracranial hypertension in each CBF group. Systemic factors did not significantly contribute to the differences in CBF among the 3 groups. A logistic regression model of the effect of CBF on neurological outcome was developed. When adjusted of variables which were found to be significant confounders, including age, initial Glasgow Coma Score, hemoglobin, cerebral perfusion pressure, and cerebral oxygen consumption, a reduced CBF remained significantly associated with an unfavorable neurological outcome.

4592. Robertson, D. P. and R. K. Simpson (1992). "Penetrating injuries restricted to the cauda equina: a retrospective review." Neurosurgery **31**(2): 265-270.

Thirty-three patients with penetrating injuries to the cauda equina were admitted to Ben Taub General Hospital (1980-1989). Thirty received gunshot injuries, and three had stab wounds. The average age was 30 years, and 30 patients were male. All patients had been admitted within 1 hour of injury and received spine films, myelography, or computed tomography. Deficits were "complete" if total loss of function existed and were "incomplete" if any function remained below the level of injury. Improvement at the end of followup was defined as any recovery of motor strength or regaining of a unilateral sensory level. Twenty-nine (88%) patients had incomplete neurological deficits. Of these, 15

(52%) had surgery, and of this patient group, 7 (47%) improved, 7 (47%) showed no change, and 1 (6%) worsened. Fourteen (48%) patients with incomplete deficits were treated conservatively; 10 (71%) improved, and 4 (29%) had no change. Four patients (12%) had complete deficits, 3 of whom had surgery, and all improved. One patient with a complete deficit was treated conservatively and did not improve. Ten (34%) patients had bowel or bladder dysfunction, and none improved regardless of the type of treatment. Complications (cerebrospinal fluid leak, pseudomeningocele, or wound infection) occurred in 5 (28%) operative patients and 1 (7%) conservatively treated patient. Early neurosurgical intervention for penetrating injuries of the cauda equina may be beneficial but carries an increased risk of complication.

4593. Robinson, B., et al. (2021). "Outcomes of stab wounds presenting to Kamuzu Central Hospital in Malawi." Malawi medical journal : the journal of Medical Association of Malawi **33**(1): 1-6.

Introduction: Injuries are a leading cause of morbidity and mortality worldwide, necessitating that we understand the local burden of injury to improve injury-related trauma care and patient outcomes. The characteristics, outcomes, and risk factors for mortality following stab wounds in Malawi are poorly delineated., Methods: This is a retrospective, descriptive analysis of patients presenting to Kamuzu Central Hospital in Lilongwe, Malawi, with stab wounds from February 2008 to May 2018. Univariate and bivariate analyses were performed to compare patient and injury characteristics based on mortality. We performed Poisson multivariate regression to predict the factors that increase the relative risk of mortality., Results: During the study, 32,297 patients presented with assault. Of those patients, 2,352 (7.3%) presented with stab wounds resulting in a 3.2% (n=74) overall mortality. The majority of wounds were to the head or cervical spine (n=1,043, 44.6%), while injuries to the chest (n=319, 13.7%) were less frequent. We found an increased relative risk of mortality in patients who presented with an injury to the chest (RR 3.95, 95% CI 1.79-8.72, p=0.001) and who were brought in by the police (RR 33.24, 95% CI 11.23-98.35, p<0.001)., Conclusion: In this study, stab wounds accounted for 7.3% of all assault cases, with a 3.2% mortality. Though the commonest site of stab was the head, wounds to the chest conferred the highest relative risk of mortality. A multifaceted approach to reducing mortality is needed. Incorporating training of first responders in basic life support, including the police, may reduce stab-related mortality.

4594. Robinson, P. D., et al. (1997). "Unlikely foreign bodies in unusual facial sites." The British journal of oral & maxillofacial surgery **35**(1): 36-39.

Two cases are reported in which retained wooden foreign bodies in the facial tissues posed considerable diagnostic difficulty and were the source of persistent and distressing symptoms. In both patients the embedded foreign material defied radiological identification and in case 1 the time between injury and final removal of the foreign body was 9 years. The cases are described to highlight the problems in managing penetrating injuries when there is the possibility that radiolucent material is implanted in the wound.

4595. Robiony, M. (2013). "Minimally invasive surgery: Endoscopic removal of a bullet from the orbital apex." Orbit **32**(3): 203-205.

I present an endoscopic approach to removal of a bullet from the orbital apex in an attempted suicide, emphasising the importance of fast, minimally invasive surgery, performing endoscopy through the bullet entrance hole, to prevent major complications and to ensure a speedy recovery.

4596. Robles, L. A. (2012). "High-velocity gunshot to the head presenting as initial minor head injury: things are not what they seem." The American journal of emergency medicine **30**(9): 2089.e2085-2087.

Tangential gunshots to the head are a special type of injury in which the bullet or bullet fragments do not penetrate the inner table of the skull. Most of patients experiencing this kind of injuries usually have a benign clinical presentation. We describe the case of a 22-year-old soldier who had a tangential gunshot to the head caused by a high-velocity projectile. Initially, the patient was neurologically intact, progressing to profound coma in the next 2 hours. The characteristics of the wound and initial neurologic condition led to first contact physicians to treat this injury as a case of mild head trauma. This case shows us that gunshots to the head caused by high-velocity missiles must be treated aggressively like a severe head injury, even when the initial neurologic examination is normal.

4597. Robles, L. A. (2022). "Orbito-cranial gunshot injury: the case of the missing entrance wound." British journal of neurosurgery **36**(1): 105-107.

This paper presents the case of a 68 years old male who was admitted to the hospital after being attacked by another person. The main clinical signs were confusion and severe periorbital edema, findings of gunshot injury were not evident initially. However, a CT scan showed findings compatible with an orbito-cranial perforating gunshot injury. To the best of the author's knowledge, cases like this have not been reported in the literature. This report shows us that an orbito-cranial gunshot injury should be ruled out in cases of severe periorbital edema, especially if the cause of the injury remains unidentified.

4598. Rocca, A., et al. (1987). "Penetrating craniocerebral injuries. Report of two unusual cases." Journal of neurosurgical sciences **31**(1): 19-21.

Two unusual cases of craniocerebral injury caused by a fishing harpoon trident are reported. Both patients, in spite of the apparent seriousness of the lesions, recovered satisfactorily.

4599. Rocker, G. M., et al. (2006). "Brief review: Practice variation in end of life care in the ICU: implications for patients with severe brain injury." Canadian journal of anaesthesia = Journal canadien d'anesthesie **53**(8): 814-819.

PURPOSE: To review end of life care issues in the intensive care unit (ICU) and how practice variation might affect the ultimate outcome of acute brain injury., SOURCES: Bibliographic literature search and personal files., FINDINGS: In Canada, 10-20% of critically ill adults die in the ICU. Many of these deaths follow acute brain injury in the setting of clinical deterioration, life support limitation and brain death. This brief review addresses some key elements of end of life care for critically ill brain injured patients, including family interactions, making survival predictions, and factors influencing decision-making about cardiopulmonary resuscitation and withdrawal of mechanical ventilation., CONCLUSIONS: Provision of compassionate high quality end of life care should be standard of practice for brain injured and all other critically ill patients who cannot survive. Inconsistencies in end of life care may affect where, when and how patients die, the quality of their death and whether or not they are considered for organ and tissue donation.

4600. Rockwood, E. J. (1995). "Retrobulbar blocks." Ophthalmology **102**(9): 1258.

4601. Rodenas-Lozano, R., et al. (2019). "[Paradoxical arterial gas embolism following a direct incisive injury to the skull]." Embolismo arterial gaseoso paradojico tras una herida incisa craneal directa. **69**(3): 109-112.

INTRODUCTION: An arterial gas embolism is defined as the presence of air in the arterial circulation. This is an extremely rare cause of stroke that has been described in a multitude of clinical scenarios, generally related to iatrogenic processes. A clinical case is reported in which the arterial gas embolism occurred after a traumatic brain injury, and the most relevant aspects of diagnosis and aetiopathogenesis are reviewed., CASE REPORT: We report the case of a 52-year-old woman with an open craniofacial wound resulting from an attack with an axe. The initial CT scan found fractures in the left zygomatic, sphenoidal and maxillary arches, as well as pneumocephalus in the cavernous sinuses and the right carotid canal. One hour later, the patient showed a neurological deficit in the right hemisphere, and so a new cranial computed tomography scan with multimodal vascular study was urgently requested, which revealed the mobilisation of the pneumocephalus and ruled out a large vessel arterial occlusion. A shunt study using transcranial Doppler and echocardiography showed the presence of a patent foramen ovale to be the cause of arteriovenous communication that justified an arterial gas embolism. The follow-up CT scan at 48 hours confirmed the appearance of a right parietal ischaemic lesion., CONCLUSION: This case reflects the simultaneous presence of air in the arterial and venous circulation of the brain, as well as the peripheral communication through a patent foramen ovale. This production mechanism is poorly documented in the literature.

4602. Rodiek, S. O. (1984). "[Computed tomographic classification of gunshot wounds of the head]." Computertomographische Klassifikation von Kopfschussverletzungen. **141**(1): 11-17.

Twenty-four patients following head bullet injuries were analyzed by CT. The major part, concerning 10 patients, refers to acute perforating lesions. Five cases showed penetrating injuries, 3 cases bolt injuries, the other ones lesions of the facial skull and residues of former bullet injuries. Because of a tempory cavitation the bullet track is wider than the bullet itself. The position of the skull fragments gives a hint to the shot direction. A reconstruction of intracranial bullet movements and spontaneous bullet dislocations is made possible by CT. It further shows secondary posttraumatic lesions.

4603. Rodionov, N. F., et al. (2015). "[The successful treatment of the combined penetrating gunshot wound of the orbit, ethmoidal labyrinth cells, and sphenoidal sinus containing a foreign body]." Vestnik otorinolaringologii **80**(2): 73-74.

4604. Rodiukova, E. N., et al. (1992). "[Changes in the cellular immunity factors in suppurative complications of penetrating craniocerebral trauma]." Izmenenie faktorov kletochnogo immuniteta pri gnoinykh oslozhneniiakh pronikaiushchei cherepno-mozgovoi travmy.(2-3): 12-15.

The authors examined patients with penetrating cerebrocranial trauma (CCT) and uneventful course of traumatic disease (30) and those with CCT complicated by intracranial purulent process (24 persons). A direct correlation of the marked character and severity of the clinical course of the posttraumatic period and the changes in the immune system was revealed. Increase of the level of neutrophil rosette formation, indices of the NST test, the activity and intensity of neutrophil phagocytosis in penetrating CCT allows the development of an intracranial purulent process to be predicted at an early stage before the appearance of clinical sings. Decrease of the number of spontaneous rosette-forming and formazan-positive neutrophils is an indication of an unfavourable course of an intracranial purulent complication with a fatal outcome.

4605. Rodriguez, E. D., et al. (2007). "Microsurgical reconstruction of posttraumatic high-energy maxillary defects: establishing the effectiveness of early reconstruction." Plastic and reconstructive surgery **120**(7 Suppl 2): 103S-117S.

BACKGROUND: Posttraumatic, high-energy defects of the midface can be challenging to reconstruct because they involve extensive composite tissue loss and result in significant permanent functional and cosmetic deformity. These injuries require replacement of the bony framework, external soft tissue, and intraoral mucosa. Local skin flaps and nonvascularized bone grafts have been used for reconstruction, but bony resorption and the associated soft-tissue collapse limit long-term viability. The authors present a classification of maxillary defects following high-energy trauma and a treatment algorithm using vascularized bone flaps., METHODS: Fourteen patients with significant maxillary loss from high-energy trauma underwent reconstruction with composite vascularized bone flaps. Eight patients had fibula flaps and six had iliac crest flaps. There were five women and nine men, with a mean age of 36.3 years (range, 21 to 48 years) and a mean follow-up of 18 months (range, 5 to 54 months)., RESULTS: Thirteen of the 14 flaps survived. Nine patients had additional procedures. Nine patients had oronasal fistulas and eight were dependent on gastrostomy tubes preoperatively. All patients were able to feed orally without nasal regurgitation postoperatively. All patients achieved stable restoration of the midfacial architecture., CONCLUSIONS: The classification scheme presented centers on the missing maxillary subunits. The reconstructive algorithm is based on the type of defect, tissue requirement, and donor tissues necessary to restore facial projection and prosthodontic rehabilitation. Iliac crest and fibula bone free flaps are ideal for restoring a variety of traumatic maxillary defects. The authors advocate early reconstructive intervention using vascularized bone flaps to achieve superior functional and cosmetic outcomes.

4606. Rodríguez Ríos, Y. D. R., et al. (2005). "Deaths by human vascular trauma." Anales de Cirugia Cardiaca y Vascular **11**(2): 64-68.

Vascular trauma is cause of high mortality inside variety of traumas that the population suffers. This is indirect relationship to the caliber and place of the affected vessels, as well as the time lapsed between the trauma and medical action. The analysis of the data gathered in 291 deaths by human vascular trauma was the objective of this study carried out in a 10 - year's period. The highest percentage was present during the weekends especially during the evening from 6 pm to 6 am with 66.6% of the cases. Those produced by knife cut, represented 64.7%, followed by traffic accident and firearms recorded 22.6% and 8.9% respectively. The greatest number of cases, 227, died in situ, 51 died in the hospital and 13 died on the way to health unit. Homicides represented 58.1% and the suicidal attempts 5.8%. The wounds of the

thoracic vessels whit 41.9% greatest number of the deaths, followed by lesser abdominal wounds with 24.7%, skull and extremities in 15.1% and the facial skull wounds in 3.2%. The data offered show the incidence of vascular trauma as the cause of mortality in the population, as well as the danger of the weekends and evening schedule. Surveillance and safety measures protection to the population should be reforced to avoid the production of human vascular trauma.

4607. Rofail, M., et al. (2005). "Suicide-related perforating injury of globe with nail gun." Clinical & experimental ophthalmology **33**(3): 294-295.

A case is reported of nail gun injury due to suicide attempt involving both orbits, frontal lobe and abdomen, which resulted in an unusual posterior perforation of the left globe. Injury was inflicted with a total of eight nails. Three nails entered the left orbit, one of which perforated the posterior aspect of the left globe. One nail entered the right orbit involving the optic nerve and crossed the midline to finish in the left sphenoid sinus. Three nails entered the frontal lobe near the midline and the final nail pierced the left lobe of the liver. The left eye underwent primary repair, lensectomy and vitrectomy with silicone oil and achieved a visual acuity of 6/60, 3 months post removal of oil with sutured posterior chamber intraocular lens. The right eye suffered traumatic optic neuropathy and currently has a visual acuity of 6/36 due to senile cataract formation. No other serious sequelae resulted from the other injuries and the patient has recovered from his episode of depression.

4608. Roganovic, Z. (2004). "Missile-caused ulnar nerve injuries: outcomes of 128 repairs." Neurosurgery **55**(5): 1120-1129.

OBJECTIVE: This prospective study presents repair results after missile-caused ulnar nerve ruptures as well as factors influencing the outcomes., METHODS: Between 1991 and 1994, 128 casualties with missile-caused complete ulnar nerve injury were managed surgically in the Neurosurgical Department of the Belgrade Military Medical Academy. At least 4 years after surgery, we scored sensorimotor recovery, neurophysiological recovery, and patient judgment of the outcome. On the basis of the total score, we defined the final outcome as poor, insufficient, good, or excellent. The last two outcomes were considered to be successful., RESULTS: A successful outcome was obtained in 0% of high-level, 33.8% of intermediate-level, and 77.3% of low-level repairs ($P < 0.001$). On average, the nerve defect, preoperative interval, and patient age were lower for patients with a successful outcome than for those with an unsuccessful outcome ($P = 0.004$, $P = 0.032$, and $P = 0.003$, respectively). Worsening of the outcome was related to nerve defect longer than 4.5 cm, preoperative interval longer than 5.5 months, and age older than 23 years ($P = 0.002$, $P = 0.034$, and $P = 0.023$, respectively). A successful outcome occurred in 48.8% of patients repaired with direct suture and in 41.2% of patients repaired with a nerve graft ($P > 0.05$). A successful outcome also occurred 22.2% of combined ulnar-median nerve repairs and in 49.5% of isolated ulnar nerve repairs ($P = 0.011$). Repair level ($P < 0.001$), preoperative interval ($P = 0.001$), length of the nerve defect ($P < 0.001$), and associated median nerve rupture ($P = 0.028$) were independent predictors of a successful outcome., CONCLUSION: The outcome of ulnar nerve repair depends significantly on the repair level, preoperative interval, associated median nerve injury, length of the nerve defect, and age of the patient. High-level ulnar nerve repair is probably useless if performed in the classic manner.

4609. Roge, D. (2012). "Bilateral foot and ankle paresis following a gunshot wound to the head with a bullet lodged in the superior sagittal sinus: A case report." PM and R **4**(10): S338.

Case Description: A 15-year-old patient presented with bilateral foot and ankle paresis and numbness after suffering a gunshot wound to the apex of his skull. There was no loss of consciousness, trauma to his spine or to the lower extremities. He denied radicular pain in his legs, saddle anesthesia or bowel or bladder dysfunction. On physical examination he had no strength in ankle dorsiflexors, plantarflexors or foot muscles. Sensory deficits were present in a non peripheral nerve and non dermatomal distribution. Proximal lower extremity and hip musculature was preserved. His patellar and Achilles reflexes were present. CT imaging of the head with and without contrast revealed “comminuted depressed skull fracture of the parietal bone at the midline of the vertex of the calvarium causing mass effect focally narrowing the superior sagittal sinus without evidence of sagittal sinus occlusion, thrombosis, or extravasation.” Setting: Tertiary-care pediatric hospital. Results or Clinical Course: Differential diagnosis included bilateral peripheral nerve injury to the sciatic nerve, spinal cord injury or a focal midline lesion to the primary motor cortex. In this patient, his deficits were best explained by a focal midline injury to the motor cortex based on history, detailed physical examination and neuroimaging studies available. Bullet was removed surgically. Sensory deficits improved but weakness remained. By

discharge the patient was able to ambulate independently with carbon fiber anklefoot orthosis. Discussion: To our knowledge, this is the first reported case of bilateral foot and ankle weakness following focal midline trauma to the head irritating the primary motor cortex. This case also underscores the importance of correlating clinical history and physical examination to imaging studies for functional neuro-anatomical localization of a lesion. Such a practice yields appropriate and cost-effective diagnostic and therapeutic interventions. Conclusions: Bilateral focal motor deficits are possible after penetrating head injury when the lesion is located midline in the motor strip.

4610. Rohrich, R. J., et al. (2021). "The Assassination of JFK: A Plastic Surgery Perspective 50 Years Later." Plastic and reconstructive surgery **148**(5S): 82S-85S.

4611. Roisentul, A., et al. (2011). "Remote penetrating orbital trauma due to a snooker cue through the mouth." Dental traumatology : official publication of International Association for Dental Traumatology **27**(3): 247-249.

PURPOSE: This is a unique case report of a self-inflicted orbital injury that presented as a simple upper vestibulum laceration. A 43-year-old man presented to the Oral and Maxillofacial Surgery Unit with a small laceration in his mouth and complaints of pain in his left eye due to a snooker cue penetration. Upon admission, clinical findings included a small laceration on the upper left vestibulum and a subdermal hematoma in the left eye lid with restricted movements of the left eye. Further examination revealed remote trauma to the orbit, penetrating through the oral cavity, passing the maxillary sinus, and the orbital floor causing traumatic optic neuropathy with partial visual loss. The patient was treated conservatively with antibiotics and corticosteroids and a 6-week follow up., CONCLUSION: In cases of remote penetrating injury, meticulous examination revealing precise injury mechanism is crucial. All cases of Dento-maxillofacial trauma should include a high degree of clinical suspicion for ocular injury, requiring early diagnosis and treatment to reduce risk of visual loss.

4612. Roitbak, T. and E. Sykova (1999). "Diffusion barriers evoked in the rat cortex by reactive astrogliosis." Glia **28**(1): 40-48.

Changes in extracellular space (ECS) diffusion parameters in astrogliotic tissue around a unilateral cortical stab wound were determined from concentration-time profiles of tetramethylammonium (TMA(+)) using TMA(+)-selective microelectrodes. Three diffusion parameters-ECS volume fraction alpha (alpha = ECS volume/ total tissue volume), tortuosity lambda (lambda(2) = D/ADC; where D is the free and ADC is the apparent diffusion coefficient of TMA(+) in the brain), and nonspecific TMA(+)uptake k'-were determined at 3, 7, 21, and 35 days postwounding (dpw), in the hemispheres ipsilateral and contralateral to the lesion. Following diffusion experiments, tissue sections were immunostained for glial fibrillary acidic protein (GFAP) and chondroitin-sulphate proteoglycans (CSPG). In the area 300-1000 micron around the wound, alpha was increased at 3, 7, and 21 dpw by about 20% but returned to control values at 35 dpw; lambda was increased at all four intervals, reaching a maximum at 7 dpw. k' was lower than in the contralateral hemisphere at 7, 21, and 35 dpw. Measurements 1,500-2,000 micron from the wound revealed only an increase in lambda at 7 dpw. The time course of changes in ECS diffusion parameters closely correlated with increased staining for GFAP and CSPG. Our results show that astrogliosis significantly changes the diffusion properties of nervous tissue, making it less permissive. Both hypertrophied astrocytic processes and an enhanced formation of some extracellular matrix molecules could affect, through changes in the diffusion of molecules in the ECS, neuron-glia communication, "cross-talk" between synapses, extrasynaptic transmission, and regenerative processes.

4613. Rojas, A. (2011). "The epidemiology study of mandibular fractures treated in two general hospitals. Caracas-Venezuela. A review of 585 cases in 8 years (2001-2008)." International journal of oral and maxillofacial surgery **40**(10): 1107.

Purpose: In Venezuela there are few studies that report the epidemiological pattern of Mandibular Fractures. Materials and methods: The medical records and radiographs for 585 patients treated for mandibular fracture in Caracas, Venezuela, over a 8-year period were reviewed. Variables such as age, gender, etiology, fracture type, treatment techniques, anesthetics and complications. The statistical methodology used was: frequency, percentages, mean, standard deviation, chi-square, t of Student and Fisher. Results: The male shows was 478 patients (81.7%) and female 107 (18.3%), with a ratio of 4:1. The average age was 28.79 years. The most common range was between 21 to

30 years (38%), followed by 11 to 20 and 31 to 40 with equal numbers of patients, (22.65%) each. Most fractures were caused by physical violence (46.3%), traffic accidents (25.1%), gunshot (17.6%), falls (10.6%) and sporting activities (0,3%). The expressions of physical violence were (44.27%), stroke (41.3%), assault (39.4%) and blunt objects (19.3%). Traffic accidents were (24.78%), automobile (49.0%), motorcycles (35.2%), bicycle (10.3%) and coil (5.5%). As for the location was in body (23.1%), angle (15.6%) condyle (3.9%), symphysis (3.6%), sub-condylar (3.3%), alveolar (3.3%), parasymphysis (2.9%), raw (1.7%) and coronoid (0.3%). The (97.9%) had not complications. Discussion: Young people are the most susceptible to the mandibular fractures. The violence and traffic accidents are the most frequent etiological factors, and there is a predisposition ofwomen to the falls and men the gunshot. Body and angle are the most fractured, and are more displaced than non-displaced. Post surgical complications were rare.

4614. Roland, J. T., Jr., et al. (1994). "Management of traumatic facial nerve paralysis with carotid artery cavernous sinus fistula." European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery **251**(1): 57-60.

Massive skull base injuries require detailed preoperative neurological and neurovascular assessment prior to undertaking surgical repair of isolated cranial nerve deficits. We present the management of a patient with traumatic facial paralysis, cerebrospinal fluid leak, and carotid artery cavernous sinus fistula as the result of a gunshot wound to the skull base. The carotid artery cavernous sinus fistula was ultimately controlled with super-selective embolization via the vertebral artery. The facial nerve injury was then safely treated with mobilization of the labyrinthine and vertical segments to allow a primary anastomosis.

4615. Roldan, M. and P. A. Kyriacou (2021). "Near-Infrared Spectroscopy (NIRS) in Traumatic Brain Injury (TBI)." Sensors (Basel, Switzerland) **21**(5).

Traumatic brain injury (TBI) occurs when a sudden trauma causes damage to the brain. TBI can result when the head suddenly and violently impacts an object or when an object pierces the skull and enters brain tissue. Secondary injuries after traumatic brain injury (TBI) can lead to impairments on cerebral oxygenation and autoregulation. Considering that secondary brain injuries often take place within the first hours after the trauma, noninvasive monitoring might be helpful in providing early information on the brain's condition. Near-infrared spectroscopy (NIRS) is an emerging noninvasive monitoring modality based on chromophore absorption of infrared light with the capability of monitoring perfusion of the brain. This review investigates the main applications of NIRS in TBI monitoring and presents a thorough revision of those applications on oxygenation and autoregulation monitoring. Databases such as PubMed, EMBASE, Web of Science, Scopus, and Cochrane library were utilized in identifying 72 publications spanning between 1977 and 2020 which were directly relevant to this review. The majority of the evidence found used NIRS for diagnosis applications, especially in oxygenation and autoregulation monitoring (59%). It was not surprising that nearly all the patients were male adults with severe trauma who were monitored mostly with continue wave NIRS or spatially resolved spectroscopy NIRS and an invasive monitoring device. In general, a high proportion of the assessed papers have concluded that NIRS could be a potential noninvasive technique for assessing TBI, despite the various methodological and technological limitations of NIRS.

4616. Rolle, M. and A.-C. Duhaime (2021). "Pediatric Gunshot Wound to Visual Cortex with Retained Bullet: Case Report and Review of the Literature." Pediatric neurosurgery **56**(1): 94-98.

INTRODUCTION: Pediatric gunshot wounds (GSWs) to the head are not well studied in the literature, especially in civilians. With a dearth of case-based and clinically relevant information, pediatric neurosurgeons may be challenged when considering the risks and benefits of removing retained bullet fragments in different intracranial locations. We explore the literature and highlight the key factors in the surgical decision-making case of a 16-year-old girl with GSW to the visual cortex., CASE REPORT: A 16-year-old girl was shot in the head in a parieto-occipital trajectory with the bullet crossing midline, lodging in the occipital lobe into the straight sinus. Her initial Glasgow Coma Scale was 7, and she was urgently stabilized with intracranial pressure monitoring and external ventricular drainage. She underwent craniectomy, debridement, and irrigation and then a reoperation for further debridement and culture 2 weeks later for persistent fevers; cultures remained negative. The retained bullet was not removed. At 18 months post-injury, she had normal speech and motor function, moderate memory dysfunction, and 3-quadrant field loss with retained macular vision.,

DISCUSSION/CONCLUSION: Pediatric penetrating GSWs to the head may be challenging to manage since literature is sparse. In this case, the primary focus of management was to maintain normal intracranial pressure, reduce risk of infection, and preserve potentially viable visual cortex. In the civilian context of available antibiotics and serial imaging, it may be possible to manage retained bullets conservatively without delayed complications.

4617. Roman, F., et al. (2003). "Neuropsychological deficits in a child with a left penetrating brain injury." Brain injury **17**(8): 695-700.

This case study reports neuropsychological and structural magnetic resonance (MRI) studies of a 10-year-old girl with a left hemisphere lesion, caused by an underwater fishing harpoon penetrating her head when she was 6 years old. The patient showed a marked deficit in the acquisition of reading, writing and arithmetic, as well as an attentional deficit. Magnetic resonance images revealed left cortical lesions in the orbital region and the gyrus angularis, as well as in the caudate and putamen nuclei and longitudinal inferior fascicle. Neuropsychological assessment showed frontal and parietal lobe dysfunctions consistent with the lesional data. The structural data explain the neuropsychological impairment and suggest that, although the left lesion was early and relatively small, plasticity was incomplete.

4618. Romano, F., et al. (2008). "Complex craniofacial trauma resulting from fireworks blast." The Journal of craniofacial surgery **19**(2): 322-327.

The authors report the case of a patient who sustained a complex craniofacial trauma secondary to a recreational fireworks blast. Initial assessment and management were performed with a multidisciplinary approach to achieve control of cerebral hemorrhage, debridement of wounds and brain, isolation of the brain from the external environment, reconstruction of the cranial base floor, and orbital and facial reconstruction. Modification of multiple conventional approaches, along with a multispecialty surgical team, were used to deal effectively with this unusual patient who was treated by single-stage immediate management. Reconstruction of both the intracranial and extracranial compartments was considered successful with a satisfactory cosmetic result.

4619. Romboy, M., et al. (2020). "A case of congenital central hypoventilation syndrome complicated by intracranial hemorrhage." Journal of Investigative Medicine **68**(1): A215.

Background Congenital Central Hypoventilation Syndrome (CCHS) is a rare cause of apnea in the neonate. We present a unique case of CCHS to demonstrate that a high index of suspicion for CCHS is necessary to avoid a delay in diagnosis. Case A full term baby boy was born to a healthy 25-year-old G1P1 via caesarean section with vacuum-assist due to failed induction. Patient required positive pressure ventilation at birth due to poor respiratory effort. At 3 hours of life, patient had a cyanotic episode and was admitted to the NICU. He required intubation due to apnea. Due to history of traumatic delivery, head CT was done and demonstrated bilateral sub-dural hemorrhages and a non-displaced skull fracture. MRI showed posterior subdural bleed. Neurology and neurosurgery were consulted to help explain the frequent apneic episodes. Patient was extubated and maintained on nasal non-invasive ventilation but continued to have frequent apnea. He failed a trial of caffeine and required reintubation due to respiratory acidosis. Subsequently, a sleep study was done revealing multiple episodes of central apneas and hypopneas. Genetic testing for CCHS was ordered and was positive for a mutation in the PHOX2B gene. Patient underwent tracheostomy and was discharged on a home ventilator. Discussion CCHS is a rare disorder of respiratory and auto-nomic dysregulation estimated to affect 1:200,000 people. It is classically characterized by hypercapnia and hypoxe-mia during sleep. Most patients require tracheostomy and lifelong ventilatory support. Apnea in the neonate has a broad differential including cardiac, pulmonary, infectious and neurogenic causes. CCHS is often overlooked because of overlap with more common disease processes and low incidence of the disease. Our patient had a neurological explanation for apnea (head trauma with intracranial hemorrhage) and thus CCHS was not initially considered as a diagnosis. Only when our patient was unable to be extu-bated due to persistent respiratory acidosis was genetic testing done. Due to the availability of genetic testing for CCHS, we recommend considering CCHS as a diagnosis in all term neonates with central apnea despite presence of confounding findings.

4620. Romero Pareja, R., et al. (2020). "Prehospital triage for mass casualty incidents using the META method for early surgical assessment: retrospective validation of a hospital trauma registry." European journal of trauma and emergency surgery : official publication of the European Trauma Society **46**(2): 425-433.

BACKGROUND: In mass casualty incidents (MCI), death usually occurs within the first few hours and thus early transfer to a trauma centre can be crucial in selected cases. However, most triage systems designed to prioritize the transfer to hospital of these patients do not assess the need for surgery, in part due to inconclusive evidence regarding the value of such an assessment. Therefore, the aim of the present study was to evaluate the capacity of a new triage system-the Prehospital Advanced Triage Method (META)-to identify victims who could benefit from urgent surgical assessment in case of MCI., METHODS: Retrospective, descriptive, observational study of a multipurpose cohort of patients included in the severe trauma registry of the Gregorio Maranon University General Hospital (Spain) between June 1993 and December 2011. All data were prospectively evaluated. All patients were evaluated with the META system to determine whether they met the criteria for urgent transfer. The META defines patients in need of urgent surgical assessment: (a) All penetrating injuries to head, neck, torso and extremities proximal to elbow or knee, (b) Open pelvic fracture, (c) Closed pelvic fracture with mechanical or haemodynamic instability and (d) Blunt torso trauma with haemodynamic instability. Patients who fulfilled these criteria were designated as "Urgent Evacuation for Surgical Assessment" (UESA) cases; all other cases were designated as non-UESA. The following variables were assessed: patient status at the scene; severity scales [RTS, Shock index, MGAP (Mechanism, Glasgow coma scale, Age, pressure), GCS]; need for surgery and/or interventional procedure to control bleeding (UESA); and mortality. The two groups (UESA vs. non-UESA) were then compared., RESULTS: A total of 1882 cases from the database were included in the study. Mean age was 39.2 years and most (77%) patients were male. UESA patients presented significantly worse on-scene hemodynamic parameters (systolic blood pressure and heart rate) and greater injury severity (RTS, shock index, and MGAP scales). No differences were observed for respiratory rate, need for orotracheal intubation, or GCS scores. The anatomical injuries of patients in the UESA group were less severe but these patients had a greater need for urgent surgery and higher mortality rates., CONCLUSION: These findings suggest that the META triage classification system could be beneficial to help identify patients with severe trauma and/or in need of urgent surgical assessment at the scene of injury in case of MCI. These findings demonstrate that, in this cohort, the META fulfils the purpose for which it was designed.

4621. Ronen, O., et al. (2017). "[HIGH VELOCITY PENETRATING HEAD AND NECK INJURIES OF SYRIAN CIVIL WAR CASUALTIES TREATED IN THE GALILEE MEDICAL CENTER]." Harefuah **156**(5): 315-317.

INTRODUCTION: For two years the State of Israel has been treating casualties from the Syrian civil war. The Galilee Medical Center in Nahariya is the main hospital for this humanitarian mission. Objectives: To evaluate the demographic and clinical characteristics of the casualties that were treated in our department., METHODS: Information from medical records of all Syrian casualties evacuated to the Galilee Medical Center were evaluated., RESULTS: Between March 2013 and December 2014, 450 casualties were evacuated to the Galilee Medical Center. Of those, 45 were treated in the Department of Otolaryngology - Head and Neck Surgery. Of the 45 cases, 43 were male (95.5%) and the mean age was 30.4 years (range 1-79 years). There was a significant difference in terms of gender ($p < 0.0001$). The majority of cases (42.1%) were aged 21-27 years. The most common cause of injury was a gunshot wound. Thirty five patients (77.7%) suffered from multiple trauma, and complex injuries of the maxillofacial bones and upper respiratory tract. Eight (18%) of the cases arrived at the medical center with a tracheotomy. The average length of hospital stay was 15 days (range: 1-141). Of the 450 cases, 97.3% were discharged back to Syria, and 12 died., CONCLUSIONS: Of all Syrian injured treated in the ENT department, the vast majority were young men. The main cause of injury was gunshot wounds., DISCUSSION: It is likely that the lack of protective gear that exist in western armies is a factor in the complex injuries treated at the Galilee Medical Center.

4622. Roosen, K. and H. Weichert -Chr (1979). "Gunshot injury of the brain as seen in the axial CT scan." Aktuelle Traumatologie **9**(4): 205-207.

The article reports on a patient with an open craniocerebral lesion due to a through-and-through bullet wound. The significance of the CT scan for theray and prognosis of the disease is discussed.

4623. Ropposch, T., et al. (2013). "The effect of steroids in combination with optic nerve decompression surgery in traumatic optic neuropathy." The Laryngoscope **123**(5): 1082-1086.

OBJECTIVES/HYPOTHESIS: Traumatic optic neuropathy (TON) is an important cause of severe visual impairment following blunt or penetrating head trauma. Treatment options include steroids, decompression, or both. Studies have failed to show a clear benefit for either steroids or surgery or a combined therapy. This study describes the visual outcome in surgically managed patients with or without steroid treatment., STUDY DESIGN: Retrospective analysis., METHODS: In a retrospective chart review we included patients (n = 42) with TON who were managed with optic nerve decompression surgery with or without steroids. Comparison of initial and final visual acuity was the primary outcome parameter., RESULTS: In 42 consecutive patients, steroids were used in 21 cases (50%). Ten patients received a high-dose systemic regimen of more than 500 mg methylprednisolone initial dose, and 11 patients were treated with a lower dose. The overall visual improvement rate was 33%, no change was noted in 50%, and no outcome data were available in 17%. The visual improvement rate of patients treated with decompression surgery and steroids was lower (29%, 6 of 21) than those treated with surgery alone (53%, 8 of 15). Comparing both groups, additional steroids had no beneficial effect on the visual outcome (P = .97). There was no case with a deterioration of visual function due to therapy., CONCLUSIONS: In patients with traumatic optic neuropathy who were treated with optic nerve decompression surgery, steroids had no beneficial effect on the visual outcome., LEVEL OF EVIDENCE: 2c.

4624. Rose, C. E., 3rd, et al. (2008). "Brain abscess caused by Streptomyces infection following penetration trauma: case report and results of susceptibility analysis of 92 isolates of Streptomyces species submitted to the CDC from 2000 to 2004." Journal of clinical microbiology **46**(2): 821-823.

The case of a patient who presented with a brain abscess caused by Streptomyces infection following penetrating cerebral trauma with a soil-contaminated object generated an interest in optimizing antimicrobial therapy. Collaboration with the Centers for Disease Control and Prevention led to the analysis of susceptibility data for Streptomyces isolates that suggested that amikacin (100% susceptibility for 92 isolates tested) and linezolid, an oxazolidinone (100% susceptibility for 41 isolates tested), offer reliable activity against all isolates.

4625. Rosen, P., et al. (2006). "Difficult airway management." Internal and emergency medicine **1**(2): 139-147.

Airway management is unequivocally the most important responsibility of the emergency physician. No matter how prepared for the task, no matter what technologies are utilized, there will be cases that are difficult. The most important part of success in the management of a difficult airway is preparation. When the patient is encountered, it is too late to check whether appropriate equipment is available, whether a rescue plan has been in place, and what alternative strategies are available for an immediate response. The following article will review the principles of airway management with an emphasis upon preparation, strategies for preventing or avoiding difficulties, and recommended technical details that hopefully will encourage the reader to be more prepared and technically skillful in practice.

4626. Rosen, T., et al. (2016). "Geriatric assault victims treated at U.S. trauma centers: Five-year analysis of the national trauma data bank." Injury **47**(12): 2671-2678.

INTRODUCTION: While geriatric trauma patients have begun to receive increased attention, little research has investigated assault-related injuries among older adults. Our goal was to describe characteristics, treatment, and outcomes of geriatric assault victims and compare them both to geriatric victims of accidental injury and younger assault victims., PATIENTS AND METHODS: We conducted a retrospective analysis of the 2008-2012 National Trauma Data Bank. We identified cases of assault-related injury admitted to trauma centers in patients aged >=60 using the variable "intent of injury.", RESULTS: 3564 victims of assault-related injury in patients aged >=60 were identified and compared to 200,194 geriatric accident victims and 94,511 assault victims aged 18-59. Geriatric assault victims were more likely than geriatric accidental injury victims to be male (81% vs. 47%) and were younger than accidental injury victims (67+/-7 vs. 74+/-9 years). More geriatric assault victims tested positive for alcohol or drugs than geriatric accident victims (30% vs. 9%). Injuries for geriatric assault victims were more commonly on the face (30%) and head (27%) than for either comparison group. Traumatic brain injury (34%) and penetrating injury (32%) occurred commonly. The median injury severity score (ISS) for geriatric assault victims was 9, with 34% having severe trauma (ISS>=16). Median length of stay was 3 days, 39% required ICU care, and in-hospital mortality was 8%. Injury severity was greater in geriatric than

younger adult assault victims, and, even when controlling for injury severity, in-hospital mortality, length of hospitalization, and need for ICU-level care were significantly higher in older adults., CONCLUSIONS: Geriatric assault victims have characteristics and injury patterns that differ significantly from geriatric accidental injury victims. These victims also have more severe injuries, higher mortality, and poorer outcomes than younger victims. Additional research is necessary to improve identification of these victims and inform treatment strategies for this unique population.

4627. Rosenbaum, K., et al. (2021). "A national analysis of pediatric firearm violence and the effects of race and insurance status on risk of mortality." American journal of surgery **222**(3): 654-658.

OBJECTIVES: To perform a national analysis of pediatric firearm violence (PFV), hypothesizing that black and uninsured patients would have higher risk of mortality., METHODS: The Trauma Quality Improvement Program (2014-2016) was queried for PFV patients <=16 years-old. Multivariable logistic regression models on all patients and a subset excluding severe brain injuries were performed., RESULTS: The PFV mortality rate was 11.2%. 66.5% of PFV patients were black ($p < 0.001$). Deceased patients were more likely to be uninsured (14.5% vs. 5.3%, $p < 0.001$). Black race was an associated risk factor for mortality in patients without severe brain injury (OR 5.26, CI 1.00-27.47, $p = 0.049$) but not for the overall population (OR 1.32, CI 0.68-2.56, $p = 0.39$)., CONCLUSION: Nearly two-thirds of PFV patients were black. Contrary to previous studies, black and uninsured pediatric patients did not have an increased risk of mortality overall. However, in a subset of patients without severe brain injury, black race was associated with increased mortality risk., SUMMARY: Between 2014 and 2016 the mortality rate for pediatric firearm violence (PFV) in children 16 years and younger was 11.2%. Although two-thirds of PFV patients were black, black race and lack of insurance were not risk factors of mortality for the overall population. Once patients with severe brain injury were excluded, black race and became associated with an increased risk of mortality.

4628. Rosenblum, W. I. and F. El-Sabban (1977). "Effects of combined parenchymal and vascular injury on platelet aggregation in pial arterioles of living mice: evidence for release of aggregate-inhibiting materials." Stroke **8**(6): 691-693.

Platelet aggregation was produced in pial arterioles by exposing them to appropriately filtered light from a mercury lamp, following intravascular injection of sodium fluorescein. The dye acted as a target for the radiant energy and initiated a sequence of events resulting in the platelet aggregation. The aggregates adhered to the vessel in which they first appeared. When a microneedle punctured the brain adjacent to a subsequently irradiated arteriole, platelet aggregation was inhibited, even though the arteriole was not touched by the microneedle. Inhibition was manifested by prolongation of the exposure time required for the light-dye stimulus to initiate an adherent aggregate and by lengthening the time required for the aggregate to grow and totally block erythrocyte flow in the affected vessel. It is suggested that a material(s) diffuses from the zone of brain puncture, to and through the arteriolar wall, with a resultant inhibition of aggregation. It is noted that the inhibiting effect is reduced as the distance between puncture and wall increases.

4629. Rosenblum, W. I. and F. El-Sabban (1978). "Platelet aggregation and vasoconstriction in undamaged microvessels on cerebral surface adjacent to brain traumatized by a penetrating needle." Microvascular research **15**(3): 299-307.

4630. Rosenbohm, A., et al. (2014). "Can lesions to the motor cortex induce amyotrophic lateral sclerosis?" Journal of neurology **261**(2): 283-290.

A recent staging effort for amyotrophic lateral sclerosis (ALS) has demonstrated that the TDP-43 neuropathology may initiate focally in the motor cortex in the majority of patients. We searched our data bank for patients with lesions of the motor cortex which preceded disease onset. We performed a search of our patient- and MRI-data bank and screened 1,835 patients with amyotrophic lateral sclerosis for frontal lobe/motor cortex lesions. We found 18 patients with definite ALS who had documented and defined lesions of the motor cortex, which preceded the initial ALS symptoms by 8-42 years. In the vast majority (15/18) of the patients, the onset of ALS was closely related to the focal lesion since it started in a body region reflecting the damaged cortical area. The findings suggest that initial lesions to the motor cortex may be a contributing initiating factor in some patients with ALS or determine the site of onset in individuals pre-disposed to ALS.

4631. Rosenfeld, J. V. (2002). "Gunshot injury to the head and spine." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **9**(1): 9-16.

The principles of management of civilian gunshot wounds (GSWs) to the head and spine have evolved directly from the experience gained in war by military neurosurgeons. The type of craniocerebral wounds being produced in urban gang warfare and suicide at tempts using handguns or rifles at close range vary considerably from the lower velocity fragment injuries which are common in modern warfare. Civilian craniocerebral GSWs are often devastating. The in-hospital mortality for civilians with penetrating craniocerebral injury is 52-95% depending on the proportion of suicide victims in the series. The most important predictive factor is the post-resuscitation Glasgow Coma Score (GCS). Many civilian victims (47%) present with GCS 3-5 and only approximately 8.1% survive. Of these survivors, 1.4% will have nil, mild or moderate disability without surgery and 4.8% with surgery. Higher post-resuscitation GCS is associated with a significantly improved survival: GCS 6-8, 35.6% and GCS 9-15, 90.5%. A selective treatment policy is recommended for the patients with GCS 3-5. There are many clinical and radiological correlates with poor outcome that help the neurosurgeon decide on operative versus supportive treatment. Early aggressive resuscitation, surgery and vigorous control of intracranial pressure offers the best chance of achieving a satisfactory outcome. Spinal GSWs are uncommon and the neurosurgeon should be aware of the principles of management and prognosis. The indication for acute spinal cord decompression is deteriorating neurological status. Steroids are not indicated for these injuries. Neurosurgeons should take an active role in formulating and supporting public policy which aims to reduce possession and usage of firearms and therefore the prevalence of gunshot injuries. Copyright 2002 Harcourt Publishers Ltd.

4632. Rosenfeld, J. V. (2006). "A neurosurgeon in Iraq: a personal perspective." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **13**(10): 986-990.

The practice of neurosurgery in a war zone provides enormous challenges and risks for the individual surgeon working in such an austere and hostile environment, but also provides a unique opportunity to treat a high volume of severe penetrating and blast injuries to the head, neck and the spine. The purpose of this article is to present the author's personal experiences and perspective as a military neurosurgeon working in the US Airforce Hospital in Balad (the 332nd Expeditionary Medical Group) Iraq in for 3 months in 2004. Strategies for managing the mass casualties, and the severe penetrating craniofacial trauma are presented and the reasons for the low mortality of troops injured in Iraq are discussed.

4633. Rosenfeld, J. V., et al. (2015). "Current concepts in penetrating and blast injury to the central nervous system." World journal of surgery **39**(6): 1352-1362.

AIM: To review the current management, prognostic factors and outcomes of penetrating and blast injuries to the central nervous system and highlight the differences between gunshot wound, blast injury and stabbing., METHODS: A review of the current literature was performed., RESULTS: Of patients with craniocerebral GSW, 66-90% die before reaching hospital. Of those who are admitted to hospital, up to 51% survive. The patient age, GCS, pupil size and reaction, ballistics and CT features are important factors in the decision to operate and in prognostication. Blast injury to the brain is a component of multisystem polytrauma and has become a common injury encountered in war zones and following urban terrorist events. GSW to the spine account for 13-17% of all gunshot injuries., CONCLUSIONS: Urgent resuscitation, correction of coagulopathy and early surgery with wide cranial decompression may improve the outcome in selected patients with severe craniocerebral GSW. More limited surgery is undertaken for focal brain injury due to GSW. A non-operative approach may be taken if the clinical status is very poor (GCS 3, fixed dilated pupils) or GCS 4-5 with adverse CT findings or where there is a high likelihood of death or poor outcome. Civilian spinal GSWs are usually stable neurologically and biomechanically and do not require exploration. The indications for exploration are as follows: (1) compressive lesions with partial spinal cord or cauda equina injury, (2) mechanical instability and (3) complications. The principles of management of blast injury to the head and spine are the same as for GSW. Multidisciplinary specialist management is required for these complex injuries.

4634. Rosenson, J. and D. Mantuani (2012). "Self-inflicted orbital and intracranial pencil." The Journal of emergency medicine **43**(3): 490-491.

4635. Rosenwasser, R. H., et al. (1991). "Penetrating craniocerebral trauma." The Surgical clinics of North America **71**(2): 305-316.

The authors review the pathophysiology of penetrating and perforating cranial wounds. Radiologic evaluation includes computed tomography and angiography. Operative technique and perioperative critical care are discussed, with special emphasis on the control of the intracranial pressure. Other problems such as fluid and electrolyte disorders and nutrition are discussed in relation to neurosurgery.

4636. Rosinski, C. L., et al. (2019). "Autologous Bone Cranioplasty: A Retrospective Comparative Analysis of Frozen and Subcutaneous Bone Flap Storage Methods." World neurosurgery **131**: e312-e320.

OBJECTIVE: The use of autologous bone for cranioplasty offers superior cosmesis and cost-effectiveness compared with synthetic materials. The choice between 2 common autograft storage mechanisms (subcutaneous vs. frozen) remains controversial and dictated by surgeon preference. We compared surgical outcomes after autologous bone cranioplasty between patients with cryopreserved and subcutaneously stored autografts., METHODS: Ten-year retrospective comparative analysis of patients undergoing cranioplasty with autologous bone stored subcutaneously or frozen at a tertiary academic medical center., RESULTS: Ninety-four patients were studied, with 34 (36.2%) bone flaps stored subcutaneously and 59 (62.8%) frozen. The 2 groups were similar in demographics, comorbidities, and craniectomy indication, with only body mass index and race differing statistically. The mean operation time was greater within the subcutaneous group ($P < 0.001$), which also had a greater number of ventriculoperitoneal shunt (VPS) placements ($P = 0.02$). There were no significant differences in complications, readmissions, unplanned reoperations, or length of stay between the 2 groups. VPS placement during cranioplasty increased length of stay ($P < 0.001$), and placement prior to cranioplasty increased both length of stay ($P = 0.009$) and incidence of hospital-acquired infection ($P = 0.03$)., CONCLUSIONS: Subcutaneous and frozen storage of autologous bone result in similar surgical risk profiles. Cryopreservation may be preferred because of shorter operation time and avoidance of complications with the abdominal pocket, whereas the portability of subcutaneous storage remains favorable for patients undergoing cranioplasty at a different institution. VPS placement prior to cranioplasty should be avoided, if possible, due to the increased risk of hospital-acquired infection.

4637. Ross, A. H. (1996). "Caliber estimation from cranial entrance defect measurements." Journal of forensic sciences **41**(4): 629-633.

Caliber estimation from entrance defects has long been rejected by forensic scientists. This appears to be a consequence of soft tissue perspective of forensic pathologists. This study examined the relation between caliber and cranial entrance defects and maximum cranial thickness. The calibers considered in this inquiry were .22, .25, .32, and .38. The sample consisted of 73 specimens obtained at autopsy (thirty-seven of .22 caliber, five of .25, six of .32, and twenty-five of .38). To test the strength of the relation between caliber, minimum diameter, and maximum thickness Pearson correlation coefficients were conducted. The strongest relationship was observed between caliber and minimum diameter. A relationship between minimum diameter and maximum thickness was also observed. To test the null hypothesis that the mean minimum diameter is not significantly different between calibers an analysis of variance procedure was performed. The ANOVA yielded a strong relationship between dependent variable minimum diameter and caliber. Multiple regression analysis measuring the association between minimum diameter, caliber, and maximum thickness was also conducted. The $Pr > F$ .0001 suggests that the overall model is significant. Discriminant functions and canonical variables were obtained. Classification was first performed by using two values small and large calibers. The large caliber group consisted of .38, while the small caliber group included .22, .25, and .32. The correct classification rate using crossvalidation for large caliber is 86.96%, and 93.33% for the group small caliber. A narrower classification was also performed by using three values, .23 caliber (.22 and .25 calibers grouped), .32, and .38 as the criterion variable groups also using minimum diameter and maximum thickness as predictors. The correct classification rate using crossvalidation is 82.02% for .23 caliber, 73.94% for .38 caliber, and 16.67% for .32 caliber defects. The discriminant functions can be used with appropriate caution to classify observations into groups defined by caliber using minimum diameter and maximum thickness as the predictors. Caution is suggested when attempting to estimate caliber from defects that are not produced from the perpendicular entrance of a bullet.

4638. Rosselli, D. (2005). "[Phineas Gage, 'Tan' and the importance of case reports]." Phineas Gage, 'Tan' y la importancia de los casos clinicos. **40**(2): 122-124.

INTRODUCTION: The original descriptions of the frontal lobe injury of Phineas Gage (1848) and the slowly growing tumor of 'Tan', Broca's famous patient (1861), are examples of how a simple case report can teach important lessons, some of them still discussed a century and a half later., DEVELOPMENT: In this article, the original sources of both of these seminal cases, in Boston and Paris, have been reviewed and are briefly summarized. The lessons learned from them in the effort to localize brain functions are explained and set in the context of modern evidence-based medicine.

4639. Rossi, C., et al. (2018). "Cranial Backspatter Pattern Production Utilizing Human Cadavers." Journal of forensic sciences **63**(5): 1526-1532.

A backspatter pattern results from blood drops that travel retrograde to an applied external force. Historically, an array of animals and nonhuman objects have been used to create and study backspatter patterns. In this study, backspatter patterns captured on foam core targets that were placed 45.72 cm (18 in) behind the impact site (occipital area of the skull) were produced by cranial gunshots to human cadavers that were reinfused with fresh defibrinated bovine blood. These patterns were compared to the backspatter patterns produced by shooting blood-soaked sponges, a typical simulant used in controlled studies of backspatter pattern production and characteristics. The backspatter pattern produced by shooting an actual human head was found to be different than those of blood-soaked sponges in the number of stains produced, the size and size range of the stains, and the stain dispersion patterns.

4640. Rostami, E., et al. (2011). "Biomarkers in serumafter experimental diffuse and focal traumatic brain injury in rats." Journal of neurotrauma **28**(5): A11.

Background: Traumatic brain injury (TBI) biomarkers would be highly valuable in the diagnosis of various forms of TBI, and also in the evaluation and treatment of TBI patients, and may even provide prediction of the outcome of the future impairments of the patients. Here we analyzed brain and serum samples derived from rodent models of rotational and penetration TBI by reverse phase protein microarray (RPPM). Methods: The first model is a controlled penetration of 2-mmthick needle-shaped object, which is accelerated with a bullet from an air gun or a pendulum (pen-TBI). In the second model we produce diffuse axonal injury. The animal is subjected to high-speed sagittal rotation acceleration (rot-TBI). A total of 48 animals were used, grouped into normal controls, sham-operated, and injured animals. The rats were sacrificed at days 1, 3, and 14 post-injury, and serum samples were analyzed for Tau, NF200, MBP, N-cadherin, NSE, and S100B. Results: We found an increase in all proteins measured in both rotational and penetrating TBI. However, there were distinct temporal patterns of expression of protein markers in each TBI model. The results of tau and NF200 appear consistent with the injury mechanism in DAI (i.e., initial axonal distention followed by a secondary axotomy). The NSE and S100B showed a biphasic pattern in focal penetrating injury (pen-TBI), indicating a secondary injury. Conclusion: This information can be used to form a palette of biomarkers that can improve and contribute to diagnostic and therapeutic tools in TBI management.

4641. Rostami, E., et al. (2014). "Alteration in BDNF and its receptors, full-length and truncated TrkB and p75(NTR) following penetrating traumatic brain injury." Brain research **1542**: 195-205.

The evidence that BDNF is involved in neuroprotection, neuronal repair and recovery after traumatic brain injury (TBI) is substantial. We have previously shown that the polymorphism of the human BDNF gene predicts cognitive recovery and outcome following penetrating TBI. The distribution of expression of BDNF and its receptors after penetrating TBI has not been investigated. In this study we examined the expression of these genes in a rat model of penetrating TBI. The injury is produced by a controlled penetration of a 2mm thick needle-shaped object, which is accelerated with a pellet from an air gun. We used in situ hybridization and investigated the mRNA expression of BDNF and its receptors: the full-length and the truncated TrkB and p75(NTR), from 1 day to 8 weeks following penetrating TBI. In addition, the protein level of BDNF in frontal cortex and hippocampus was measured by reverse phase protein microarray (RPPM). The mRNA expression of BDNF and its receptors decreased in the hippocampus in the border zone ipsilateral to the injury while there was an increase in mRNA expression at the contralateral side. The increase in BDNF

mRNA expression in the hippocampus was sustained for 2 weeks following injury, with the highest expression noted in the CA3 cell layer. Furthermore, the protein analysis by RPPM showed increased levels of BDNF in the frontal cortex and the hippocampus up to 2 weeks after TBI. At 8 weeks following injury there was an intense labeling of the truncated TrkB receptor and the p75(NTR) in the area surrounding the cavity. Our study is the first report on the expression of BDNF and its receptors following penetrating TBI and suggests that their expression is altered long after the acute phase of injury. Further studies are needed to investigate if the late expressions of these receptors are beneficial or deleterious. In either case it indicates the possibility to influence the recovery after brain injury during the chronic phase and the development of treatments that may improve the outcome of TBI patients. Copyright © 2013 Published by Elsevier B.V.

4642. Rostami, E., et al. (2011). "BDNF polymorphism predicts general intelligence after penetrating traumatic brain injury." PloS one **6**(11): e27389.

Neuronal plasticity is a fundamental factor in cognitive outcome following traumatic brain injury. Brain-derived neurotrophic factor (BDNF), a member of the neurotrophin family, plays an important role in this process. While there are many ways to measure cognitive outcome, general cognitive intelligence is a strong predictor of everyday decision-making, occupational attainment, social mobility and job performance. Thus it is an excellent measure of cognitive outcome following traumatic brain injury (TBI). Although the importance of the single-nucleotide polymorphisms polymorphism on cognitive function has been previously addressed, its role in recovery of general intelligence following TBI is unknown. We genotyped male Caucasian Vietnam combat veterans with focal penetrating TBI (pTBI) (n = 109) and non-head injured controls (n = 38) for 7 BDNF single-nucleotide polymorphisms. Subjects were administrated the Armed Forces Qualification Test (AFQT) at three different time periods: pre-injury on induction into the military, Phase II (10-15 years post-injury, and Phase III (30-35 years post-injury). Two single-nucleotide polymorphisms, rs7124442 and rs1519480, were significantly associated with post-injury recovery of general cognitive intelligence with the most pronounced effect at the Phase II time point, indicating lesion-induced plasticity. The genotypes accounted for 5% of the variance of the AFQT scores, independently of other significant predictors such as pre-injury intelligence and percentage of brain volume loss. These data indicate that genetic variations in BDNF play a significant role in lesion-induced recovery following pTBI. Identifying the underlying mechanism of this brain-derived neurotrophic factor effect could provide insight into an important aspect of post-traumatic cognitive recovery.

4643. Rostomily, R. C., et al. (1997). "Gunshot wounds of the internal carotid artery at the skull base: management with vein bypass grafts and a review of the literature." The Journal of trauma **42**(1): 123-132.

BACKGROUND: Penetrating trauma to the skull base and distal cervical internal carotid artery (ICA) can result in occlusion or pseudoaneurysm formation. The appropriate management strategy for these rare lesions is controversial and includes observation, anticoagulation, carotid ligation, balloon occlusion, or revascularization., METHODS: We present the management and outcomes of four consecutive patients, two with pseudoaneurysms and two with acute occlusions, after injury to the distal cervical/petrous ICA from gunshot wounds. Preoperative assessment determined intracranial collateral flow patterns and the patency of the distal portion of the petrous ICA., RESULTS: Two patients underwent cervical-to-petrous ICA vein bypass grafts without neurologic complications. Both grafts remain patent without evidence of emboli at 2 years and 3 months, respectively. Both of the conservatively managed patients died, one from a massive cerebral infarction and the other from intracerebral hemorrhage., CONCLUSIONS: These cases underscore the need for an aggressive approach to the assessment and management of patients with penetrating vascular skull-base injuries. Although the optimal treatment of remains controversial, when the goal is exclusion of the injured portion of the carotid artery and revascularization, the cervical to petrous ICA vein bypass graft is a valuable management option that can reduce the potential morbidity and mortality from acute ischemic or delayed embolic or hemorrhagic complications, provide immediate restoration of high flow, and allow good surgical access with minimal risk to intracranial structures.

4644. Rostworowski, M., et al. (1997). "Astrogliosis in the neonatal and adult murine brain post-trauma: elevation of inflammatory cytokines and the lack of requirement for endogenous interferon-gamma." The Journal of neuroscience : the official journal of the Society for Neuroscience **17**(10): 3664-3674.

The relevance of astrogliosis remains controversial, especially with respect to the beneficial or detrimental influence of reactive astrocytes on CNS recovery. This dichotomy can be resolved if the mediators of astrogliosis are identified. We have measured the levels of transcripts encoding inflammatory cytokines in injury systems in which the presence or absence of astrogliosis could be produced selectively. A stab injury to the adult mouse brain using a piece of nitrocellulose (NC) membrane elicited a prompt and marked increase in levels of transcripts for interleukin (IL)-1alpha, IL-1beta, and tumor necrosis factor (TNF)-alpha, which are considered to be microglia/macrophage cytokines. The elevations preceded, or occurred concomitantly with, the rise in glial fibrillary acidic protein mRNA, an early manifestation of astrogliosis. In neonatal mice, IL-1 and TNF-alpha mRNA were elevated to a greater extent by an NC-implant injury, which produced astrogliosis, than after an NC-stab, with minimal astrogliosis. We determined whether endogenous interferon (IFN)-gamma could be responsible for the observed increases in IL-1 and TNF-alpha, because IFN-gamma is a potent microglia/macrophage activator, and because its exogenous administration to rodents enhanced astrogliosis after adult or neonatal insults. A lack of requirement for endogenous IFN-gamma was demonstrated by three lines of evidence. First, no increase in IFN-gamma transcripts could be found at injury. Second, the administration of a neutralizing antibody to IFN-gamma did not attenuate astrogliosis. Third, in IFN-gamma knockout adult mice, astrogliosis and increases in levels of IL-1alpha and TNF-alpha were induced rapidly by injury. The marked elevation of inflammatory cytokines is discussed in the context of astrogliosis and general CNS recovery.

4645. Roth, J., et al. (2005). "Brain injuries caused by spherical bolts." Journal of neurosurgery **102**(5): 864-869.

OBJECT: Metallic particles contained in antihuman bombs increase the number of fatalities. The ballistics of these particles depends on the explosive that is used, the distance from the explosion, the shape of the particle projected, and the biomechanics of the injured tissue. The authors present their experience with penetrating spherical bolt injuries to the brain., METHODS: The authors retrospectively reviewed clinical and radiological data obtained in eight patients with penetrating spherical bolt injuries to the cranium: four had Glasgow Coma Scale (GCS) scores less than 8 (three died, one from an unrelated injury) and four had a GCS score of 15 (all survived). Two of the latter patients suffered unique anatomical injuries attributed to the distinctive ballistics of spherical bolts: in one patient the bolt penetrated the cavernous sinus causing minimal cranial nerve injury, and in the other patient the bolt lodged in the fourth ventricle causing acute hydrocephalus without other neurological deficits., CONCLUSIONS: Penetrating spherical bolts to the brain may be lethal. Nevertheless, they have unique ballistics that cause highly delineated anatomical damage and minor neurological deficits.

4646. Roth, M., et al. (1989). "Penetrating injuries involving the anterior cranial fossa." Archives of oto-rhino-laryngology **246**(6): 411-416.

Penetrating injuries of the anterior cranial fossa may result in permanent neurologic changes or even death if injuries are unrecognized and remain untreated. The diverse etiologies of such injuries are reviewed, as well as their diagnosis, treatment and prognosis.

4647. Rothman, M. I., et al. (1998). "Superior blowout fracture of the orbit: the blowup fracture." AJNR. American journal of neuroradiology **19**(8): 1448-1449.

We describe a patient who sustained a blowout fracture of the superior orbital roof without an orbital rim fracture. The initial CT study (obtained with 10-mm-thick sections) did not show herniation of the intraorbital fat into the anterior cranial fossa; however, thin (3-mm-thick) direct orbital sections showed a fracture of the midportion of the superomedial orbital roof with displacement of the fracture fragment into the anterior cranial fossa.

4648. Rothman, S. L., et al. (1973). "Stereo roentgenography in craniofacial injuries. A revival of fundamental ideas." Radiologic clinics of North America **11**(3): 683-696.

4649. Rothman, S. L., et al. (1974). "Traumatic vertebral-carotid-jugular arteriovenous aneurysm. Case report." Journal of neurosurgery **41**(1): 92-96.

4650. Rothschild, M. A. and D. M. Krause (1996). "[Blank firearms--an underestimated weapon class. Dangerousness, mechanical effect and legal classification]." Schreckschusswaffen--eine unterschatzte Waffengattung. Gefahrlichkeit, Wirkungsweise und strafrechtliche Einordnung. **197**(3-4): 65-75.

The dangers posed to individuals by blank-cartridge guns are frequently underestimated by German courts. A description is given to the effects, specific dangers and typical consequences of injuries caused by the use of these weapons, inclusion of blank guns in the catalogue of terms applying to weapons law and penal law as well as individual questions of penal decisions regarding their use against man. The paper comes to the conclusion that it is hardly possible to doubt any more the not insignificant probability and objective foreseeability of severe or even fatal injuries when blank guns are used against people.

4651. Rothschild, M. A. and H. Maxeiner (1994). "Unusual findings in a case of suicide with a gas weapon." International journal of legal medicine **106**(5): 274-276.

Case report on a suicide with a gas pistol loaded with 8 mm blank cartridges. A 58-year-old male shot himself in the right temple and then in the back of the neck. The contact shot wounds showed large wound cavities with interspersed powder particles. The soft tissues were injured solely by the pressure of the exploding powder. Death was due to an air/gas embolism in the right ventricle of the heart.

4652. Rothschild, M. A. and V. Schneider (2000). "Gunshot wound to the head with full recovery." International journal of legal medicine **113**(6): 349-351.

A 28-year-old man was shot in the back of the head at close range by a robber who then locked him in a room assuming that he was dead. The man was discovered 2 days later. The entrance wound of the bullet was in the left occipital region and it passed into the periphery of the right temporal lobe, where it lodged. The man was transferred to a rehabilitation centre 3 weeks later in relatively good health with only slight general EEG changes. The mild clinical course in this case is attributable to two major factors: firstly, no important brain structures were injured, and secondly, the kinetic energy of the silver-tip hollow-point bullet was probably rather low. Three years after the incident, the man still has slight sensory disturbances in the fingers of the left hand and left-sided homonymous hemianopia. He is now working again at his old profession (managing director) and the projectile is still lodged in the right temporal lobe.

4653. Rothstein, J. P. (1997). "A surgeon's diary: Washington, DC of the '60s." Dentistry today **16**(11): 88-83.

4654. Roure, A., et al. (1985). "[A very misleading palpebral wound. Value of the examination of the trigeminal nerve]." A propos d'une plaie palpebrale bien trompeuse. Interet de l'examen du trijumeau. **85**(5): 577-579.

4655. Roux, F. E. and M. Mejdoubi (2001). "[Potential neurosurgical damage of rubber bullets. Analysis of 2 pediatric cases]." Gravite neurochirurgicale potentielle des projectiles "caoutchouc". Analyse de 2 cas pediatriques. **47**(6): 576-579.

We present 2 cases of craniocerebral injuries in children caused by rubber bullets. The potential severity of these projectiles is discussed. The first case was an eleven-year-old boy who died a few days after having been injured by a rubber bullet during a riot. He presented with a bi-hemispheric fronto-parietal craniocerebral injury with massive intraventricular hemorrhage. The second case was a fourteen-year-old boy also injured by a similar rubber bullet with an important left fronto-temporal cerebral contusion. These projectiles were composed of a metal cylinder (length: 1.7 cm, diameter: 1.7 cm) covered by a 2 mm layer of rubber. The term "rubber bullet" could give the impression that these projectiles are harmless. But, based on these observations and on the literature, these rubber bullets (like their predecessors) can induce severe, or even fatal craniocerebral injuries.

4656. Roux, F.-E. and M. Reddy (2013). "Neurosurgical work during the Napoleonic wars: Baron Larrey's experience." Clinical neurology and neurosurgery **115**(12): 2438-2444.

OBJECTIVES: Considered as the most famous French military surgeon, Dominique-Jean Larrey (1766-1842), who joined all the campaigns of Napoleon, wrote his memoirs and several medical articles. This paper discusses how in the Napoleonic times, Larrey dealt with neurosurgical diseases or injuries., PATIENTS AND METHODS: We reviewed four main publications of Larrey published between 1812 and 1838 and analyzed the type of neurosurgical cases presented and their treatment., RESULTS: These works include his practice of what we call now "neurosurgery" since most injuries described concern the skull or spine. He seemed to treat patients with humanity, integrity and perseverance. Larrey dealt with many aspects of neurosurgery, such as cranial or spinal trauma surgery, and also infectious diseases. He saw many head injuries inflicted not only by muskets or artillery, but also with spears and sabers. Unlike some others, Larrey advocated the use of trepanation in many situations as practiced, for instance, in the treatment of depressed fractures or in presence of subdural collections. On the other hand, this surgeon who saw thousands of amputees during his career did not mention the phantom limb phenomenon in his memoirs. Similarly, the issue of cerebral localizations is only mentioned in his last work, published in 1838., CONCLUSIONS: In his work, Larrey (and all his contemporaries) dealt essentially with "cranial" surgery, as in skull fractures where the brain could potentially have been injured by bone fragments. The time for brain surgery had not come yet.

4657. Rovlias, A., et al. (2016). "The influence of the epidemiological and nontreatment variables on neurological outcome in severe head injury." Brain injury **30**(5-6): 492.

Objectives: It has long been recognized that the method of clinical management of severe head injuries often creates a remarkable difference in neurological outcome. Moreover, the development of advanced systems of emergency and primary care has minimized medical complications associated with severe traumatic brain injuries. Previous literature suggests the influence and contribution of several non-treatment factors, other than clinical protocols, on patients' outcome. This study analyzes nine prognostic epidemiological variables and their potential relationship to the late outcome in a series of patients with severe head injury. Methods: Our study is based on 280 patients admitted to Asclepeion Hospital, a regional trauma centre, with severe head injury. Patients with associated major chest, abdominal or orthopaedic trauma were excluded. The sample population was composed of 214 males and 66 females, with a mean age of 38 years; 16.42% of the patients had a history of alcohol intake with road traffic accident (83.21%) as the most common mode of brain injury. Over 50% of the patients were admitted to the hospital within 4 hours of injury; 47.14% of the patients were intubated within the first hour from the time of the accident. All patients underwent a CT scan as soon as possible after initial resuscitation. Only non-penetrating head injuries were included in this study. All variables were individually and simultaneously related to outcome. Neurological outcome was evaluated at 6 months according to Glasgow Outcome Score (GOS). Results: Severity of injury (GCS) was the best and strongest statistical predictor of outcome. Patient's age, type of head injury according to CT scan findings, time from accident to emergency room and time from accident to intubation had also a statistically significant impact on neurological outcome. Multivariate analysis indicated an overall multiple correlation of R = 0.73, generated primarily from the confounding influence of GCS score, age and CT scan findings. Conclusions: The type of patient most frequently encountered in this study was the young adult male, under 40 years of age, involved in a moving vehicular accident. This suggests a potential target group for any preventive measures directed at severe head injuries. In the arena of severe head trauma, where randomization and patient comparisons are frequently difficult, it is important to determine statistically whether reported differences in outcome are due to differences in patient groups or to more effective therapy or to other factors associated with outcome. Thus, predicting neurological outcome is an assimilative and integrative process of various pre-injury, injury and post-injury variables. These also suggest the necessity of continuing evaluative research on emergency care networks which can link together data relating to ambulances, paramedical personnel, physicians, community hospitals and trauma centres.

4658. Rowe, N. L. (1971). "The history of the treatment of maxillo-facial trauma." Annals of the Royal College of Surgeons of England **49**(5): 329-349.

4659. Rowell, S. E., et al. (2011). "Specific abbreviated injury scale values are responsible for the underestimation of mortality in penetrating trauma patients by the injury severity score." The Journal of trauma **71**(2 Suppl 3): S384-388.

BACKGROUND: The Injury Severity Score (ISS) is widely used as a method for rating severity of injury. The ISS is the sum of the squares of the three worst Abbreviated Injury Scale (AIS) values from three body regions. Patients with

penetrating injuries tend to have higher mortality rates for a given ISS than patients with blunt injuries. This is thought to be secondary to the increased prevalence of multiple severe injuries in the same body region in patients with penetrating injuries, which the ISS does not account for. We hypothesized that the mechanism-based difference in mortality could be attributed to certain ISS ranges and specific AIS values by body region., METHODS: Outcome and injury scoring data were obtained from transfused patients admitted to 23 Level I trauma centers. ISS values were grouped into categories, and a logistic regression model was created. Mortality for each ISS category was determined and compared with the ISS 1 to 15 group. An interaction term was added to evaluate the effect of mechanism. Additional logistic regression models were created to examine each AIS category individually., RESULTS: There were 2,292 patients in the cohort. An overall interaction between ISS and mechanism was observed (p = 0.049). Mortality rates between blunt and penetrating patients with an ISS between 25 and 40 were significantly different (23.6 vs. 36.1%; p = 0.022). Within this range, the magnitude of the difference in mortality was far higher for penetrating patients with head injuries (75% vs. 37% for blunt) than truncal injuries (26% vs. 17% for blunt). Penetrating trauma patients with an AIS head of 4 or 5, AIS abdomen of 3, or AIS extremity of 3 all had adjusted mortality rates higher than blunt trauma patients with those values., CONCLUSION: Significant differences in mortality between blunt and penetrating trauma patients exist at certain ISS and AIS category values. The mortality difference is greatest for head injured patients.

4660. Rowland, B. A., et al. (2018). "Aberrations in inflammation and fibrinolysis in the context of tbi and polytrauma." Shock **49**(6): 141-142.

Moderate to severe traumatic brain injury (TBI) is a leading cause of morbidity and mortality in our society. After the initial traumatic injury, secondary inflammatory insults to the CNS potentiate further brain injury. Moreover, early fibrinolysis is associated with progressive hemorrhagic injury (PHI)- the early expansion of intracranial hemorrhage. The pathophysiology underlying inflammatory and fibrinolytic processes in polytrauma with TBI are poorly understood, largely in part to a lack of studies exploring the phenomena. We predict that patients with severe TBI in the presence of polytrauma exhibit derangements in both fibrinolysis and acute inflammation. Methods: We conducted a single center retrospective study of a cohort of patients with polytrauma who were enrolled in the PROPPR study. These patients had blood samples prospectively collected at eight timepoints in the first 3 days of admission. Using radiological data to determine TBI, our polytrauma cohort was dichotomized into TBI or non-TBI groups. Patients with penetrating trauma were excluded. Inflammatory biomarkers and D-dimer were measured by ELISA and ACL TOP Coagulation Analyzer, respectively. Data across time were compared for TBI vs. non-TBI groups using Spearman correlation coefficients and Wilcoxon rank sum test. Results: TBI (n = 31) and non-TBI patients (n = 54) had similar demographic variables. The majority of patients were males. Patients with TBI had a higher median age (46 (IQR 24,61) vs. 36 (25,53) years) and injury severity score (ISS) (43 (34,50) vs. 29 (22,41); p-value < 0.001). Within the TBI group, 80% of patients developed PHI. Patients with TBI had higher (p-value < 0.001) 30-day mortality (51.6%) compared to patients without TBI (16.9%). Patients with TBI demonstrated increased inflammatory responses based on elevatedIL-6, IL-8, MCP-1, and G-CSF levels at each time point from 2-12 hours after admission, with peak differences occurring at 6 hours (IL-6, IL-8, MCP-1; p-value <0.05) (Figure). D-dimer were greater upon admission in patients with TBI. Unlike the pattern demonstrated for inflammatory markers, D-dimer levels were highest at admission and subsequently decreased across time. Among all patients, D-dimer and inflammatory cytokines were not correlated with each other across time (r<0.3, p-value >0.05). Conclusion: Peak inflammation and fibrinolysis were more pronounced in those polytrauma patients with TBI. The temporal onset of fibrinolysis and the subsequent inflammatory upregulation suggests that fibrinolytic products may potentiate inflammatory dysregulation. These data provide a molecular basis for understanding the relationship between fibrinolytic and inflammatory mechanisms found in polytrauma patients. An improved understanding of the underlying pathophysiology may provide novel opportunities for therapeutic intervention. (Figure Presented).

4661. Rowlands, H. E. and K. P. Morris (2007). "Management of severe traumatic brain injury." Paediatrics and Child Health **17**(3): 82-88.

Traumatic brain injury (TBI) causes significant morbidity and mortality in children. Physiological insults worsen morbidity and mortality and are particularly common in the pre-hospital setting. Management of severe TBI in the ICU is largely focused on the management of raised intracranial pressure and preservation of cerebral perfusion. Few randomised controlled trials have been undertaken in children with TBI. © 2007.

4662. Rowse, C. W. (1971). "Notes on interpretation of the orthopantomogram." British dental journal **130**(10): 425-434.

4663. Roy, B., et al. (2016). "Isolated tongue hemi-atrophy from hypoglossal-vertebral entrapment syndrome." Neurology **86**(16).

Objective: To review differential diagnosis of isolated hemi-atrophy of the tongue and present a case of hypoglossal-vertebral entrapment syndrome leading to unilateral hypoglossal nerve compression. Background: Isolated hemi-atrophy of the tongue, a rare neurological condition, is often a manifestation of peripheral hypoglossal nerve involvement. It can be associated with dysarthria and dysphagia. Skull base and neck tumors, schwannoma, gunshot wound related trauma, stroke, arterial dissection, multiple sclerosis, Guillain-Barré neuropathy, other inflammatory and infectious conditions can affect the nerve. Nerve can be affected along its course from caudal medulla, intracranial extramedullary portion, through the hypoglossal canal to its extracranial termination. Structural vascular anomaly leading to hypoglossal nerve compression is rare. Method: Case report presentation. Results: 44 year old male presented with isolated left sided hemi-atrophy of the tongue without any significant dysarthria or dysphagia. He did not have any neck trauma, or any recent infection. Review of systems did not suggest any other systemic or neurological illness. Neurological examination revealed left sided tongue atrophy with left deviation of the tongue on protrusion without any other cranial nerve involvement. Motor, sensory, coordination testing and reflexes were normal. Work up including complete blood count, comprehensive metabolic panel, cerebrospinal fluid (CSF) analysis, Lyme serology, angiotensin-converting enzyme level in CSF were unremarkable. MRI of the brain revealed compression of left hypoglossal nerve from left vertebral artery ectasia. A diagnosis of hypoglossal-vertebral entrapment syndrome was made based on clinical symptoms and radiological finding. Conclusion: Hypoglossal vertebral entrapment syndrome from a structural vascular anomaly or anomalous vascular course is an extremely rare cause of isolated hypoglossal nerve palsy. Only a few cases have been reported in the literature. Imaging studies and careful exclusion of other potential etiologies is essential to establish the diagnosis.

4664. Ruan, W.-S. and Y.-Q. Lu (2020). "The life-saving emergency thoracic endovascular aorta repair management on suspected aortoesophageal foreign body injury." World journal of emergency medicine **11**(3): 152-156.

BACKGROUND: Fatal aortic rupture caused by esophageal foreign body (EFB), is associated with a high mortality, but can be prevented by thoracic endovascular aorta repair (TEVAR) that performed increasingly as technology improves. This study aims to investigate the cause, management and prognosis of suspected penetrating aortoesophageal foreign body injury., METHODS: Twelve cases who met the criteria were enrolled in this study. The demographic and clinical data were reviewed for evaluating the characteristics of EFB., RESULTS: Among 12 cases enrolled, 7 were males and 5 were females, with an age 27-86 years. The distance of EFB from aorta (DFA) of 7 cases were less than or equal to 0 mm, 5 cases were 0-2 mm. Eleven cases were managed with TEVAR, only one case was with open surgery standby but finally treated by flexible endoscopy (FE) successfully, without TEVAR. In group with TEVAR, EFB of 7 cases were successfully removed by rigid endoscopy (RE), and one of them was failed at the first RE treatment. EFB of 2 cases were successfully removed by open surgery with TEVAR, and other 9 cases were managed by endoscopies with TEVAR. The mean length of stay of hospitalization (LOS) and length of ICU stay of patients treated by open surgery with TEVAR (18.50+/-2.12 days and 5.50+/-0.71 days) was significantly longer than those of patients treated by endoscopy with TEVAR (7.00+/-2.74 days and 1.33+/-1.12 days, $P<0.001$ and $P=0.001$, respectively). Five cases had severe complications., CONCLUSION: Rational application of TEVAR can be a life-saving management for aortoesophageal foreign body injury, and jointed with endoscopy is safe and effective with a shorter length of ICU or total hospital stay.

4665. Ruberti, R. F. (1997). "Cranioplasty with inner table of bone flap in children: Report of two cases." African Journal of Neurological Sciences **16**(2).

Cranioplasty is performed with various materials and autogenous bone. Since 1956 the Author has adopted the cranioplasty with acrilic resin in 149 consecutive cases and is satisfied with this technique in adult patients, less so in children where, due to the growing of the head and growing of the bone around the skull defect the acrilic cranioplasty can be displaced with bad cosmetic results so much that often it requires redoing. For this reasons the Author has adopted recently the cranioplasty with inner table of bone flap as described by KAZUHIKO et all in 1985. This technique has been used to repair the skull defect in two children with very satisfactory results. It is worth reporting this method of

grafting applicable in various situations. particularly in children and especially in Africa where acrilic resin may not be available.

4666. Rubiano, A. M., et al. (2019). "The Evolving Concept of Damage Control in Neurotrauma: Application of Military Protocols in Civilian Settings with Limited Resources." World neurosurgery **125**: e82-e93.

OBJECTIVE: The aim of the present review was to describe the evolution of the damage control concept in neurotrauma, including the surgical technique and medical postoperative care, from the lessons learned from civilian and military neurosurgeons who have applied the concept regularly in practice at military hospitals and civilian institutions in areas with limited resources., METHODS: The present narrative review was based on the experience of a group of neurosurgeons who participated in the development of the concept from their practice working in military theaters and low-resources settings with an important burden of blunt and penetrating cranial neurotrauma., RESULTS: Damage control surgery in neurotrauma has been described as a sequential therapeutic strategy that supports physiological restoration before anatomical repair in patients with critical injuries. The application of the concept has evolved since the early definitions in 1998. Current strategies have been supported by military neurosurgery experience, and the concept has been applied in civilian settings with limited resources., CONCLUSION: Damage control in neurotrauma is a therapeutic option for severe traumatic brain injury management in austere environments. To apply the concept while using an appropriate approach, lessons must be learned from experienced neurosurgeons who use this technique regularly.

4667. Rubinstein, A., et al. (2005). "Self-inserted intraorbital foreign bodies." Ophthalmic plastic and reconstructive surgery **21**(2): 156-157.

We report an unusual case of self-mutilation by insertion of multiple foreign bodies in the orbit. A 26-year-old female psychiatric patient with a severe emotionally unstable personality disorder was reviewed in the ophthalmology clinic. She had allegedly inserted a metal staple into her right eye 2 days previously and was complaining of pain around the right eye. Radiography showed multiple foreign bodies in the right orbit and one in the left orbit. Self-mutilation in psychiatric patients has been well documented. The management of nonorganic, nontoxic intraorbital foreign bodies is discussed. A low threshold for imaging in these cases is of vital importance.

4668. Rubio, A., et al. (2012). "The gunshot wound that wasn't: A case of foramina parietalia permagna in a skeletonized calvarium." Clinical neuropathology **31**(4): 304.

Introduction: Incidental autopsy findings can mimic clinical or traumatic conditions resulting in erroneous conclusions. It is the challenge and responsibility of the pathologist to gather additional information and interpret the findings in a multidisciplinary setting. Methods: Case report: A 78-year-old African-American man was found dead in his residence in a state of advanced decomposition, with partial skeletonization of the head and torso. Medical history included hypertension, perforated gastric ulcer, obesity, diabetes, prostatic cancer and hip replacement surgery. There was no history of significant trauma or neurosurgical procedures. Postmortem radiology did not reveal osseous trauma. Results: the skull was partially exposed and revealed bilateral defects involving the parietal bones. The defects were roughly symmetric, 6.4 cm to the left and 5.7 cm to the right of the sagittal suture, 7 cm anterior to the lambdoid suture and 5 over the temporal squame. The defect on the left side was round and measured 1.1 cm in diameter. The edge was smooth and rounded like a lip, giving the impression of outward beveling. The defect on the right consisted of a 1 cm area of skull thinning with a similarly smooth round lip and three 1 to 6 mm irregular orifices. X-rays of the cranium did not reveal ballistic evidence. One of the defects in the reported case was incomplete, ruling out the possibility of a true perforating gunshot wound. These defects were recognized as foramina parietaliapermagna (FPP). We present photographic documentation of the current case as well as other cases of FPP incidentally found during autopsy at our institution. Conclusions: FPP is a rare condition (estimated incidence of 1 in 15,000 to 25,000 individuals), transmitted in an autosomal dominant pattern. FPP in a skeletonized cranium closely resembles gunshot wounds, which could result in the incorrect diagnosis with untoward forensic and social consequences.

4669. Ruchholtz, S., et al. (2002). "A multidisciplinary quality management system for the early treatment of severely injured patients: implementation and results in two trauma centers." Intensive care medicine **28**(10): 1395-1404.

OBJECTIVE: The impact of a multidisciplinary quality management system (MQMS) on the early treatment of severely injured patients was tested., DESIGN AND SETTING: Prospective clinical study in two level 1 trauma centers., METHODS AND MATERIALS: MQMS comprised a protocol for documentation, 20 assessment criteria, and the judgement of data by a quality circle. After implementation in Munich (1st period, n=90; 2nd period, n=77) the validation took place in Essen (1st period, n=175; 2nd period, n=150)., RESULTS: Improvements in diagnostics were shown by significant time savings in radiological diagnostics and before computed tomography in severe traumatic brain injury. In patients with hemorrhagic shock there was a reduction in time before transfusion (49 to 14 min in Munich; 31 to 22 min in Essen) and before emergency operation (74 to 43 min in Munich; 69 to 45 min in Essen). The time before craniotomy was reduced from 97 to 67 min in Munich. The incidence of delayed diagnosis of life-threatening lesions was diminished from 6% to 3% in Munich (not found in Essen). The TRISS technique showed a reduction in mortality in both hospitals in the second period (Munich: 15.4% TRISS vs. 9.1% observed mortality; Essen: 17.8% vs. 11.3%)., CONCLUSIONS: MQMS improved early clinical treatment in severe injury with respect to therapeutic effectiveness and outcome. The effectiveness of the MQMS was shown at two different hospitals

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4670. Ruddat, M. S. and M. W. Johnson (1995). "The use of perfluorocarbon liquid in the removal of radiopaque intraocular glass." Archives of ophthalmology (Chicago, Ill. : 1960) **113**(12): 1568-1569.

4671. Ruddy, R. M. and G. R. Fleisher (1985). "Pediatric trauma: an approach to the injured child." Pediatric emergency care **1**(3): 151-159.

The approach to the injured child requires great care and clinical acumen to establish the diagnosis and institute appropriate treatment. Loss of life from occult internal hemorrhage or neurologic sequelae from a missed unstable cervical spine injury may be devastating. Yet, physicians in the ED must also know which children need only a careful physical examination, and when laboratory testing or admission is unnecessary. We have described a schema for providing appropriate care to children with trauma in such a way that specific issues about management can be reasonably approached by the emergency physician.

4672. Ruess, D., et al. (2013). "Pitfalls in brain death diagnosis: a case report." Journal of neurological surgery. Part A, Central European neurosurgery **74**(3): 192-196.

Although there are distinct guidelines in nearly all countries, a reliable secure assessment of brain death in cases with open head injury can be challenging. We present a case of a 32-year-old man with severe head injury after intracranial penetration of a grindstone fragment. As the injury led to destruction of nearly the whole greater wing of the right sphenoid bone and parts of the right orbit, the examination of brainstem reflexes and the confirmation of brain death was unfeasible. On day 2, all clinical criteria of brain death (coma, absence of brainstem reflexes, apnea) were fulfilled. In addition, there was an extinction of brainstem auditory (BAEP) and cerebral (N20) components of median nerve somatosensory evoked potentials, while electroencephalogram (EEG) activity was still present. In the following days, a persisting EEG activity was obtained. Thus, an irreversible loss of whole brain functions could not be proved. As the patient had agreed to organ donation in case of brain death several years ago, ancillary methods to test the cessation of cerebral blood flow were mandatory. However, in this patient these methods turned out either to be doubtful or unavailable. For example, values of transcranial Doppler ultrasonography are not reliable in cases with open head injury. Due to a progressive septic state, time was running out to get the radiopharmaceutical agent for a cerebral scintigraphy (delivery time about 7 days, as the radiopharmaceutical agent was not in stock). Referring to the actual German guidelines, we had no legitimating indication for a cerebral angiography. Finally, the patient died of sepsis. We discuss the widening of the German guidelines in assessing brain death with the fast and low-risk method of cerebral computed tomography-angiography (CTA) to confirm diagnosis of brain death. Copyright Georg Thieme Verlag KG Stuttgart . New York.

4673. Ruiz, C., et al. (2013). "[Characteristics of trauma patients admitted to the intensive care unit of a general hospital in Chile]." Caracteristicas de los pacientes traumatizados que ingresan a la UCI de un hospital general en Chile. **141**(11): 1389-1394.

BACKGROUND: Trauma is an important cause of death among young adults., AIM: To determine the characteristics, treatments and evolution of trauma patients admitted to an intensive care unit (ICU) of a public hospital in Santiago, Chile., MATERIAL AND METHODS: All polytrauma (PT) and severely traumatized (ST) patients admitted to ICU were included. We recorded the type of trauma along with demographic and hemodynamic variables, treatments and complications. The evolution and treatments received by PT and ST patients were compared., RESULTS: We recorded data from 72 patients aged 43 +/- 21 years (93% males). Sixty two percent were PT and 24% had penetrating injuries. TBI (Trauma Brain Injury) was the most common trauma. On admission, acute Physiology and Chronic Health Evaluation II (APACHE II) score was 18.7 + 7.3, and Injury Severity Score (ISS) was 32.8 + 20.1. ICU stay was 7.8 + 6 days. Sixty seven per cent of patients required surgery and 58% received blood transfusions. No differences were found between PT and ST. ICU and hospital mortality rates were 15 and 25% respectively., CONCLUSIONS: The characteristics and evolution of PT and ST of this series of patients are similar to those described abroad. Mortality was in agreement with ISS and APACHE II scores.

4674. Ruiz, C., et al. (2019). "[Features of patients with trauma admitted to an emergency room of a general hospital]." Atencion de los pacientes con trauma grave durante los primeros dias: evolucion entre la urgencia, el pabellon y la unidad de cuidados intensivos. **147**(10): 1256-1265.

BACKGROUND: Trauma is the main cause of death among people aged 5 to 44 years., AIM: To describe features, treatment and evolution of trauma patients admitted to an emergency room., MATERIAL AND METHODS: Adult patients admitted in the emergency department of a public hospital due to severe trauma were studied and followed during their hospital stay., RESULTS: We included 114 patients aged 40 +/- 17 years (78%men) with an injury severity score of 21 +/- 11. Trauma was penetrating in 43%. Traumatic brain injury (TBI) was the most common diagnosis in 46%. In the emergency room, 8% had hypotension, 5% required vasopressors and 23% required mechanical ventilation. The initial lactate was 3.6 +/- 2.9 mmol/L. Sixty-five patients (57%) required emergency surgery. The intraoperative lactate was 3 +/- 1.7 mmol/L and 20% required vasopressors. Sixty-four patients (56%) were admitted to the ICU, with APACHEII and SOFA scores of 16 +/- 8 and 5 +/- 3, respectively. ICU lactate was 3.2+/-1.5 mmol/L. In the ICU 40% required vasopressors and 63% mechanical ventilation. Thirty two percent had coagulopathy, 43% received transfusions and 10% required massive transfusions. The hospital stay was 13 (6-32) days, being significantly longer in patients with TBI. ICU and hospital mortalities were 12.5 and 18.4% respectively. The only predictor for mortality was the APACHEII score (Hazard Ratio 1.18, 95% confidence intervals 1.03-1.36)., CONCLUSIONS: APACHE score was a predictor of mortality in this group of patients.

4675. Ruiz-Martin, M. M., et al. (2007). "[Penetrating orbitocranial injury after trivial eyelid trauma: a case report]." Lesion orbito-craneal penetrante tras traumatismo palpebral minimo: a proposito de un caso. **82**(12): 785-788.

CASE REPORT: We report a patient who, while in a drunken state, sustained a cerebral hemorrhage associated with an apparently trivial eyelid injury after an aggressive attack with a metallic object., DISCUSSION: Any apparently trivial eyelid injury may be associated with serious cerebral lesions. Making a correct diagnosis that distinguishes between that of drunkenness and an organic injury is essential, because failure to do so may result in both clinical and legal repercussions.

4676. Rummelt, V., et al. (1993). "Congenital nonpigmented epithelial iris cyst after amniocentesis. Clinicopathologic report on two children." Ophthalmology **100**(5): 776-781.

BACKGROUND: Congenital nonpigmented epithelial iris cysts are not common. They may arise spontaneously from developmental entrapment of surface ectodermal epithelium or from occult ocular trauma prenatally or at birth., PATIENTS AND METHODS: Between 1989 and 1991, an 8-month-old child and a 6-year-old child presented with large, progressive congenital epithelial iris cysts. Both children had a maternal history of diagnostic amniocentesis after an ultrasound scan, and there was no history of postnatal ocular trauma. The cysts were successfully removed by a modified block excision and tectonic corneoscleral grafting., RESULTS: A dense adherence of the cyst wall to Descemet's membrane resembled old anterior synechiae after occult perforation of the globe in both patients. On histopathologic examination, the epithelial lining of the cysts consisted of non-keratinizing stratified squamous epithelium with goblet cells resembling conjunctival epithelium. A perforating limbal scar with a corresponding break in Descemet's membrane could be detected in one eye. The long-term visual acuity of both children was encouraging, and there was no evidence

of recurrence of the iris cyst during the follow-up period (average, 23 months)., CONCLUSIONS: The authors conclude that the clinical and histopathologic features of these congenital iris cysts may be consistent with an occult intrauterine limbal perforation of the anterior chamber with a needle during amniocentesis. Amniocentesis, when not guided by a real-time ultrasound scan, may be a risk factor for prenatal ocular trauma, which should be considered in the differential diagnosis of congenital ocular disorders.

4677. Runge, J. W. (1993). "The cost of injury." Emergency medicine clinics of North America **11**(1): 241-253.

The public health problem of injury has an enormous impact on individuals and society, both as a health and economic issue. Prior to the last decade, little attention has been paid to the costs generated by injury, much of which is preventable. By looking at aggregate economic costs for different injuries and population groups, the physician can understand where the problems occur that need to be addressed to curb this staggering burden on society.

4678. Rungruangsak, K. and N. Poriswanish (2021). "Pathology of fatal diffuse brain injury in severe non-penetrating head trauma." Journal of forensic and legal medicine **82**: 102226.

Traumatic brain injury (TBI) is recognised as a serious global public health problem that imposes a heavy socioeconomic burden on society. The vast majority of cases result from road traffic accidents and falls, and the injuries are mainly attributed to velocity-related mechanisms. Lethal cases are mostly found to suffer from severe diffuse brain injuries (DBI), comprising diffuse vascular injury, diffuse axonal injury (DAI), generalized cerebral edema and ischemic-hypoxic injury. Coup and contrecoup brain contusions may also occur. This study set out to describe the pathological findings of severe DBI in terms of survival times and Abbreviated Injury Scale (AIS) severity scores. The autopsy data from 2 recent years (2018 and 2019) were reviewed to recruit over 800 cases presenting with severe head injuries. Many demographic characteristics of TBI were identified (for example, causes, victim genders and victim ages). These were revealed to be like those previously reported in the literature, confirming that there are shared risk factors across the globe. The hallmarks of severe TBI-such as a unimodal survival distribution and a period for detecting DAI via conventional staining-were also evident, as per previous reports. However, it was noticed that the histopathological detection rates of DAI surged after 72 h, which might be because these injuries are mediated by secondary axotomy. This study also analysed real brain weights to identify the time period for the development of cerebral edema in humans; this period seems to have never been reported. The increment time of cerebral edema reached a peak in 12 h, after which the condition sustained for at least 72 h. This may be a golden period in clinical practice as well as a prognostic factor in forensic medicine.

4679. Rupp, W. R., et al. (2001). "[Early post-mortem animal bites after suicidal gunshot wound to the head of a police dog handler]." Fruhpostmortaler Tierfrass nach suizidalem Kopfschuss eines polizeilichen Hundefuhrers. **207**(3-4): 73-80.

A 41-year-old police officer committed suicide in his office by firing a contact shot to the left temple. When the body was found 12 hours later, the German shepherd dog the officer had been in charge of had caused considerable damage on the lower half of the face and the adjacent parts of the neck. The clothing of the suicide was undamaged. Blood traces in the shape of paws were found at the place of death. The wound margins of the postmortem animal injury were nicked and jagged by the canine teeth. The entrance and exit wounds were not affected by the soft tissue defect. The findings gathered are discussed in reference to the relevant literature.

4680. Ruprecht, K. W. (1983). "[Emergency conditions in ophthalmology. First aid in general practice and in the clinic. 3: Leading symptoms "results of injury"--"unconsciousness"--"diplopia"]." Notfall-Situationen in der Ophthalmologie. Erstmassnahmen in der Praxis und Klinik--Schluss. Folge 3: Leitsymptome "Verletzungsfolgen"--"Bewusstlosigkeit"--"Diplopie". **101**(30): 1378-1385.

The emergency situations in ophthalmology are divided into the main symptoms (acute loss of sight, pain in the eye, "Red Eyes", injuries, unconsciousness, diplopia). Subjective symptom identification, diagnosis and current therapy are briefly outlined. For the general doctor the important preceding symptoms are emphasized as well as the prognosis according to clinical treatment.

4681. Rushworth, B. and L. Carter (2018). "Tetanus after a penetrating injury to the right globe: a case report." The British journal of oral & maxillofacial surgery **56**(5): 425-426.

A 24-year-old man attended the emergency department with a penetrating injury to the right globe after a road traffic accident. He later contracted tetanus for which he was given human tetanus immunoglobulin. Although it is rare, tetanus is life-threatening and a thorough immunisation history should be obtained before treatment of tetanus-prone injuries.

4682. Russell, D. J., et al. (2013). "Evaluation and management of 2 ferocactus spines in the orbit." Ophthalmic plastic and reconstructive surgery **29**(5): e120-123.

A 49-year-old woman, who had fallen face first in a cactus 1 week earlier, presented with a small, mobile, noninflamed subcutaneous nodule at the rim of her right lateral orbit with no other functional deficits. A CT scan was obtained, which revealed a 4-cm intraorbital tubular-shaped foreign body resembling a large cactus spine. A second preoperative CT scan, obtained for an intraoperative guidance system, demonstrated a second cactus spine, which was initially not seen on the first CT scan. Both spines were removed surgically without complication. The authors discuss factors that can cause diagnosis delay, review the radiographic features of cactus spines, and discuss the often times benign clinical course of retained cactus spine foreign bodies. To the authors' knowledge, this is the first case report of cactus spines in the orbit. Health-care professionals should have a low threshold for imaging in cases of traumatic injuries involving cactus spines.

4683. Russell, M. E., et al. (2013). "Rehabilitation of an eighteen-year-old male with a severe traumatic brain injury complicated by sinking skin flap syndrome: A case report." PM and R **5**(9): S281.

Case Description: The patient is an 18-year-old male who presented to an outside hospital after a self-inflicted gunshot wound to the head for which the patient underwent emergent hemicraniectomy and decompression. Patient had ventriculoperitoneal shunt placement for hydrocephalus on hospital day 22. He presented to our inpatient rehabilitation hospital 28 days after injury. Patient was making great strides during his rehabilitation course and progressed from total assistance to minimal assistance with ADLs and transfers. However, six weeks into his rehabilitation stay, patient became extremely limited by pain from positional headaches. Multiple medications for pain, including norco, gabapentin and topiramate were started for headaches presumed to be secondary to an overdraining shunt. The shunt was adjusted and headaches improved slightly. Patient began to digress with therapies and was noted to have increasing lethargy, decreased responsiveness, increased spasticity and irretractable nausea and vomiting. Head CT done during week seven of inpatient rehabilitation showed an increase in the sunken in appearance of the brain with increased left to right subfalcine herniation. Patient was transferred to an acute care hospital to expedite cranioplasty given neurologic deterioration from sinking skin flap syndrome. Program Description: 18-year-old male with severe neurological deficits secondary to a gunshot wound to the head. Setting: Rehabilitation hospital. Results or Clinical Course: Three months after injury, patient had shown significant improvement before neurologic deterioration secondary to sinking skin flap syndrome. It is uncertain what deficits may remain after cranioplasty. Patient was discharged to a post-acute brain injury rehabilitation program. Further developments will be discussed. Discussion: Sinking skin flap syndrome is a serious and unusual complication of hemicraniectomy after traumatic brain injury and should be considered given neurologic deterioration in the setting of subfalcine herniation in a patient with hydrocephalus managed with a ventriculoperitoneal shunt. Conclusions: Sinking skin flap syndrome is an unusual neurological complication of hemicraniectomy in the traumatic brain injury population.

4684. Russell, W. R. (1968). "The development of grand mal after missle wounds of the brain." The Johns Hopkins medical journal **122**(5): 250-253.

4685. Rustia, A., et al. (1999). "Head injury in a military setting: Clinical experience from January 1993 to August 1998." Rivista Medica **5**(3): 131-137.

We analyse the principal causes of head injury in a military setting in 2233 treated patients with a uniform age and sex distribution. We define the pathophysiological mechanisms and significant prognostic factors of open and closed

head trauma including lesions caused by firearms and explosions. We also set out a diagnostic protocol for cases of minor head injury.

4686. Rutherford, G. W. and R. C. Wlodarczyk (2009). "Distant sequelae of traumatic brain injury: premature mortality and intracranial neoplasms." The Journal of head trauma rehabilitation **24**(6): 468-474.

OBJECTIVE: Determine the relationship between traumatic brain injury (TBI) and premature mortality and intracranial neoplasms occurring 6 months or more after TBI., PARTICIPANTS: Not applicable., DESIGN: Systematic review of the published, peer-reviewed literature., PRIMARY MEASURES: Not applicable., RESULTS: We identified 23 studies that examined premature mortality following TBI and 16 that addressed intracranial neoplasms. There was clear evidence of an association between penetrating brain injury and premature mortality among patients surviving at least 6 months; and similarly compelling evidence of an association between moderate or severe TBI and premature mortality among patients injured severely enough to require acute rehabilitation. There was inadequate evidence to reach a conclusion about whether other closed head injuries were associated with premature mortality. For intracranial neoplasms, there was an apparent association between TBI and intracranial neoplasms diagnosed within 1 year following TBI; however, these tumors were likely incidentally found during evaluation for the TBI. For tumors diagnosed more than 1 year post injury, the evidence was inadequate to conclude that there was an association, although at least 1 very large registry-based study found a borderline association., CONCLUSION: More severe TBI (ie, penetrating and moderate and severe TBI requiring rehabilitation) is associated with premature mortality among patients surviving at least 6 months. There is no clear evidence for an association between TBI and intracranial neoplasms presenting more than 1 year following TBI.

4687. Ryu, B., et al. (2021). "Treatment of Mandibular Non-union Using Patient Specific Crib Cage Plates and Cellular Bone Allograft: A Case Report." Craniomaxillofacial Trauma and Reconstruction Open **6**.

A gunshot wound to the mandible frequently creates a comminuted fracture that can be debilitating for the patient and challenging for the surgeon. In some instances, immediate open reduction and rigid fixation is not possible, and closed reduction with intermaxillary fixation is employed. This may lead to non-union or mal-union of the segments. This case report describes the management of mal-union of bilateral comminuted mandibular angle fractures secondary to a gunshot wound injury. The mandibular fractures were repaired using virtually planned patient specific reconstruction plates that included a specially designed crib cage to contain a bone graft. A cellular bone allograft—Vivigen (DePuy Synthes, Warsaw, IN)—was chosen as the bone grafting material. The patient was followed up for 7 months with normal functional status and mouth opening and without pain or signs of infection. This report demonstrates that using a virtually planned crib cage plate with cellular bone allograft can optimize surgical repair and bony healing of comminuted mandible fractures.

4688. Rzaev, D. A., et al. (2017). "[Penetrating orbitocranial injury: a review of the literature and a case report of injury by a watercolor brush in a 3-year-old child]." Pronikaiushchaia orbitokranial'naia travma: obzor literatury s opisaniem klinicheskogo sluchaia raneniia akvarel'noi kistochkoi u rebenka 3 let. **81**(2): 77-87.

We present a rare case of orbitocranial penetrating injury by a watercolor brush in a 3-year-old child. Injuries of this localization can affect important orbital structures (eyeball, blood vessels, nerves, muscles) and cause severe intracranial damages. In some cases, diagnosis of these injuries in children may be difficult due to the lack of marked clinical manifestations. The presented clinical case illustrates the approaches for choosing methods for diagnosis of injury in childhood and subsequent treatment options.

4689. Saad, A., et al. (2013). "Virtual surgical planning in complex composite maxillofacial reconstruction." Plastic and reconstructive surgery **132**(3): 626-633.

BACKGROUND: Complex osteocutaneous maxillofacial reconstruction requiring multiple free flaps and with an extensive zone of injury can be fraught with complications and difficulty. Often, the remnants of native mandible are malpositioned and the skeletal structure of the upper face is distorted. The authors seek to extend the use of virtual planning to complex maxillofacial reconstruction by presenting their early experience in these difficult patients., METHODS: A retrospective chart review of 10 consecutive patients who underwent complex maxillofacial reconstruction

using virtual surgical planning was undertaken. The authors define complex maxillofacial reconstruction as that requiring an osteocutaneous flap in which multiple osteotomies were required in addition to at least one of the following: need for multiple free flaps, history of osteoradionecrosis, and ballistic injury. Synthes Proplan CMF surgical planning was performed using computed tomographic scanning of the maxillofacial area and the donor site. Jigs and cutting guides were created and plates were prebent. The flap was harvested and osteotomized using the jigs and inset. Postoperative computed tomographic scanning was performed to evaluate the reconstruction., RESULTS: Ten consecutive patients who met the criteria underwent review. There were no intraoperative complications. Postoperative computed tomographic scans showed excellent contour of the osseous flaps. All patients had functional mandibular range of motion., CONCLUSIONS: Use of virtual surgical planning allows for complex maxillofacial reconstruction with multiple simultaneous free flaps to be performed reliably and successfully. The use of prefabricated jigs and precontoured plates eases osteocutaneous flap molding and inset, allowing for a more complex procedure to be successful.

4690. Saar, I., et al. (1991). "Recurrent corneal oedema following late migration of intraocular glass." The British journal of ophthalmology **75**(3): 188-189.

This is a report of very late complications following intraocular penetration of numerous fragments of glass as a result of a test tube explosion. Fifteen years after the initial injury glass splinters began to migrate from the vitreous into the anterior chamber, causing acute episodes of corneal oedema. Four such episodes occurred over the past nine years, the corneal oedema each time disappearing within a few days following surgical extraction of the glass splinters. The literature on intraocular glass and its movement within the eye is reviewed.

4691. Sabaci, G., et al. (2002). "Endophthalmitis after deadly-weapon-related open-globe injuries: risk factors, value of prophylactic antibiotics, and visual outcomes." American journal of ophthalmology **133**(1): 62-69.

PURPOSE: To identify clinical and microbiologic factors influencing the prevalence and visual outcomes in endophthalmitis after deadly-weapon-related open-globe injuries., METHODS: In a retrospective study of 228 eyes of 212 patients with deadly-weapon-related open-globe injuries, clinical and microbiologic factors influencing the prevalence and visual outcome in endophthalmitis were analyzed in detail., RESULTS: Twenty-nine eyes enucleated for irreparable damages at presentation were excluded. Nineteen eyes (18 patients) of 199 (186 patients) were associated with culture-proven endophthalmitis. Presence of grade 4 injury, a variable of Ocular Trauma Classification System, and lens disruption at presentation were the significant risk factors for development of endophthalmitis (P =.001; odds ratio = 15.9 [2.0 to 122.1]), and ([P <.001; odds ratio = 17.7 [2.3 to 136.3]), respectively. Favorable outcome (visual acuity of 5/200 or better) was achieved in only four eyes (21%). Five eyes (26.3%) were phthisical, and five eyes (26.3%) were enucleated or eviscerated. All eyes were under the coverage of prophylactic intravenous antibiotics when culture positivity was obtained. Except two eyes with Acinetobactersp., all were infected by gram-positive micro-organisms (89.5%), the most common of which (42%) was Staphylococcus epidermidis. None of the clinical characteristics and treatment modalities affected final visual outcome. Favorable outcome was associated with infection by the less virulent micro-organism S. epidermidis (P =.018; odds ratio = 0.50 [0.25 to 1.00])., CONCLUSIONS: Endophthalmitis after deadly-weapon-related open-globe injuries has a dismal visual prognosis. Severity of injury and lens disruption are significant risk factors for development of endophthalmitis. Infection with a less virulent microbe is the only factor associated with favorable outcome.

4692. Sabel, M., et al. (1999). "Glioblastoma multiforme at the site of metal splinter injury: a coincidence? Case report." Journal of neurosurgery **91**(6): 1041-1044.

The authors report the case of a man who had suffered a penetrating metal splinter injury to the left frontal lobe at 18 years of age. Thirty-seven years later the patient developed a left-sided frontal tumor at the precise site of the meningocerebral scar and posttraumatic defect. Histological examination confirmed a glioblastoma multiforme adjacent to the dural scar and metal splinters. In addition, a chronic abscess from which Propionibacterium acnes was isolated was found within the glioma tissue. The temporal and local association of metal splinter injury with chronic abscess, scar formation, and malignant glioma is highly suggestive of a causal relationship between trauma and the development of a malignant brain tumor.

4693. Sabetay, S., et al. (2014). "Cerebrovascular occlusive disease vertebral artery revascularization in vertebrobasilar ischemia cases the hillel yaffe medical center experience." International Journal of Stroke **9**: 141-142.

Introduction: Symptoms of vertebrobasilar ischemia (VBI) can be caused both by flow limiting lesions and embolic phenomena of the vertebral arteries. VBI is often under-diagnosed and under-treated since the optimal management of vertebral artery (VA) stenosis untill now received limited attention with controversial results. Methods: We present a retrospective review of our medical center's experience in VA reconstruction. Between February 2006 and November 2013, 9 patients underwent 12 VA reconstructions, including transposition of external carotid artery to VA (V3) at the C1-2 level (n = 7), bypass from common carotid artery to VA (V3) with great saphenous vein (n = 3), and relocation of VA origin (n = 2). The presenting symptoms were attributed to flow limiting lesions in 8 cases (66%), embolization in 2 cases (17%), and ischemia after penetrating trauma in 2 cases (17%). Results: All the procedures were performed under general anesthesia with no intraoperative complications. One patient required re-exploration for bleeding. There were no perioperative death or strokes and no cranial nerve injuries. During follow up, two bypass procedures required endovascular treatment of stenosis in the distal anastomosis and return of VBI symptoms. The symptoms resolved in all patients but one (92%) with no late strokes. Conclusions: Although our experience includes a small number of patients, our results are in line with the reported in the literature and suggest that VA reconstruction provides good symptomatic relief with acceptable risk in selected patients. Based on the above elements we developed a comprehensive protocol for decision-making in patients with suspected VBI.

4694. Sackheim, A., et al. (2020). "Disruption of inside-out signaling between capillaries and upstream arterioles after traumatic brain injury is due to a pervasive endothelial in ward rectifier potassium channelopathy." Shock **53**: 113.

Introduction: Traumatic brain injury (TBI) impairs functional hyperemia, the process of cerebral blood flow regulation that delivers blood when demanded by metabolically active neurons (neurovascular coupling); however, the pathophysiologic mechanisms of this impairment are not fully understood. Functional hyperemia depends upon capillary endothelial cells (cECs) responding to neuronal activity through inward-rectifier potassium channels (KIR2). These vascular ion channels conduct a regenerative, hyperpolarizing electrical signal that propagates from the capillaries along the vascular wall to dilate the upstream arteriole. We hypothesized that signaling from capillaries to penetrating arterioles (inside- out signaling) is disrupted following TBI. Methods: Mice were randomized to either fluid percussion brain injury (FPI) or control groups. TBI mice were euthanized after 3-7 days. A craniotomy-based approach utilizing fluorescence of intravascular FITC-dextran was used to measure cerebral blood flow by multiphoton microscopy. Vascular responses were elicited by picospritzing 10 mM potassium (K+) directly on to the capillary bed and measuring diameter and blood flow through the penetrating arterioles. Posterior cerebral arteries (PCAs) were excised from the brain and used for pressure myography experiments. Patch clamp electrophysiology was performed in the conventional whole-cell configuration on freshly isolated cECs from control and TBI animals. All mice were subjected to a battery of behavioral and sensorimotor tests to assess neurological outcomes following both treatments. Results: We obtained real time, in vivo measurements of K+-induced hyperemia in TBI and control animals. In controls, capillary stimulation with 10 mM K+ caused vasodilation of the upstream arteriole and an increase in local blood flow. This K+-induced hyperemia response was impaired in TBI animals. Myogenic tone, measured as the difference in arteriolar diameter between baseline and calcium free conditions, was decreased after TBI. Dilatory responses to 10 mM K+ in pressurized PCAs and capillary KIR2 currents in cECs from TBI animals were also significantly impaired. Three-dimensional renderings of cortical capillaries revealed no changes in the vascular architecture following TBI, suggesting a pathophysiological mechanism of dysfunction. TBI animals exhibited significantly higher behavioral and sensorimotor deficits when compared to controls. Conclusions: In vivo cerebral hemodynamics are altered after TBI. We observed increased myogenic tone in the penetrating arterioles, and an impaired K+ induced hyperemia in response to stimulation of the downstream capillary bed. A pervasive KIR2 channelopathy persists throughout the vasculature of the brain which provides a novel mechanism to explain altered neurovascular coupling after brain injury.

4695. Sacks, D., et al. (2013). "The role of the endonasal endoscope in the operative management of brain abscess: a case report." Journal of neurological surgery. Part A, Central European neurosurgery **74 Suppl 1**: e54-57.

BACKGROUND: The endonasal endoscope has become widely integrated into the operative practice of skull-base surgeons. Although it is not the current standard of practice for the drainage of intracranial abscesses, transnasal neuroendoscopy has the potential for benefit over both stereotaxy and open craniotomy because it is minimally invasive and provides a visual confirmation of debridement. We present two recent cases in which patients with intradural

abscesses adjacent to the anterior skull base were successfully drained and irrigated using an endoscopic approach., CASE: Two patients with post-traumatic intradural brain abscess underwent transnasal neuroendoscopic drainage in a 1-year period. In both cases, the abscesses were drained and irrigated without complication under direct visualization. The patients' outcomes were felt to be positive given their initial insults., CONCLUSION: Transnasal endoscopic drainage of brain abscesses appears to be safe and has particular advantages in specific cases over the current operative standard, which are likely to prove beneficial for patients and cement it as a feasible alternative to stereotactic aspiration and craniotomy. Copyright Georg Thieme Verlag KG Stuttgart . New York.

4696. Sacks, I. and A. T. Matheson (1962). "UNUSUAL INTRA-ORBITAL FOREIGN BODY." The British journal of ophthalmology **46**(5): 304-305.

4697. Sacks, T. (1988). "Prophylactic antibiotics in traumatic wounds." The Journal of hospital infection **11 Suppl A**: 251-258.

There is well-documented evidence justifying, perhaps demanding, the obligatory use of early, anticipatory treatment in open fractures and in penetrating abdominal wounds, and equally convincing evidence that they are not indicated in fractures of the base of the skull with CSF leaks, in thermal injuries, or in simple lacerations. As far as penetrating chest wounds, and bites are concerned, the evidence is perhaps as yet inconclusive, but antibiotics are probably not indicated in these situations.

4698. Sadar, E. S., et al. (1973). "Traumatic aneurysms of the intracranial circulation." Surgery, gynecology & obstetrics **137**(1): 59-67.

4699. Sadeghi, N., et al. (2019). "Patterns of maxillofacial fractures: A systematic review." Trauma Monthly **24**(4).

Context: The face is the most exposed part of the body; therefore, the maxillofacial region is vulnerable to trauma. The evaluation of the incidence and etiology of maxillofacial traumas is necessary to disclose the pattern of fractures. Objectives: The study aimed to evaluate the pattern of maxillofacial fractures (MFs) and associated injuries by a literature review. Data Sources: Original papers investigating the pattern of MFs and associated injuries published before November 2018 were examined. Online sources including PubMed, Scopus, Medline, Wiley, ISI Web of Knowledge, and EMBASE were searched for these papers. The extracted data included study characteristics, participants' characteristics, MFs causes, and distribution of various MFs. Results: In total, 17,055 patients (men: 83.61%; women: 16.38%) were examined. The age range was 21 - 30 years in 40.89% of the patients with MFs. The most common risk factor of fractures was road traffic accidents (45.33%). Mandibular fractures were more frequent than other injuries. Condyle was the most common mandibular fracture (25.89%). Le Fort II was the most common site in the middle-third fractures (30.29%). Conclusions: The results showed that maxillofacial fractures were more frequent in men, in the age of 21 to 30 years, in the site of the mandible, and mainly caused by road traffic accidents.

4700. Sadeghi Tari, A., et al. (2005). "Post-traumatic fatal Nattrassia mangiferae orbital infection." International ophthalmology **26**(6): 247-250.

Nattrassia mangiferae orbital infection is a very rare disease that is usually curable. We report the first case of a fatal N. mangiferae orbital infection following a thorn penetration injury in a patient who also had diabetes mellitus, heart failure, and cirrhosis.

4701. Sadeghian, H. and R. Motiei-Langroudi (2016). "Does distracting pain justify performing brain computed tomography in multiple traumas with mild head injury?" Emergency radiology **23**(3): 241-244.

Traumatic brain injury (TBI) is a significant health concern classified as mild, moderate, and severe. Although the indications to perform brain computed tomography (CT) are clear in moderate and severe cases, there still exists controversy in mild TBI (mTBI). We designed the study to evaluate the significance of distracting pain in patients with mTBI. The study population included patients with mild traumatic brain injury (GCS >=13). Moderate and high risk

factors including age <18 months or >=60 years, moderate to severe or progressive headache, >=2 episodes of vomiting, loss of consciousness (LOC), post-traumatic amnesia, seizure or prior antiepileptic use, alcohol intoxication, previous neurosurgical procedures, uncontrolled hypertension, anticoagulant use, presence of focal neurologic deficits, deformities in craniofacial region, and penetrating injuries were excluded. The patients were then grouped based on presence (DP+) or absence (DP-) of another organ fracture with severe pain (based on VAS). The primary outcome was any abnormal findings on brain CT scans; 330 patients were enrolled (184 DP+ and 146 DP-). Overall, two DP+ and one DP- patients had mild cerebral edema in brain CT ($p > 0.99$). No patients had any neurologic symptoms or signs in follow-up. Our results show that in the absence of any other risk factors, distracting pain from other organs (limbs, pelvis, and non-cervical spine) cannot be regarded as a brain CT indication in patients with mild TBI, as it is never associated with significant intracranial lesions.

4702. Sadiq, S. A. and G. Thurairajan (1995). "A case of transorbital intracranial damage underlying a seemingly innocuous injury." Injury **26**(4): 279-280.

4703. Sadove, R. C. and L. A. Powell (1993). "Simultaneous maxillary and mandibular reconstruction with one free osteocutaneous flap." Plastic and reconstructive surgery **92**(1): 141-146.

The concept of immediate reconstruction of massive facial injury with rigid internal fixation and free-tissue transfer continues to evolve. This case is unique in that it is the first report of the following: (1) simultaneous combined maxillary and mandibular reconstruction with one vascularized bone graft and (2) immediate total maxillary reconstruction with vascularized fibular bone. The nasopharynx was closed with a tubed radial forearm flap. Reconstruction was staged over several days, with dissection/banking of flaps, grafts, recipient sites, and debridement as a preliminary stage.

4704. Saeed, A., et al. (2008). "Plain X-ray and computed tomography of the orbit in cases and suspected cases of intraocular foreign body." Eye (London, England) **22**(11): 1373-1377.

AIM: To evaluate the roles of plain X-ray and computed tomography (CT) orbital imaging in cases and suspected cases of intraocular foreign body (IOFB)., METHODS: Retrospective review of clinical and radiological data relating to 204 consecutive cases and suspected cases of IOFB. Setting Royal Victoria Eye and Ear Hospital, Dublin, Ireland., RESULTS: Plain X-rays were performed in the absence of clinically evident ocular penetration in 177 (87%) cases, and no IOFB was demonstrated in any of these radiographs. Twenty-seven (13%) plain X-ray radiographs were obtained in the presence of clinically evident ocular penetration, and an IOFB was clinically visible in 19 (70%) of these cases. CT scans were undertaken in 21 (10%) of the 204 patients. Of these CT images, 9 (43%) and 12 (57%) were undertaken in the absence and presence of clinically evident ocular penetration, respectively. None (0%) and all (100%) of the CT scans obtained in the absence and presence of clinically evident ocular penetration demonstrated an IOFB, respectively., CONCLUSION: Plain X-ray and CT orbital imaging are non-contributory in the absence of clinically evident ocular penetration. In the presence of clinically evident ocular penetration, and where an IOFB is clinically visible, plain X-ray orbital radiography may have a role in excluding multiple IOFBs. In the presence of clinically evident ocular penetration, but where an IOFB is not clinically visible, CT orbital imaging remains the investigation of choice, and the role of pre-CT plain X-ray orbital radiography, as recommended by the guidelines of the Royal College of Radiologists, merits re-evaluation.

4705. Safarova, M. S. and M. V. Ezhov (2011). "Images in clinical medicine. A head shot." The New England journal of medicine **365**(26): 2519.

4706. Sahan, M., et al. (2014). "[Fracture of the glenoid fossa without mandibular condylar dislocation or fracture: two case reports]." Mandibuler kondil cikigi ve kirigi olmaksizin glenoid fossa kirigi: Iki olgu sunumu. **24**(5): 295-298.

The mandibular condyle region which protects the middle cranial fossa from facial and jaw traumas has an excellent osteomuscular structure. Condylar structures reduce or limit the force of trauma. Most importantly, the condylar neck is the weakest part of the mandible and is easily fractured without dislocation. Generally, this mechanism prevents condylar penetration into the middle cranial fossa; however, there are condylar penetration into the middle

cranial fossa can be rarely. Glenoid fossa fractures without mandibular condylar fracture and dislocation can be made. In this article, we present two cases to assess the isolated glenoid fossa fractures of the temporal bone.

4707. Sahebjam, S., et al. (2015). "A phase 1 study of TPI 287 concurrent with fractionated stereotactic radiotherapy (FSRT) in treatment of brain metastases from advanced breast and non-small cell lung (NSCL) cancer." Neuro-Oncology **17**: v15.

BACKGROUND: TPI 287, a member of taxanes diterpenoid (taxoid) family, is a microtubule-stabilizer with significant cytotoxic activity. In vivo studies have demonstrated that TPI 287 penetrates the blood brain barrier and significantly reduces the formation of large brain metastases in models of human breast cancer brain metastasis. The radiosensitizing effect of taxanes has been well established. METHODS: This phase I study (3 + 3 design) explores the safety, recommended phase II dose (RP2D), pharmacokinetics (PK), and antitumor activity (local control rate, distant intra-cranial control rate, progression-free survival) of TPI 287 administered concurrently with FSRT (NCT02187822). Patients with up to 3 untreated brain metastases (maximum diameter of each brain lesion ≤ 5 cm, maximum tumor volume ≤ 120 cc) from breast cancer or NSCLC are eligible. Eligible patients are treated with FSRT to target brain metastases (25 Gy in 5 daily fractions). TPI 287 is administered intravenously once per week, for total of 3 doses. The first dose of TPI 287 is given concurrently with the first fraction of FSRT. Once the RP2D is determined, an additional 10 patients will be enrolled in an expansion safety cohort, for a planned total enrollment of 36 patients. Effect of treatment on quality of life measures will be evaluated. RESULTS: As of June 2015, a total of 4 patients have been enrolled in the first two dose escalation cohorts (14 and 28 mg/m2). No treatment-related grade 3/4 adverse events (AEs) have been observed. No dose limiting toxicity has been reported, and maximal tolerated dose has not been reached. TPI 287 dose escalation continues. CONCLUSIONS: Preliminary data to date indicate that administration of TPI 287 concurrent with FSRT is well tolerated. Updated safety and efficacy results will be presented.

4708. Sahin, S., et al. (2018). "Gunshot bullet embolisation in the middle cerebral artery." Journal of the Royal Army Medical Corps **164**(2): 120-121.

Bullet embolism (BE) is a rare phenomenon following a gunshot wound. A middle cerebral artery BE was detected in a 36-year-old male patient following a perforating left thoracic gunshot wound without obvious cranial injury. This paper discusses a case of BE in the cranial circulation in conjunction with a review of the relevant literature.

4709. Sahoo, D., et al. (2016). "Head injury assessment of non-lethal projectile impacts: A combined experimental/computational method." Injury **47**(11): 2424-2441.

The main objective of this study is to develop a methodology to assess this risk based on experimental tests versus numerical predictive head injury simulations. A total of 16 non-lethal projectiles (NLP) impacts were conducted with rigid force plate at three different ranges of impact velocity (120, 72 and 55m/s) and the force/deformation-time data were used for the validation of finite element (FE) NLP. A good accordance between experimental and simulation data were obtained during validation of FE NLP with high correlation value (>0.98) and peak force discrepancy of less than 3%. A state-of-the art finite element head model with enhanced brain and skull material laws and specific head injury criteria was used for numerical computation of NLP impacts. Frontal and lateral FE NLP impacts to the head model at different velocities were performed under LS-DYNA. It is the very first time that the lethality of NLP is assessed by axonal strain computation to predict diffuse axonal injury (DAI) in NLP impacts to head. In case of temporo-parietal impact the min-max risk of DAI is 0-86%. With a velocity above 99.2m/s there is greater than 50% risk of DAI for temporo-parietal impacts. All the medium- and high-velocity impacts are susceptible to skull fracture, with a percentage risk higher than 90%. This study provides tool for a realistic injury (DAI and skull fracture) assessment during NLP impacts to the human head.

4710. Sahuquillo, J. and J. A. Dennis "Decompressive craniectomy for the treatment of high intracranial pressure in closed traumatic brain injury." (12).

Background, High intracranial pressure (ICP) is the most frequent cause of death and disability after severe traumatic brain injury (TBI). It is usually treated with general maneuvers (normothermia, sedation, etc.) and a set of first-line therapeutic measures (moderate hypocapnia, mannitol, etc.). When these measures fail, second-line therapies are initiated, which include: barbiturates, hyperventilation, moderate hypothermia, or removal of a variable amount of skull bone (secondary decompressive craniectomy)., Objectives, To assess the effects of secondary decompressive craniectomy (DC) on outcomes of patients with severe TBI in whom conventional medical therapeutic measures have failed to control raised ICP., Search methods, The most recent search was run on 8 December 2019. We searched the Cochrane Injuries Group's Specialised Register, CENTRAL (Cochrane Library), Ovid MEDLINE(R), Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid OLDMEDLINE(R), Embase Classic + Embase (OvidSP) and ISI Web of Science (SCI-EXPANDED & CPCI-S). We also searched trials registries and contacted experts., Selection criteria, We included randomized studies assessing patients over the age of 12 months with severe TBI who either underwent DC to control ICP refractory to conventional medical treatments or received standard care., Data collection and analysis, We selected potentially relevant studies from the search results, and obtained study reports. Two review authors independently extracted data from included studies and assessed risk of bias. We used a random-effects model for meta-analysis. We rated the quality of the evidence according to the GRADE approach., Main results, We included three trials (590 participants). One single-site trial included 27 children; another multicenter trial (three countries) recruited 155 adults, the third trial was conducted in 24 countries, and recruited 408 adolescents and adults. Each study compared DC combined with standard care (this could include induced barbiturate coma or cooling of the brain, or both). All trials measured outcomes up to six months after injury; one also measured outcomes at 12 and 24 months (the latter data remain unpublished). All trials were at a high risk of bias for the criterion of performance bias, as neither participants nor personnel could be blinded to these interventions. The pediatric trial was at a high risk of selection bias and stopped early; another trial was at risk of bias because of atypical inclusion criteria and a change to the primary outcome after it had started., Mortality: pooled results for three studies provided moderate quality evidence that risk of death at six months was slightly reduced with DC (RR 0.66, 95% CI 0.43 to 1.01; 3 studies, 571 participants; I(superscript 2) = 38%; moderate-quality evidence), and one study also showed a clear reduction in risk of death at 12 months (RR 0.59, 95% CI 0.45 to 0.76; 1 study, 373 participants; high-quality evidence)., Neurological outcome: conscious of controversy around the traditional dichotomization of the Glasgow Outcome Scale (GOS) scale, we chose to present results in three ways, in order to contextualize factors relevant to clinical/patient decision-making., First, we present results of death in combination with vegetative status, versus other outcomes. Two studies reported results at six months for 544 participants. One employed a lower ICP threshold than the other studies, and showed an increase in the risk of death/vegetative state for the DC group. The other study used a more conventional ICP threshold, and results favoured the DC group (15.7% absolute risk reduction (ARR) (95% CI 6% to 25%). The number needed to treat for one beneficial outcome (NNTB) (i.e. to avoid death or vegetative status) was seven. The pooled result for DC compared with standard care showed no clear benefit for either group (RR 0.99, 95% CI 0.46 to 2.13; 2 studies, 544 participants; I(superscript 2) = 86%; low-quality evidence). One study reported data for this outcome at 12 months, whe the risk for death or vegetative state was clearly reduced by DC compared with medical treatment (RR 0.68, 95% CI 0.54 to 0.86; 1 study, 373 participants; high-quality evidence)., Second, we assessed the risk of an 'unfavorable outcome' evaluated on a non-traditional dichotomized GOS-Extended scale (GOS-E), that is, grouping the category 'upper severe disability' into the 'good outcome' grouping. Data were available for two studies (n = 571). Pooling indicated little difference between DC and standard care regarding the risk of an unfavorable outcome at six months following injury (RR 1.06, 95% CI 0.69 to 1.63; 544 participants); heterogeneity was high, with an I(superscript 2) value of 82%. One trial reported data at 12 months and indicated a clear benefit of DC (RR 0.81, 95% CI 0.69 to 0.95; 373 participants)., Third, we assessed the risk of an 'unfavorable outcome' using the (traditional) dichotomized GOS/GOS-E cutoff into 'favorable' versus 'unfavorable' results. There was little difference between DC and standard care at six months (RR 1.00, 95% CI 0.71 to 1.40; 3 studies, 571 participants; low-quality evidence), and heterogeneity was high (I(superscript 2) = 78%). At 12 months one trial suggested a similar finding (RR 0.95, 95% CI 0.83 to 1.09; 1 study, 373 participants; high-quality evidence)., With regard to ICP reduction, pooled results for two studies provided moderate quality evidence that DC was superior to standard care for reducing ICP within 48 hours (MD -4.66 mmHg, 95% CI -6.86 to -2.45; 2 studies, 182 participants; I(superscript 2) = 0%). Data from the third study were consistent with these, but could not be pooled., Data on adverse events are difficult to interpret, as mortality and complications are high, and it can be difficult to distinguish between treatment-related adverse events and the natural evolution of the condition. In general, there was low-quality evidence that surgical patients experienced a higher risk of adverse events., Authors' conclusions, Decompressive craniectomy holds promise of reduced mortality, but the effects of long-term neurological outcome remain controversial, and involve an examination of the priorities of participants and their families. Future research should

focus on identifying clinical and neuroimaging characteristics to identify those patients who would survive with an acceptable quality of life; the best timing for DC; the most appropriate surgical techniques; and whether some synergistic treatments used with DC might improve patient outcomes.

4711. Sahuquillo, J., et al. (1993). "Early ischaemia after severe head injury. Preliminary results in patients with diffuse brain injuries." Acta neurochirurgica **122**(3-4): 204-214.

Ischaemic brain lesions still have a high prevalence in fatally head injured patients and are the single most important cause of secondary brain damage. The present study was undertaken to explore the acute phase of severely head injured patients in order to detect early ischaemia using Robertson's approach of estimating cerebral blood flow (CBF) from calculated arterio-jugular differences of oxygen (AVDO2), lactates (AVDL), and the lactate-oxygen index (LOI). Twenty-eight cases with severe head injury were included (Glasgow Coma Scale Score below or equal to 8). All patients but one had a non-missile head injury. All the patients had a diffuse brain injury according to the admission CT scan. ICP measured at the time of admission was below 20 mmHg in 17 cases (61%). All patients were evaluated with the ischaemia score (IS) devised in our center to evaluate risk factors for developing ischaemia. Mean time from injury to the first AVDO2/AVDL study was 23.9 +/- 9.9 hours. According to Robertson's criteria, 13 patients (46%) had a calculated LOI (-AVDL/AVDO2) value above or equal to 0.08 and therefore an ischaemia/infarction pattern in the first 24 hours after the accident. Of the 15 patients without the ischaemia/infarction pattern, in three cases the CBF was below the metabolic demands and therefore in a situation of compensated hypoperfusion. No patient in our series had hyperaemia. Comparing different variables in ischaemic and non-ischaemic patients, only arterial haemoglobin and ischaemia score (IS) was significantly different in both groups. The ischaemia score had mean of 4.3 +/- 1.7 in the ischaemic group and 2.7 +/- 1.4 in non-ischaemic patients ($p = 0.01$). It is concluded that ischaemia is highly prevalent in the early period after severe head injury. Factors potentially responsible of early ischaemia are discussed.

4712. Saidi, R. F., et al. (2010). "Changing pattern of organ donation at a single center: are potential brain dead donors being lost to donation after cardiac death?" American journal of transplantation : official journal of the American Society of Transplantation and the American Society of Transplant Surgeons **10**(11): 2536-2540.

Donation after cardiac death (DCD) has proven effective at increasing the availability of organs for transplantation. We performed a retrospective examination of Massachusetts General Hospital (MGH) records of all 201 donors from 1/1/98 to the 11/2008, including 54 DCD, 115 DBD and 32 DCD candidates that did not progress to donation (DCD-dnp). Comparing three time periods, era 1 (01/98-12/02), era 2 (01/03-12/05) and era 3 (01/06-11/08), DCD's comprised 14.8,48.4% and 60% of donors, respectively ($p = 0.002$). A significant increase in the incidence of cardiovascular/cerebrovascular as cause of death was evident in era 3 versus eras 1 and 2; 74% versus 57.1% ($p<0.001$),as was a corresponding decrease in the incidence of traumatic death. Interestingly, we noted an increase in utilization of aggressive neurological management over time, especially in the DCD group. We detected significant changes in the make-up of the donor pool over the past decade. That the changes in diagnosis over time did not differ between DCD and DBD groups suggests this difference is not responsible for the increase in DCD rates. Instead, we suggest that changes in clinical practice, especially in management of patients with severe brain injury may account for the increased proportion of DCD.

4713. Saigal, R., et al. (2014). "Induced hypertension does not improve outcomes in penetrating spinal cord injury." Journal of neurotrauma **31**(12): A76.

Many trauma centers treat traumatic spinal cord injured-patients with MAP goals greater than 85-90 mm Hg. However, there is a lack of high grade evidence to support this practice or to identify the best target blood pressure. There is even less evidence to weigh towards specific BP goals for penetrating spinal cord injuries (SCI). We studied our own experience in using pressors to maintain a MAP goal greater than 85-90 in patients with penetrating SCI. We retrospectively reviewed penetrating spinal cord injuries treated at a single academic medical center (San Francisco General Hospital) from 2005-2011. For inclusion, we required an ASIA grade on admission and discharge. Exclusion criteria included inadequate clinical documentation and non-penetrating injury. Nineteen cases met inclusion criteria. 1 case was excluded for inadequate documentation of the ASIA grade. In the remaining 19 cases, mean age was 40.1 (range 18-93). Mean injury severity score was 28.8 (range 9-75). Mean hospital stay was 20.6 days (range 1-151). Six patients had concomitant TBI. Initial American Spinal Injury Association (ASIA) grade was A for 13 patients, C for 1

patient, and D for 5 patients. 18 patients received pressors in order to maintain MAP goals. 17 ASIA grades were unchanged at the time of discharge. Two patients improved: one from ASIA A to B and the second from C to D. One patient worsened from ASIA C to B. There was no obvious benefit to blood pressure augmentation in a retrospective, single-center study of penetrating, traumatic SCI. Two patients improved by one ASIA grade and another worsened by one ASIA grades. Further study is needed to assess whether there is a role for blood pressure augmentation in patients with penetrating SCI.

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4714. Sain, A. K., et al. (1977). "Visualization of a bullet track on brain imaging. Case report." Journal of neurosurgery **46**(2): 259-260.

A case is reported in which an intracerebral bullet track was demonstrated by brain imaging, The possible advantages of technetium-99-m localization and the role of brain imaging in gunshot injuries of the head are discussed.

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4715. Saint-Martin, P., et al. (2008). "An unusual death by transcranial stab wound: homicide or suicide?" The American journal of forensic medicine and pathology **29**(3): 268-270.

Penetrating stab wounds of the brain are uncommonly seen in modern times and occur almost exclusively in homicides. We report an unusual death by self-stabbing. A 24-year-old man was found dead at home, the handle of a kitchen knife protruding from his forehead. Data such as the psychiatric history of the victim, the multiplicity and site of wounds, the implement used, the presence of hesitation, and defense wounds were studied to elucidate the manner of death, and the suicidal nature of the event was established after police investigation. Atypical injuries require a careful forensic investigation, and medico-legal aspects of the differentiation between homicide and suicide are discussed in this particular case. A review of the literature revealed few cases of suicidal transcranial stab wounds.

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4716. Saito, N., et al. (2014). "Imaging of penetrating injuries of the head and neck:current practice at a level I trauma center in the United States." The Keio journal of medicine **63**(2): 23-33.

Penetrating neck injuries are commonly related to stab wounds and gunshot wounds in the United States. The injuries are classified by penetration site in terms of the three anatomical zones of the neck. Based on this zonal classification system, penetrating injuries to the head and neck have traditionally been evaluated by conventional angiography and/or surgical exploration. In recent years, multidetector-row computed tomography (CT) angiography has significantly improved detectability of vascular injuries and extravascular injuries in the setting of penetrating injuries. CT angiography is a fast and minimally invasive imaging modality to evaluate penetrating injuries of the head and neck for stable patients. The spectrum of penetrating neck injuries includes vascular injury (extravasation, pseudoaneurysm, dissection, occlusion, and arteriovenous fistula), aerodigestive injury (esophageal and tracheal injuries), salivary gland injury, neurologic injury (spinal canal and cerebral injuries), and osseous injury, all of which can be evaluated using CT angiography. Familiarity with the complications and imaging characteristics of penetrating injuries of the head and neck is essential for accurate diagnosis and optimal treatment.

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4717. Sakles, J., et al. (2014). "Incidence of hypoxemia during rapid sequence intubation of head injured patients in the emergency department." European Journal of Emergency Medicine **21**(2): 161.

Background: Previous literature has demonstrated that a single event of hypoxemia in a head injured patient substantially increases morbidity. During intubation in the emergency department (ED), patients with head injuries are at great risk of oxygen desaturation. Objectives: To determine the incidence of hypoxemia during rapid sequence intubation (RSI) of head injured patients in the emergency department setting. Methods: Data was collected prospectively through a continuous quality improvement (CQI) database on all patients undergoing RSI in an academic emergency department over a 5 year period (2008-2012). Following each intubation, the operator completed a standardized data form, including the patient's demographic information, trauma diagnosis, highest and lowest pulse oximetry reading during the intubation, and number of intubation attempts. Patients who sustained blunt or penetrating trauma with the following written diagnoses were included in the study: closed head injury, traumatic brain injury, intracranial hemorrhage, subdural hematoma, subarachnoid hemorrhage, epidural hematoma, gunshot wound to the head. This subset of patients was categorized into 3 groups based on percent decrease in saturation during intubation: mild (10-19%), moderate (20-29%), and severe (>29%). Within these groups, we determined how many intubations were

completed on the first attempt. Results: There were 435 trauma patients with a diagnosis of head injury that underwent RSI in the five year period. Of these, 350 had oxygen saturations documented. 320 of these cases were a result of blunt trauma, while 30 were a result of penetrating trauma. 20% of patients (n=69) were found to have experienced desaturation of 10% or more. 8.6% had mild desaturation, 4.9% had moderate desaturation, and 6.3% had severe desaturation. 30 out of these 69 patients were intubated on the first attempt. Conclusion: In this study we found an alarmingly high rate of hypoxemic events during the intubation of head injured patients. Steps to avoid hypoxemia in this patient population are warranted, such as adequate pre-oxygenation prior to intubation, apneic oxygenation during intubation, and the avoidance of prolonged intubation attempts.

4718. Sakles, J. C., et al. (2013). "Incidence of hypoxemia during rapid sequence intubation of head-injured patients in the emergency department." Annals of emergency medicine **62**(4): S147.

Study Objectives: Previous literature has demonstrated that a single event of hypoxemia in a head-injured patient substantially increases morbidity. During intubation in the emergency department (ED), patients with head injuries are at great risk of oxygen desaturation. The purpose of this study is to determine the incidence of hypoxemia during rapid sequence intubation (RSI) of head-injured patients in the ED. Methods: Data was collected prospectively through a continuous quality improvement (CQI) database on all patients undergoing RSI in an academic emergency department over a 5-year period (2008-2012). Following each intubation, the operator completed a standardized data form, including the patient's demographic information, trauma diagnosis, highest and lowest pulse oximetry reading during the intubation, and number of intubation attempts. Patients who sustained blunt or penetrating trauma with the following written diagnoses were included in the study: closed head injury, traumatic brain injury, intracranial hemorrhage, subdural hematoma, subarachnoid hemorrhage, epidural hematoma, gunshot wound to the head. This subset of patients was categorized into 3 groups based on percent decrease in saturation during intubation: mild (10-19%), moderate (20-29%), and severe (>29%). Results: There were 435 trauma patients with a diagnosis of head injury that underwent RSI in the five-year period. Of these, 350 had oxygen saturations documented. 320 of these cases were a result of blunt trauma, while 30 were a result of penetrating trauma. A total of 19.7% of patients (n=69) were found to have experienced desaturation of 10% or more. Thirty out of these 69 patients were intubated on the first attempt (Table). Conclusions: In this study we found an alarmingly high rate of hypoxemic events during the intubation of head-injured patients. Steps to avoid hypoxemia in this patient population are warranted, such as adequate pre-oxygenation prior to intubation, apneic oxygenation during intubation, and the avoidance of prolonged intubation attempts. (Table Presented).

4719. Sakr, S., et al. (2016). "Surgical management of penetrating intracranial bullet injuries." Neurosurgery Quarterly **26**(1): 37-41.

Objectives: This study aimed to determine the outcome after gunshot wounds (GSWs) to the head and to evaluate the impact of prognostic factors mentioned in the literature on the outcome. Methods: This prospective study included 30 patients; 24 males and 6 females with a mean age of 31 years. All with penetrating GSWs to the head admitted to the emergency department of Cairo University Hospitals from January 2008 till June 2011. Shotgun was the most common injury in this study, whereas bullet injury was in only 3 patients (10%). Preoperatively, patients were categorized according to their Glasgow Coma Scale (GCS) into mild, moderate, and severe penetrating head injury. Upon admission, all patients underwent a complete physical and neurological examination together with a computed tomography of the brain without contrast. Initial management included a variety of the following according to indications; resuscitation, prophylactic antiepileptics, antibiotics, control active bleeding from wounds, and measures to decrease intracranial pressure. Surgical intervention ranged from simple debridement to hematoma evacuation and/or bullet extraction. Outcome was assessed after surgical interference using GCS and Glasgow Outcome Scale. Results: Fifteen (50%) patients had mild penetrating head injury (GCS 13 to 15), 12 patients (40%) were severely injured (GCS 3 to 8), and only 3 patients (10%) were moderately injured (GCS 9 to 12). Eighteen patients (60%) were found to have isolated intracranial injury, whereas 40% had other associated injuries. Twelve patients (40%) had an associated intracranial hematoma on their initial computed tomography scan. The average follow-up period was 16 months. The most common systemic complications were urinary tract infection (12 patients) and chest infection (12 patients), whereas the most common local complications were wound infection (10 patients), cerebrospinal fluid fistula (8 patients), and hydrocephalus (5 patients). At the follow up, The GCS of 10 patients (33.3%) was (13 to 15), 6 patients (20%) were (9 to 12), 5 patients (16.7%) showed persistent vegetative state (<3), and 9 patients (30%) died.

Postoperative outcome was significantly correlated with the preoperative one (P<0.001). According to Glasgow Outcome Scale, 33.3% of patients had good recovery and 30% of the patients died. The others suffered from various degrees of disability. Conclusions: The prevalence of GSWs to the head is increasing dramatically as private ownership of weapons and gang-related urban violence increases. Most of the irreversible brain damage from a GSW is sustained at impact and can be understood in terms of a missile's trajectory and the pattern of energy transfer to brain tissue. Treatment is aimed at preventing subsequent brain injury that might further limit recovery. One third of patients obtain a good recovery.

4720. Salam, A. A., et al. (1990). "Penetrating brain stem injury from crossbow bolt: a case report and review of the literature." Archives of emergency medicine **7**(3): 224-227.

Because injury to the brain stem is usually associated with diffuse brain damage, recovery is rare and mortality high. A non-fatal penetrating injury involving the brain stem is described from a crossbow bolt. The diagnosis and management of such injuries are discussed.

4721. Salama, A. and M. Jesin (2011). "Racial disparities in craniomaxillofacial trauma." International journal of oral and maxillofacial surgery **40**(10): 1111.

Racial disparities have been shown to exist in several arenas of health care. The institutional trauma registry at Boston Medical Center was queried to investigate racial injury patterns and outcomes in craniomaxillofacial trauma from 2001 to 2010. 2357 complete records were reviewed that met inclusion criteria based on ICD-9 codes. Multivariate/bivariate logistic regression was used to analyze data. There were distinct differences in injury mechanism based on race. Less than 1% of White patients were admitted for ballistic injuries compared to 13.1% of Blacks and 5.8% of Asians. The male:female ratio amongst Blacks, Hispanics and Whites was 6:1, 4:1 and 2.5:1 respectively. Death following ICU admission was related to age, shock, GCS, ISS, but not race ($p < 0.0001$). The risk of mortality was greater in patients with gun shot wounds (OR 14.3, $p < 0.0001$) and with admission systolic blood pressure < 90mmHg (OR 12.3, $p < 0.0001$) Length of stay among non-ICU patients was strongly related to ISS, a diagnosis of shock on admission, increasing numbers of surgical procedures; OR 0.28, 0.98, 1.09, $p < 0.001$. Relationships between race, length of stay or insurance status did not reach statistical significance. This study illustrates distinct differences in injury patterns according to race, however there were no statistically relevant relationships between race, gender and cause specific mortality. Shock, decreased GCS and increased ISS were the most powerful predictors of outcome. The data strongly suggest that while racial disparities exist in the mechanism of injury, patient outcomes were similar irrespective of race.

4722. Salama, K., et al. (2021). "A rare case of a penetrating cranio-facial foreign body stuck in the skull base." International journal of surgery case reports **81**.

Introduction: Penetrating craniofacial wounds due to foreign bodies, specifically sharp white blades, represent an eventual life threatening condition and a rare case of emergency facial surgery requiring a complex medical care. We report an original case of a penetrating craniofacial wound by a knife with a review of the literature concerning the tendencies, the complications and the specific medical care needed for these particular cranio-facial lesions. Presentation of case: A 35 year old man admitted to our ENT emergency room with a penetrating craniofacial wound caused by a knife stuck in the cranio-orbital-nasal junction. A craniofacial profile x-ray showed the presence of the metallic foreign body, a knife, penetrating deeply to the base of the skull. Computed tomography showed that the transcranial metallic foreign body arrived in the right sellar region after passing through the nasal cavity and the right sphenoid sinus with hemosinus and suprentorial pneumocephaly. the management consisted of multidisciplinary management, and the extraction was performed successfully under 3D endoscopic control. Conclusion: The majority of penetrating craniofacial wounds secondary to foreign bodies, regardless of their size, are rarely associated with major neurological symptoms and their management must be adapted to their potential severity.

4723. Salar, G., et al. (2004). "Multiple craniocerebral injuries from penetrating nails. Case illustration." Journal of neurosurgery **100**(5): 963.

4724. Salazar, A. M. and J. Grafman (2015). "Post-traumatic epilepsy: clinical clues to pathogenesis and paths to prevention." Handbook of clinical neurology **128**: 525-538.

Post-traumatic epilepsy (PTE) remains one of the most intractable consequences of traumatic brain injury (TBI) and its incidence and characteristics have remained relatively constant through the past century, in spite of significant advances in medical management. Survivors of military penetrating head injury (PHI) suffer by far the highest incidence of (PTE), ranging from 32% to 55%, and they are a particularly valuable group in which to study this complication. Clues to the high incidence of PTE in PHI survivors are likely related to dural penetration with free intracerebral blood, and perhaps to retained ferric metal fragments. The failure of well-reasoned and well-conducted trials evaluating conventional anticonvulsants for prevention of PTE also offers important clues and has forced us to reconsider our approach to management. Here we briefly review the clinical characteristics of PHI patients with PTE, with an emphasis on clues to pathogenesis that can generalize to other types of head injury; followed by a discussion of the pathogenetic mechanisms common to epilepsy, PHI, and TBI in general, with an eye to future neuroprotection and PTE prophylaxis. Future studies that more directly target the basic pathogenesis of TBI, including neuroinflammation and lipid peroxidation with their consequent excitotoxic mechanisms and aberrant regeneration, may ultimately prove to be more fruitful in the struggle to understand and control this especially stubborn complication of head injury.

4725. Salazar, A. M., et al. (1986). "Consciousness and amnesia after penetrating head injury: neurology and anatomy." Neurology **36**(2): 178-187.

Among 342 men who survived severe penetrating brain wounds, only 15% had prolonged unconsciousness and 53% had no or momentary unconsciousness after injury, emphasizing the focal nature of these wounds. The left (or language-dominant) hemisphere was dominant for the "wakefulness" component of consciousness. The areas most associated with unconsciousness included the posterior limb of the left internal capsule, left basal forebrain, midbrain, and hypothalamus. Left dominance was not seen for posttraumatic amnesia after elimination of the wakefulness variable, suggesting that wakefulness may be linked to the role of the left hemisphere in verbal memory.

4726. Salazar, A. M., et al. (1985). "Epilepsy after penetrating head injury. I. Clinical correlates: a report of the Vietnam Head Injury Study." Neurology **35**(10): 1406-1414.

Of 421 veterans who had penetrating brain wounds in Vietnam 15 years ago, 53% had posttraumatic epilepsy, and one-half of those still had seizures 15 years after injury. The relative risk of developing epilepsy dropped from about 580 times higher than the general age-matched population in the first year to 25 times higher after 10 years. Patients with focal neurologic signs or large lesions had increased risk of epilepsy, and site of the lesion may have been more important than size in determining occurrence. Family history of epilepsy or preinjury intelligence had no effect on seizure occurrence. Seizure frequency in the first year predicted future severity of seizures. Phenytoin therapy in the first year after injury did not prevent later seizures.

4727. Saldana Rodrigue, M., et al. (2011). "Outcome for traumatic optic neuropathy: treatment versus no treatment." International journal of oral and maxillofacial surgery **40**(10): 1109.

Background: Traumatic optic neuropathy (TON) is an important cause of severe visual loss following blunt or penetrating head trauma. Following the initial injury, optic nerve swelling within the optic nerve canal can result in secondary retinal ganglion cell loss. Optic nerve decompression with steroids or surgical interventions or both have therefore been advocated as a means of improving visual prognosis in TON. Objectives: The aim of this review was to examine the effectiveness and safety of surgical interventions, using steroids and observation in the management of TON. Method:We included only randomised controlled trials of TON in which any form of surgical intervention either on its own or in combination with steroidswas compared to any steroid regime alone or no treatment. Conclusions: There is a relatively high rate of spontaneous visual recovery in TON. There is no convincing data that steroids provide any additional visual benefit over observation alone. Recent evidence also suggests a possible detrimental effect of steroids in TON. Each case therefore needs to be assessed on an individual basis and proper informed consent is paramount. Neither there is evidence that surgical decompression of the optic nerve provides any additional benefit. On the other hand, surgery carries a definite risk of complications such as postoperative cerebrospinal fluid leak and meningitis. The decision to proceed with surgery in TON remains controversial and each case needs to be assessed on its own merits.

4728. Saleem, S. N. and Z. Hawass (2021). "Computed Tomography Study of the Mummy of King Seqenenre Taa II: New Insights Into His Violent Death." Frontiers in medicine **8**.

Seqenenre-Taa-II, The Brave, (c.1558–1553 BC) ruled Southern Egypt during the occupation of Egypt by the Hyksos. The mummy was physically examined and X-rayed in the 1960s, which showed severe head wounds that have prompted various theories about the circumstances of his death. We postulated that Computed Tomography (CT) study of Seqenenre-Taa-II's mummy would give insights into the circumstances of his death. We examined Seqenenre's mummy using CT and compared the findings with the archaeological literature as well as with five Asian weapons found in Tell-el-Dabaa. CT findings indicate that Seqenenre died in his forties. The mummies deformed hands suggest that the King was likely imprisoned with his hands tied. CT images provided detailed analysis of Seqenenre's previously reported injuries to the forehead, right supra-orbital, nose-right orbit, left chick, and skull base. This study revealed additional craniofacial fractures in the right lateral side of the skull that had been concealed by the embalmers beneath layers of material. Analysis of the morphology of the injuries enabled a better understanding of the mechanism of trauma, possible number of the attackers, and their relative position to the King. The size and shape of the fractures correlated well with the studied Hyksos weapons. The lethal attack was aimed at the King's face, likely in an attempt to disgrace him. Mummification of Seqenenre's body was limited to evisceration without brain removal. The desiccated brain is shifted to the left side of the skull. This may indicate that the King's dead body stayed on its left side for some time—long enough for decomposition start before the mummification began. This suggests that the King likely died at a location distant from the funeral place, possibly on a battlefield. The embalmers attempted to conceal the King's injuries; the methods used suggest that the mummification took place in a royal mummification workshop rather than in a poorly equipped location. CT findings of Seqenenre's mummy helped us to better understand the circumstances of his violent death. His death motivated his successors to continue the fight to unify Egypt and start The New Kingdom.

4729. Salehpoor, F., et al. (2016). "Prognostic serum factors in patients with traumatic brain injury: A systematic review." Neurosurgery Quarterly **26**(1): 19-36.

Objective: The aim of the study was to systematically review which factor of serum, assessed in traumatic brain injury (TBI), predicts patient's outcome. Materials and Methods: Databases were searched for relevant publications between 2005 and January 2013, and those fulfilling the following selection criteria were included: (1) studies conducted from 2005 until February 2013; (2) studies in which factors affecting the outcome after TBI were evaluated; (3) studies that defined TBI as "acute changes in brain function resulting in a strong external force to the head"; (4) studies in which the result was measured by the Glasgow Outcome Score (GCS) or by means of a comparable measure describing the activity limitation and neurological state; (5) studies in which the correlation between the measured factors in the first month after injury and prognosis was addressed; and (6) studies involving patients with moderate and/or severe TBI (GCS<13). All of the papers shortlisted were checked and approved by a specialist and expert in that field. A systematic review and analysis was performed for the prognostic factors assessed in the studies. Results: A total of 71 studies were included, 58 of which were of high quality. Most studies used the GCS at 6 months after injury as the outcome measure, sometimes in combination with other outcome measures. Strong evidence for predicting outcome was found for serum concentration of S100 protein, NSE, MBP, NF-H, GFAP, UCH-L1, blood glucose levels, serum levels of LDH, sodium level, prothrombin time, partial thromboplastin time, platelet count, D-dimer, HSP 70, serum levels of IL-8, number of circulating endothelial progenitor cells (EPCs), and DNA levels in serum. Moderate evidence for predicting outcome was found for high serum MMP9. Strong evidence of no association was found for WBC count and serum cortisol levels, and moderate evidence of no association was found for serum total cholesterol. For other determinants, inconclusive or no evidence or limited evidence was found. Conclusions: S100 protein, NSE, MBP, NF-H, GFAP, UCH-L1, blood glucose levels, serum levels of LDH, sodium level, prothrombin time, partial thromboplastin time, platelet count, Ddimer, HSP 70, serum levels of IL-8, number of circulating EPCs, and DNA levels in serum predicted outcome after TBI. WBC count, serum cortisol levels, total cholesterol, and MMP9 did not have predictive values.

4730. Salerian, A. J. (2010). "President Kennedy's death: a poison arrow-assisted homicide." Medical hypotheses **75**(4): 372-377.

"President John F. Kennedy's death was a neurotoxin-assisted homicide" is the hypothesis of this study. A review of medical evidence demonstrates evidence of a neurotoxin-assisted homicide. The convergence of three independent

actions, or the signature traits of a neurotoxin-assisted homicide- the emergence of neurological signs consistent with a neurotoxin-induced paralysis, the induction of a small neck wound consistent with a flechette-transported neurotoxin entry wound, and the execution of a coverup to eliminate neurotoxin evidence, supports this hypothesis. This review suggests, JFK's death had all the signature traits of a neurotoxin-assisted homicide. Copyright 2010 Elsevier Ltd. All rights reserved.

4731. Salhia, B., et al. (2000). "Expression of vascular endothelial growth factor by reactive astrocytes and associated neoangiogenesis." Brain research **883**(1): 87-97.

Injury to the central nervous system (CNS) invokes a reparative response known as astrogliosis, characterized largely by hypertrophy, proliferation and increased expression of glial fibrillary acidic protein (GFAP), resulting in reactive astrocytosis. Based on our prior observation that peritumoral reactive astrocytes express Vascular Endothelial Growth Factor (VEGF), a highly potent and specific angiogenic growth factor, we have hypothesized that reactive astrocytosis also contributes to the neovascularization associated with astrogliosis. To evaluate this hypothesis we evaluated human surgical/autopsy specimens from a variety of CNS disorders that induce astrogliosis and an experimental CNS needle injury model in wild type and GFAP:Green Fluorescent Protein (GFP) transgenic mice. Using computer image semi-quantitative analysis we evaluated the number of GFAP-positive reactive astrocytes, degree of VEGF expression by these astrocytes, associated Factor VIII-positive microvascular density (MVD) and Ki-67 proliferating endothelial cells. The degree of reactive astrocytosis correlated to levels of VEGF immunoreactivity and MVD in the neuropathological specimens. The mouse-needle-stick brain injury model demonstrated this correlation was temporally and spatially related and maximal after 1 week. These results, involving both human pathology specimens augmented by experimental animal data, supports our hypothesis that the neoangiogenesis associated with reactive astrogliosis is correlated to increased reactive astrocytosis and associated VEGF expression.

4732. Salibi, B. S. (1963). "AN UNUSUAL BULLET WOUND OF THE CRANIUM: RECOVERY FROM A PRE-EXISTING LONG-STANDING HIGH-TONE DEAFNESS ON THE SAME SIDE." Archives of neurology **9**: 313-318.

4733. Salim, A., et al. (2008). "Intracranial pressure monitoring in severe isolated pediatric blunt head trauma." The American surgeon **74**(11): 1088-1093.

Very little research regarding standard treatments for pediatric traumatic brain injury (PTBI) exists. The objective of this study was to examine the use of intracranial pressure (ICP) monitoring devices in PTBI and to determine if its use was associated with any outcome benefit. Data were collected from the Trauma Registry over an 11-year period (1996-2006) on all blunt trauma pediatric patients (age < 14 years) with an initial Glasgow Coma Scale score 3 vs. 55%, P = 0.01) than patients without monitors. However, there was no difference in mortality (28% vs. 35%, P = 0.52), discharge location (P = 0.10), and discharge capacity (P = 0.84). After multivariable analysis to adjust for the differences between the two study groups, the use of ICP monitor provided no survival benefit (adjusted odds ratio: 1.1; 95% confidence interval [CI]: 0.3-4.1; adjusted P value = 0.85). The use of ICP monitor was, however, independently associated with a higher risk of developing extracranial complications (adjusted odds ratio: 4.3; 95% CI: 1.2-16.4; adjusted P value = 0.025). In conclusion, the use of ICP monitors in pediatric patients with severe isolated head injury provided no survival benefit and was associated with an increased risk of complications.

4734. Sal'kov, N. N. and D. V. Ovcharenko (2014). "[Case report of spine and spinal cord injury]." Zhurnal voprosy neirokhirurgii imeni N. N. Burdenko **78**(3): 49-52.

We present a case report of spine and spinal cord injury caused by wound to the face by a foreign body followed by its penetration to cervical soft tissues and lateral compression of the spinal canal by the foreign body causing a neurological deficit. A significant regression of neurological disorders was observed after the dislocation of the vertebra had been eliminated.

4735. Salov, D. A., et al. (1999). "[The capacity of the victim for active functioning with a fatal gunshot wound to the brain]." O sposobnosti poterpevshego k aktivnym deistviiam pri smertel'nom ognestrel'nom povrezhdenii golovnogo mozga. **42**(1): 26-27.

4736. Saltz, S., et al. (2015). "The complications associated with treating depression and traumatic brain injury: A case report of a suicide attempt in a 26 year old male." Neuropsychopharmacology **40**: S307.

Background: Traumatic brain injury (TBI) is a debilitating illness that often causes comorbid depression. Treating depression is often difficult with only 30%-40% of patients responding to their first antidepressant. Medical comorbidities exacerbate the struggle of determining optimal pharmacotherapy for a patient. Psychiatrists, in particular, may be exposed to patients with traumatic brain injury (TBI) secondary to the mental illness and substance abuse that may accompany TBI4. While first line pharmacotherapies for depression remain selective serotonin reuptake inhibitors (SSRIs), patients with TBI cannot necessarily be treated with these medications. It is well documented in the literature that both SSRIs and SNRIs may cause hyponatremia. Likewise, traumatic brain injury is often complicated by SIADH or cerebral salt wasting syndrome (CSWS). Methods: We present a case of a 26 year old male status post suicide attempt via gunshot wound resulting in traumatic brain injury. Results: CT brain scan was done and significant for a penetrating ballistic injury to the face, brain, and calvarium with a trajectory extending from the left inferior face, through the left maxillary sinus, ethmoids, posterior right orbit, right frontal region, and through the right frontal calvarium. Hospitalization was complicated by diabetes insipidus, CSF leak, increased pneumocephalus, and hyponatremia. Conclusions: One needs to consider electrolyte abnormalities, seizure propensity, fall risk, potential weight loss, and confusion in TBI patients when choosing psychotherapeutic agents. This case report highlights the difficulties accompanying choosing safe and effective treatment modalities for depression as many psychotherapeutics have side effects that limit their use in patients with traumatic brain injury.

4737. Salvadori, A., et al. (2013). "Pediatric wartime: First learning of 63 pediatric intensive care unit admissions in the French military hospital of Kabul." Intensive care medicine **39**: S26-S27.

Objectives: Children management during wartime is a challenge for non-specialized medical teams in pediatric trauma. The purpose of this study is to describe the features of pediatric wartime admissions in intensive care unit at the French military hospital of Kabul. Methods: A retrospective study of all intensive care unit pediatric admissions between June 2011 and August 2012 was conducted. Results: 261 patients were analyzed. Pediatric patients represented 24 % of all admissions (63 patients). Mean age was 8.9 ± 4.1 years old and mean ISS was 25 ± 13. Traumatic diagnoses were responsible for 92 % of all pediatric admissions. The primary mechanism was explosion (43 %) followed by gunshot wound (22 %) and motor vehicle crash (13 %). Twenty-four patients (38 %) sustained abdominal injuries with more than a half was penetrating. 23/63 (37 %) had thoracic injuries among which 11 (48 %) was penetrating. 21/63 (33 %) sustained head injuries, 20/63 (32 %) had traumatic brain injury and 17/63 (27 %) was had multiple penetrating injuries. Twenty-six patients were mechanically ventilated with a mean duration of mechanical ventilation of 3 ± 4 days. 89 % required surgery, 87 % a body scan and 43 %were transfused. The mean length of stay was 3 ± 2.5 days. 3 patients died during the study period. Conclusion: Our study confirms a significant number of pediatric wartime admissions (24 %). The primary mechanism encountered in the field was explosion and gunshot wound.

4738. Salvati, M., et al. (1997). "Spontaneous movement of metallic foreign bodies. Case report." Journal of neurosurgical sciences **41**(4): 423-425.

We report a case of missile injury to the brain with an unusual complication. The bullet migrated by its mere weight to a distant location through the brain parenchyma after initially lodged in a superficial site. Movement of the bullet was first detected on CT scan and the significance and treatment of this finding is emphasized.

4739. Salzano, A., et al. (1999). "[The role of computed tomography in gunshot lesions of the chest. The authors' personal experience]." Ruolo della Tomografia Computerizzata nelle lesioni da arma da fuoco del torace. Esperienza personale. **98**(5): 356-360.

PURPOSE: CT is a valuable tool in assessing thoracic gunshot wounds. CT is also the method of choice in emergency, because it permits rapid depiction of bullet damage to the chest and to other body districts. This in turn

permits correct assessment of the main thoracic injuries, plus adequate and prompt planning of surgical treatment or support intensive care. We report on the role of CT in diagnosing the complex pleuropulmonary, cardiovascular and thoracic wall injuries caused by gunshot wounds, with their specific and acute signs which differ greatly from those of other types of chest trauma., MATERIAL AND METHODS: In the last 4 years, we observed 76 cases of gunshot injury, twenty-six of them involved the chest. The patients, 25 men and 1 woman (mean age: 32 years, range: 17-48), were all submitted to emergency CT with i.v. contrast agent injection and the CT-angiography technique. The reanimator was always present to monitor the patients' vital functions and shock state. CT of the chest was integrated with CT of the abdomen and pelvis in 4 cases and with CT of the skull in 3 cases, to detect associated bullet wounds if any., RESULTS: The most frequent CT finding was lung parenchyma tear and bruise (25 cases), followed by hemothorax (18 cases) and subcutaneous chest wall emphysema (9 cases). Pneumothorax was seen in 5 cases, associated with hemothorax in 6; rib injuries were found in 7 cases; pneumomediastinum was found in 4 cases and areas of pulmonary atelectasis in 3; the diaphragm was ruptured in 4 cases. CT showed spinal involvement in 11 patients, with injury of D3 and D5 in 4 and 3 cases, respectively; signs of interrupted spinal marrow were found in 7 cases. Damage from gunshot wounds was detected in the liver, spleen, skull and limbs in 3, 2, 3 and 10 cases, respectively., DISCUSSION AND CONCLUSIONS: Chest radiography shows major gunshot wound damage to the chest and lungs, except for heart injuries and minimal pneumothorax. When abdominal and skull injuries are associated, CT should be the method of choice because it permits prompt and panoramic assessment of the severity of pulmonary and extrathoracic damage. This results in prompt and targeted treatment, avoiding unnecessary delays which may damage the patient further.

4740. Salzano, A., et al. (1999). "[The topicality and use of the radiological exam in gunshot wounds of the limbs. An assessment of 132 cases]." Attualita e impiego dell'esame radiologico nelle ferite da arma da fuoco degli arti. Valutazione di 132 casi. **98**(6): 468-471.

INTRODUCTION: Gunshot wounds of limbs are frequent injuries especially in Western countries. They can be single or associated with other penetrating gunshot wounds, for instance to the chest, abdomen and skull., PURPOSE: We investigated the current role and usefulness of conventional radiography in the assessment of gunshot injuries to limbs because, despite major advances in diagnostic imaging, this method remains the examination of choice in this condition. We stress the valuable contribution of conventional radiography to detection of bone blow-out fractures, multifocal traumatic bone changes, bone and joint injuries, bullet retention, and finally subcutaneous emphysema., MATERIAL AND METHODS: We retrospectively reviewed 132 cases of firearm injuries of limbs submitted to radiography March 1996 to July 1999. All the patients were men ranging in age 17-66 years (mean: 35). Radiography followed a preliminary physical examination, and follow-ups were carried out in the following days after orthopedic reduction of bone fractures or surgery with metal osteosynthesis. Emergency CT was performed first when chest, abdomen, or skull were involved., RESULTS: The lower limbs were involved three times as much as the upper ones; the leg was most frequently involved (61%), followed by thigh (61%), forearm and hands (24%), and feet (15%). The right lower limb was wounded in 65% of cases, especially tibia (55 cases) and femur (46 cases). Spiral injuries to bone diaphysis were the most frequent ones, followed by mixed fractures caused by cortical bone sinking from bullet impact. Bullets were retained in 60% of cases; subcutaneous emphysema was found in 78% of cases and vascular injuries in 25 cases in relation to disarranged fractures. We observed 4 arteriovenous fistulas during 3 years' follow-up., DISCUSSION AND CONCLUSIONS: Gunshot wounds to the limbs need a different clinical, diagnostic and therapeutic approach than thoracoabdominal and skull injuries, which require immediate and quick diagnosis and emergency treatment. The cases with injury to a primary artery from open and splintered fractures require emergency surgical reconstruction with vascular anastomosis and reduction of compound fractures, to prevent necrosis and amputation. Conventional radiography does depict the bullet and its site, subcutaneous emphysema, blow-out fractures, and the location of bone splinters. This permits adequate emergency surgery and an efficacious orthopedic approach, as well as selection of the cases to be submitted to clinical monitoring.

4741. Salzano, A., et al. (1999). "[Gunshot wounds of the abdomen studied by computed tomography. The authors' personal experience in 30 cases]." Ferite da arma da fuoco dell'addome studiate con Tomografia Computerizzata. Esperienza personale in 30 casi. **98**(3): 168-172.

INTRODUCTION: CT plays an important role in depicting gunshot wounds in parenchymal and hollow organs in the abdomen. Relative to other techniques and to emergency laparotomy, CT permits good assessment of abdominal content, major injuries and changes in other districts, such as chest, pelvis and skull. We investigated the yield and role

of CT in diagnosing abdominal gunshot wounds, with their rich and varied radiological signs and associated injuries., MATERIAL AND METHODS: We retrospectively reviewed the findings of 30 patients with abdominal gunshot wounds examined in 4 years at Loreto-Mare Hospital, Naples. All patients were men, age ranging 19-54 years (mean: 35); 6 of them were not from the European Union. Examinations were carried out from diaphragm to pubis with i.v. contrast injection and the CT angiography technique. CT was integrated with chest studies in 6 cases and with skull studies in 5. Subsequent CT follow-ups were necessary in 12 cases submitted to conservative treatment., RESULTS: Liver was the most damaged parenchyma, with hemorrhage and lacerocontusion in 7 cases and mashed in 1 case; spleen was involved in 4 cases; hemoperitoneum was found in 18 cases. Diaphragm was involved in 5 cases and pancreas in 2; gallbladder, stomach and duodenum were involved in 1 case each and jejunum-ileum and colon in 3 and 6 cases, respectively. CT showed renal injury in 3 cases and bladder injury in 2. Eight patients had vertebral gunshot damage. Pneumothorax, hemothorax and lacerocontusion were found in 7 cases; brain was injured in 4 cases and limbs in 16., DISCUSSION AND CONCLUSIONS: Tissue damage extent depends on the speed and kinetic energy the bullet carries into the abdomen. Abdominal radiography shows the bullet and its site, pneumoperitoneum from gastrointestinal perforation, crash bone injuries, vertebral trauma and subcutaneous emphysema. Instead, CT depicts early parenchymal damage and vascular injury and thus becomes a complete and necessary tool for imaging gunshot wounds. CT provides early diagnostic information which help plan emergency treatment and thus decrease mortality. As for angiography and US, we suggest they be used subsequently because in emergency they may delay the diagnosis. Moreover, vessel rupture and active intraabdominal bleeding are easily detected with spiral CT, which appears the best tool for prompt assessment of the injuries associated with gunshot wounds in other districts such as, the skull. To conclude, CT permits adequate planning of emergency surgery and helps select the cases for follow-up, intensive care and conservative treatment.

4742. Salzano, A., et al. (2000). "[Gunshot wounds of the cranium studied with computerized tomography. Personal experience in 23 cases]." Ferite da arma da fuoco del cranio osservate con Tomografia Computerizzata. Esperienza personale in 23 casi. **99**(1-2): 26-30.

INTRODUCTION: Gunshot wounds to the head are usually mortal injuries. Their frequency has been increasing in the last years because of increasing crime rates. Gunshot wounds to the head require close clinical and diagnostic cooperation of the neurosurgeon and radiologist, detailed assessment of skull and brain damage, and finally prompt treatment. Emergency Computed Tomography (CT) makes a useful tool for depicting bullet course and brain damage, and thus helps plan treatment. We investigated the CT signs of subdural hematoma, lacerocontusive focus, subarachnoid hemorrhage, hemoencephalus, skull bone fracture and thecal hollow and report them as an aid to the neurosurgeon and the radiologist, for best treatment planning, and in an attempt to establish useful prognostic criteria., MATERIAL AND METHODS: We retrospectively reviewed 23 cases of gunshot injuries to the head studied with CT at the Emergency Unit of Loreto Mare Hospital in Naples, Italy. Twenty patients were men and 3 women; their mean age was 31 years (range: 18-49). Three women and 2 men had been injured accidentally by wandering bullets, and one case was an attempted suicide; all the other cases resulted from shootings. CT slices were 10 mm thick, with 8 mm gap (5 mm in complex injuries and when posterior cranial fossa was involved); all scans were unenhanced., RESULTS: We found 22 penetrating gunshot wounds: 13 of them with thecal entry hole and intracranial bullet retention and 9 with an entry and an exit hole. One case was a superficial wound. Crash skull fractures were seen in 22 cases and they were fragmented in 12, with overlapping thecal fragments in 4, and with deep fragments in 2 cases. There were scattered bone splinters in 3 cases and the bullet was retained in the mastoid bone in one case. Lacerocontusive foci were assessed in 22 cases, brain swelling in 20, subarachnoid hemorrhage in 19, brain hematoma in 15, blood in the ventricular system in 9, pneumoencephalus in 7, air bubbles along the bullet course in 7, impression on ventricula and linear structures in 7, interhemispheric blood in 5, and finally blood effusion in Sylvian scissure in 4 cases., DISCUSSION AND CONCLUSIONS: Gunshot wounds to the head are complex and severe traumas with high mortality rates because of both early and late effects and complications. CT provides the neurosurgeon with abundant findings for diagnosis and surgical planning, which may result in improved survival rates. In these patients emergency CT plays a fundamental diagnostic role in depicting brain damage and thus remains the method of choice for thorough, rapid and accurate brain and skull studies, as well as to detect possible injury to the chest and abdomen.

4743. Salzano, A., et al. (2000). "[Craniocerebral trauma from bullets: the correlation between computed tomography, the clinical picture, neurosurgical treatment and the long-term sequelae]." Traumi cranio-encefalici da proiettile: correlazione tra Tomografia Computerizzata, clinica, trattamento neurochirurgico e sequele a distanza. **99**(3): 156-160.

PURPOSE: To demonstrate the usefulness of CT findings in the planning of brain neurosurgery in gunshot victims, for prompt and successful treatment., MATERIAL AND METHODS: Thirty patients with brain gunshot wounds were examined with CT over 5 years. The patients were 27 men and 3 women whose mean age was 33 years (range: 17-56). Brain CT was carried out with thin (5-mm) slices and 10-mm gap; dynamic scanning (3-mm interscan time) was used especially in case of posterior fossa involvement and diffuse brain damage. The examination was integrated with cervical scout views to detect bullets in the neck and cervical dislocation. CT follow-up was carried out in 20 patients 24 hours postoperatively and every 6 hours in 9 patients in a severe postoperative coma., RESULTS: Twelve intracranial hematomas and 9 subdural hematomas, 3 of them bilateral, were treated and hemorrhage was resolved in 8 lacerocontusive foci. Skull plastic surgery was carried out in 5 cases. Surgical maneuvers were most difficult in the 5 crash bone injuries with wedged splinters; postoperative subarachnoid hemorrhage followed in 3 cases. Blood effusion in ventricles was drained in 6 cases; in 2 of them with permanent catheters. Eleven patients died: 4 right after surgery and 7 an average 15 days postoperatively., DISCUSSION AND CONCLUSIONS: In our series the mortality rate of firearm wounds of the skull base was 34% higher than that of the hemisphere; this is due to carotid hemorrhage and midbrain damage. Such traumas require emergency radiological diagnosis and neurosurgical treatment because of their severity and early irreversible complications. Complex operations and skilled surgeons may prevent disabling postoperative sequels. CT findings are indispensable and must be correctly interpreted. The radiologist and the neurosurgeon must collaborate closely and both must consider several diagnostic and prognostic factors affecting surgical planning.

4744. Samaha, M., et al. (2000). "Sino-orbital foreign body in a child." International journal of pediatric otorhinolaryngology **52**(2): 189-192.

Foreign bodies of the sinuses are uncommon. Few reports exist in the English literature. Among these, the frontal and maxillary sinuses are most often involved. Ethmoid and sphenoid foreign bodies are rare and tend to present with chronic symptoms due to delayed diagnosis. We present a case of an acute presentation of a foreign body involving the orbit and ethmoid sinus in a 12-year-old male.

4745. Samarasekera, S. and G. Mazibrada (2012). "Shot in the foot." Practical neurology **12**(6): 382-383.

4746. Sammani, A., et al. (2017). "Thirty years of heart transplantation at the university medical centre Utrecht." Netherlands Heart Journal **25**(9): 516-523.

Purpose To analyse patient demographics, indications, survival and donor characteristics for heart transplantation (HTx) during the past 30 years at the University Medical Centre Utrecht (UMCU). Methods Data have been prospectively collected for all patients who underwent HTx at the UMCU from 1985 until 2015. Patients who were included underwent ortho-topic HTx at an age >14 years. Results In total, 489 hearts have been transplanted since 1985; 120 patients (25%) had left ventricular assist device (LVAD) implantation prior to HTx. A shift from ischaemic heart disease to dilated cardiomyopathy has been seen as the leading indication for HTx since the year 2000. Median age at HTx was 49 years (range 16–68). Median waiting time and donor age have also increased from 40 to 513 days and from 27 to 44 years respectively (range 11–65). Donor cause of death is now primarily stroke, in contrast to head and brain injury in earlier years. Estimated median survival is 15.4 years (95% confidence interval 14.2–16.6) There is better survival throughout these years. Conclusion Over the past 30 years, patient and donor demographics and underlying diseases have shifted substantially. Furthermore, the increase in waiting time due to lack of available donor hearts has led to a rise in the use of LVADs as bridge to transplant. Importantly, an improvement in survival rates is found over time which could be explained by better immunosuppressive therapy and improvements in follow-up care.

4747. Samson, D. S. (1982). "Cervical carotid injuries." Clinical neurosurgery **29**: 647-656.

4748. Samuelson, M. B., et al. (2017). "Sinonasal metallic foreign body penetration of the anterior cranial fossa." Otolaryngology Case Reports **2**: 10-12.

Introduction: Intracranial foreign bodies have the potential to cause several devastating complications including CSF leak, meningitis, hydrocephalus, nerve or vessel injury, and even death [1,3,5]. These risks must be weighed against

the risks associated with potential management options and techniques for removal. With the advent of endonasal anterior skull base techniques, safe and efficient options for surgical retrieval and skull base repair have become available [1,2,4]. Methods: In the present report, we present three cases involving metallic foreign bodies penetrating anterior cranial fossa via the sinonasal tract, and the management approaches employed. Results: The three cases involved [1] a migrated K-wire from nasal reconstruction in the remote past [2], an acute nail-gun injury, and [3] an impaled car antenna. A combined endoscopic and transcranial approach was performed in the former two cases, while in the latter, an EVD was placed due to elevated ICP after the foreign body had been withdrawn. Conclusion: Intracranial metallic foreign bodies may have significant potential morbidity. Recent advances in endonasal techniques for anterior skull base access may enhance outcomes through reduced morbidity and mortality, improved speed and precision, shorter hospital stays, and lower post-operative pain [1,2,4]. Technical nuances of these approaches and medical decision-making in the context of various neurosurgical considerations are discussed.

4749. Samuthrat, T., et al. (2017). "Transoral Intracranial Injury via Middle Skull Base by a Blunt Chopstick in a Child." World neurosurgery **103**: 952.e911-952.e917.

BACKGROUND: Transoral penetrating injury from a blunt-tipped chopstick is unusual and should be promptly dealt with because it is associated with high morbidity and mortality., CASE DESCRIPTION: We report a case of a 2-year-old girl who sustained a transoral penetrating brain injury after falling onto a bamboo chopstick, which penetrated through the hard palate and eventually led to middle skull base fracture as well as temporal lobe laceration and contusion. The chopstick was successfully extracted via a transoral approach followed by administration of empirical antibiotics and anticonvulsants. The postoperative course was uneventful, and a 2-year follow-up evaluation revealed a favorable outcome., CONCLUSIONS: Preoperative and postoperative imaging and extensive monitoring of the patient's condition are mandatory for evaluation of possible development of complications. An optimal result can be obtained by a tailored management and treatment approach for each specific patient.

4750. Sanaei-Zadeh, H., et al. (2004). "Intracranial penetration." The Medical journal of Australia **181**(11-12): 670.

4751. Sanaei-Zadeh, H., et al. (2006). "Orbito-cerebral penetrating knife-wound." Journal of clinical forensic medicine **13**(3): 146-147.

An orbit-cerebral knife wound is described. Reasons for variation in outcome art discussed.

4752. Sances, A., Jr., et al. (2002). "Biomedical engineering analysis of glass impact injuries." Critical reviews in biomedical engineering **30**(4-6): 345-377.

This article outlines the history, development, and safety aspects of glass and its use in motor vehicles. It traces the manufacture and describes the characteristics of laminated and tempered glass. It further compares the differences in injuries caused by impact with laminated and tempered glass. The development, use, and results of high penetration resistance (HPR) laminated glass for windshields are examined. Head and neck injuries from impact with glass and glazing structures are delineated. Results of studies with laminated and tempered glass are presented. The probability and severity of injuries occurring secondary to partial or full ejection of vehicle occupants are discussed, and the differences between the performance of laminated and tempered glass are highlighted. Current research to quantify head and neck injury parameters caused by glass impact during rollover is described. The biomechanics of head and neck injury assessment and the development of injury prediction parameters and reference values, respectively, are reviewed.

4753. Sanchez, G. M. and A. L. Burridge (2007). "Decision making in head injury management in the Edwin Smith Papyrus." Neurosurgical focus **23**(1): E5.

The Edwin Smith Papyrus (circa 1650-1550 BC) is a didactic trauma treatise of major interest to neurosurgery, as it deals primarily with cranial and spine injuries. Information regarding the patient's condition is conveyed in the papyrus with sufficient clarity to allow a clinical assessment of each injury. The ancient Egyptian physician/teacher lists the key

diagnostic elements in each case, and then pronounces his opinion of the treatment potential in one of three verdicts: 1) "a medical condition I can treat;" 2) "a medical condition I can contend with;" or 3) "a medical condition you will not be able to treat." The structural organization of the text according to regional injuries of increasing severity permits analysis of sequential cases, and makes it possible to determine which clinical features led the ancient Egyptian physician to give the first or second verdict in the less severe injuries, but the third in the worst cases. Interestingly, the ancient physicians were not deterred from contending with injuries in the presence of basilar skull fractures, traumatic meningismus, skull perforation without overt neurological deficit, drowsiness, limited facial fractures, or closed head injuries without depressed fragments. Factors identified as determinant for the third verdict in head injuries are depressed skull fragments, dura laceration with exposed brain, infected cranial wounds/tetanus, major craniofacial fractures, deep skull-penetrating stab wounds, and aphasia. This study describes three case sequences of head injuries.

4754. Sánchez-Vázquez, M. A., et al. (2001). "Incidental wound shot in a child." Archivos de Neurociencias **6**(3): 153-158.

Incidental wound by stray bullet in a 9 years old child is presented, which was follow up with X-ray, showing bullet shifting downwards, requiring a posterior fossa craniotomy to remove it, evolving without neurological deficit. Literature of the subject is review. Analyses of the circumstances of the injury revealed that the wound was make by the falling bullet, which penetrate the bone, crossing the left brain parenchyma by the speed of weight and gravity, leaving no sequel at all, however it required two surgical procedures. Sequels in this patient were very different of that reported in the literature because of the absence of the hit wave. We recommend in every case remove the bullet by the shorter route. Lesions by stray bullet may be fatal making mandatory federal regulation for freewill shooting in urban areas.

4755. Sancho-Rieger, J. and J. Parra-Martinez (2002). "[Preventive and therapeutic attitude in post-traumatic epileptic seizures]." Actitud preventiva y terapeutica en las crisis epilepticas postraumaticas. **35 Suppl 1**: S39-42.

INTRODUCTION AND DEVELOPMENT: Due to the vast number of different circumstances surrounding them, the frequency with which post traumatic epileptic seizures occur varies greatly from study to study. Immediate and early epileptic seizures, within a week of the traumatism having taken place, are usually of little importance as regards the risk of post traumatic seizures. The most important factors governing the presentation of post traumatic seizures have to do with the seriousness of the injury, the extension of the brain tissue that is affected and the penetrating nature of the brain traumatism., CONCLUSION: Although antiepileptic medication significantly reduces the risk of early seizures from occurring, a review of well designed clinical trials has found no evidence that these drugs reduce the morbidity and mortality associated with head injuries, or the appearance of late seizures.

4756. Sanders, W. R., et al. (2021). "Association of ct-based fronto-temporal contusion volume with the development of post-traumatic epilepsy." Annals of neurology **90**(SUPPL 27): S185-S186.

Post-traumatic epilepsy (PTE) is a common complication of traumatic brain injury (TBI), and TBI is one of the primary causes of acquired epilepsy. Thus far, TBI severity has been the leading risk factor for PTE development. However aside from severity and its related characteristics (penetrating injury, skull fracture, etc.) few etiological risk factors for PTE have been firmly established. Tubi et al (2018) found that lesion location based on MRI is related to both a high incidence of early seizures and longitudinal development of PTE, but lesion volume was not investigated. The CT scan is highly accessible and more common in TBI evaluations and thus evaluation of contusion location and volume could feasibly be used as a screening tool for PTE risk. Thus, in this study we sought to evaluate the effect of both CT-based contusion volume and location on the development of PTE We identified a retrospective cohort of 25 TBI patients admitted to a tertiary care center from 2011-2015 who developed PTE. Patients were matched by age and TBI severity (Glasgow Coma Scale score) with 25 TBI controls who did not develop PTE. Using OSIRIX MD software two blinded raters evaluated contusion volume and location in all 50 patients. Volumes were manually compared and adjudicated by consensus in cases of disagreement >5cc; volume measurements were then averaged. Contusions were classified according to laterality and involvement of the frontal or temporal lobes. Prior research has shown that parietal and occipital contusions exhibit minimal association with the development of PTE, and thus contusions in these lobes were excluded from analysis. Using two-tailed T-tests we compared overall fronto-temporal contusion volume and regional contusion volume (left/right frontal and temporal lobes). We also compared the proportion of subjects with contusions in each anatomic region using Fisher's Exact Test. We found that patients who developed PTE had significantly greater fronto-temporal contusion volume (29.0 vs 4.6 cc, $P < 0.05$). Patients with PTE were more likely to have a left frontal

lobe contusion compared to non-PTE subjects (Fisher's Exact Test, P < .05). We did not find a significant difference in lesion volume for any specific region between PTE and non-PTE patients. These data suggest that greater fronto-temporal contusion volume is associated with development of PTE. These findings also illustrate the possible utility of CT contusion volume measurement as a PTE risk screening tool .

4757. Sandiumenge, A., et al. (2020). "Donor referral from outside the intensive care unit: A multidisciplinary cooperation model using communication apps and redefining refereal criteria." Medicina intensiva **44**(3): 142-149.

OBJECTIVE: We evaluate the impact of a web-based collaborative system on the referral of possible organ donors from outside of the intensive care unit (ICU)., STUDY DESIGN: Cohort prospective study., SETTINGS: University hospital., PATIENTS AND INTERVENTION: In 2015 a virtual collaborative system using a cross-platform instant messaging application replaced the previous 2014 protocol for the referral of patients outside of the ICU with a severe brain injury in whom all treatment options were deemed futile by the attending team to the donor coordination (DC). Once the DC evaluated the medical suitability and likelihood of progression to brain death (BD), the option of intensive care to facilitate organ donation (ICOD) was offered to the patient's relatives. This included admission to the ICU and elective non-therapeutic ventilation (ENTV), where appropriate., RESULTS: A two-fold increase of referrals was noted in 2015 [n=46/74; (62%)] compared to 2014 [n=13/40; (32%)]; p<0.05. Patients were mostly referred from the stroke unit (58.6%) in 2015 and from the emergency department (69.2%) in 2014 (p<0.01). Twenty (2015: 42.5%) and 4 (2014: 30.7%) patients were discarded as donors mostly due to medical unsuitability. Family accepted donation in 16 (2015: 62%) and 6 (2014: 66%) cases, all admitted to the ICU and 10 (2015: 62.5%) and 3 (50%) being subject to ENTV. Ten (2015: 66.6%) and 5 (2014: 83.3%) patients progressed to BD, 60.5+/-20.2 and 44.4+/-12.2h after referral respectively. Nine (2015) and 4 (2014) of these patients became utilized donors, representing 29.0% (2015) and 13.0% (2014) of the BD donors in the hospital during the study period (p<0.05)., CONCLUSION: The implementation of a virtual community doubled the number of patients whose families were presented with the option of donation prior to their death.

4758. Sanford, R., et al. (2018). "Longitudinal trajectory of brain volume and cortical thickness in primary infection." Topics in Antiviral Medicine **26**: 47s-48s.

Background: HIV penetrates the brain early in infection. However, brain volume changes that occur during this period and the effect antiretroviral therapy (ART) has on these changes are unclear. To explore this issue, we used tensor-based morphometry (TBM) and cortical modeling to examine the longitudinal trajectory of regional brain volumes and cortical thickness in treated and untreated primary HIV-infected (PHI) participants. Methods: PHI participants (<1 year after exposure) in the PISCES cohort from San Francisco underwent longitudinal MRI. Several participants commenced ART during follow-up. TBM and cortical modeling estimated regional brain volumes and cortical thickness, respectively. A two-phase mixed-effect model assessed the trajectory of our MRI measures before and after ART. This involved fitting a linear model at time points before ART initiation and a different linear model at time points after ART. Both models were constrained to meet at the time of ART initiation. Additional mixed-effect models assessed correlations of regional MRI measures with CD4+ and CD8+ cell counts, CD4/CD8 ratio, and CSF and blood HIV RNA at time points before ART. Results: 65 male PHI participants enrolled ((mean±SD) age 36.8±9 year, education 15.4±2.3 year, duration of infection 4.2±2.5 month, MRI per participant 2.5±1.5). Prior to ART initiation, we observed that longer duration of infection was correlated with brain volume loss in the thalamus, caudate, temporal lobe and cerebellum as shown by TBM (see Fig 1 for voxel-wise statistics), and with cortical thinning in the frontal and temporal lobes, as well as middle cingulate cortex (p<.05) (Fig 1B). After ART initiation, no further significant brain volume changes were found by TBM (Fig 1A). However, small but statistically significant increases of cortical thickness in the right frontal and temporal lobes correlated with longer ART duration (p<.05) (Fig 1B). Before ART, increased CSF HIV RNA was related with volume reductions in the thalamus (p<0.1) (Fig 1C). CD4+ cell count and CD4/CD8 ratio were positively correlated with cortical thickness in the left frontal lobe (p<.05) (Fig 1D). Conclusion: Regional subcortical volume loss and cortical thinning occur before ART initiation. However, initiating ART can halt further structural deterioration. These findings support the hypothesis that brain injury due to HIV occurs during untreated infection and worsens in the absence of ART. This suggests that early initiation of ART preserves longterm brain health. (Figure Presented).

4759. Sanger, J. R., et al. (1992). "Scalp reconstruction with a prefabricated abdominal flap carried by the radial artery." Plastic and reconstructive surgery **89**(2): 315-319.

Custom prefabrication of free flaps provides an unlimited variety of applications, since flaps can be created with expendable tissues and without restriction to naturally occurring vascular territories. These principles also can be used to customize flaps that could not be completed by conventional means. We report a case of scalp reconstruction using a random-pattern abdominal flap in which a radial artery fascial flap was induced to serve as the vascular carrier. In addition to providing durable scalp coverage, the prefabricated free flap enabled salvage of an abdominal flap that would otherwise have been aborted after intermediate transfer to the forearm.

4760. Sani, S., et al. (2005). "Successful repair of an intracranial nail-gun injury involving the parietal region and the superior sagittal sinus. Case report." Journal of neurosurgery **103**(3): 567-569.

Intracranial nail injuries to the brain are rare. Various techniques for the removal of penetrating nails have been reported, but to date successful nail extraction following an injury involving the superior sagittal sinus (SSS) has not been reported. The authors report the case of a nail-gun injury to the midline parietal region with penetration of the SSS. They describe an original surgical technique involving the use of a graft patch of temporal fascia and muscle to repair the SSS following extraction of the nail. The procedure resulted in preservation of distal flow across the sinus and a good neurological outcome. Technical considerations in the repair of penetrating posterior SSS injuries are discussed. Penetrating nail injuries to the brain involving the SSS can be successfully repaired with maintenance of sinus patency.

4761. Sanjakdar, S., et al. (2016). "Evaluation of acute and chronic caffeine preexposure in the wrair penetrating ballisticlike brain injury model." Journal of neurotrauma **33**: A78-A79.

Caffeine (1, 3, 7-trimethyxanthanine) is one of the most widely used psychoactive drugs to combat fatigue and sleep loss. As a non-specific adenosine receptor antagonist, caffeine has recently been shown to exert neuroprotective effects against brain injury in animal models of Parkinson's disease (PD) and stroke. However, studies of the neuroprotective effects of caffeine on traumatic brain injury (TBI) are limited. This study assessed the potential therapeutic effect of caffeine on neurobehavioral recovery in the WRAIR penetrating ballistic-like brain injury (PBBI) model. Unilateral frontal PBBI was produced in the right hemisphere of anesthetized rats (10% injury severity level). Animals were randomly assigned to pretreatment groups: (1) acute caffeine (25mg/kg CAF) or vehicle (gavage, 1 h prior to PBBI); (2) chronic caffeine (0.25 g/L CAF) or water (water bottle, 3 weeks prior to PBBI). Blood samples (0.7mL) were collected at 1 h, 4 h, 24 h, and the terminal endpoints to measure plasma levels of the glial biomarker GFAP and inflammatory cytokines. Motor function was evaluated on the rotarod (7 and 10 days post) at fixed-speed increments of 10, 15, and 20 rpm. Cognitive performance was evaluated on the Morris water maze (MWM). In pilot studies, cognitive performance in the MWM revealed deficits in all injury groups with the average latency to find the hidden platform (across all testing days) increased by 140% (PBBI) and 130% (25mg/kg CAF) vs. respective sham ($p < .05$). Results of the probe trial indicated that caffeine-treated rats showed reduced thigmotaxic behavior and spent more time in the target annulus zone; however, these results were not statistically significant. The effects of chronic caffeine treatment and plasma GFAP and inflammatory cytokine levels are currently ongoing. Overall, the results of this study indicate that acute caffeine does not promote significant neurofunctional recovery when delivered via oral gavage in the 10% PBBI model. Future studies will evaluate additional doses and injury severity levels.

4762. Sanjakdar, S. S., et al. (2019). "Differential Effects of Caffeine on Motor and Cognitive Outcomes of Penetrating Ballistic-Like Brain Injury." Military medicine **184**(Suppl 1): 291-300.

This study assessed the effect of caffeine on neurobehavioral recovery in the WRAIR penetrating ballistic-like brain injury (PBBI) model. Unilateral frontal PBBI was produced in the right hemisphere of anesthetized rats at moderate (7%-PBBI) or severe (10%-PBBI) injury levels. Animals were randomly assigned to pretreatment groups: acute caffeine (25 mg/kg CAF gavage, 1 h prior to PBBI), or chronic caffeine (0.25 g/L CAF drinking water, 30 days prior to PBBI). Motor function was evaluated on the rotarod at fixed-speed increments of 10, 15, and 20 RPM. Cognitive performance was evaluated on the Morris water maze. Acute caffeine showed no significant treatment effect on motor or cognitive outcome. Acute caffeine exposure prior to 10%-PBBI resulted in a significantly higher thigmotaxic response compared to vehicle-PBBI groups, which may indicate caffeine exacerbates post-injury anxiety/attention decrements. Results of the chronic caffeine study revealed a significant improvement in motor outcome at 7 and 10 days post-injury in the 7%-PBBI

group. However, chronic caffeine exposure significantly increased the latency to locate the platform in the Morris water maze task at all injury levels. Results indicate that chronic caffeine consumption prior to a penetrating TBI may provide moderate beneficial effects to motor recovery, but may worsen the neurocognitive outcome.

4763. Sano, A. (2016). "Commentary." Journal of neurosciences in rural practice **7**(5): S108.

4764. Santana-Montero, B. L., et al. (2009). "Cerebellar abscesses caused by dog bite: a case report." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **25**(9): 1137-1141.

INTRODUCTION: Bites by house pets can be lethal or cause a series of catastrophic events with severe sequels, such as the loss of a limb or a systemic infection which may be life-endangering, especially in the case of children being bitten., PRESENTATION: A 2-year-old girl was attacked by a dog, causing lesions at the occipital region. This was treated initially as a superficial wound that became further complicated with two cerebellar abscesses. These abscesses required neurosurgical and antimicrobial treatment, with a satisfactory outcome., CONCLUSION: The precise and diligent evaluation of a lesion caused by an animal bite may prevent further life-endangering complications. To the best of our knowledge, there are no reports about cerebellar abscess caused by a dog bite. When cranial lesions are penetrating, an abscess must to be considered. We insist on the importance of medical evaluation and adequate treatment of such lesions.

4765. Santander, X. A., et al. (2019). "Occult Transorbital Intracranial Injury by Windshield Wiper Handle: Case Report and Review of Literature." World neurosurgery **126**: 530-532.

BACKGROUND: We present the case of a 51-year-old male with an occult transorbital intracranial injury after a car accident. The identified foreign object was a windshield wiper handle. To our knowledge, this is the first case reported., CASE DESCRIPTION: Multidisciplinary treatment with maxillofacial and otorhinolaryngology departments was planned. A bifrontal craniotomy with removal of the foreign object and posterior orbital reconstruction were performed. A review of the literature was done, in order to highlight certain general principles in decision making despite the variability in case presentation., CONCLUSIONS: Occult TII is a rare subtype of penetrating brain injury. Diagnosis requires high suspicion as it can be missed during physical examination. Computed tomography (CT) scan, CT angiogram, and magnetic resonance imaging should be performed in order to design the optimal treatment for each patient. Magnetic resonance imaging should be avoided when metallic density on CT is observed. The use of a broad-spectrum antibiotic regimen is critical.

4766. Santangelo, G., et al. (2018). "Imaging and surgical approach to a pediatric penetrating intradural wooden splinter: case report." Journal of neurosurgery. Pediatrics **21**(4): 409-413.

Penetrating spinal injuries by wood are infrequently reported. They are particularly rare in children. Only 6 cases of wooden fragments causing penetrating intradural spinal injury have been reported. The authors report a case of a 3-year-old girl who suffered a penetrating wound on her lower back after sliding on a wood floor. A portion of the extraspinal part of the wooden splinter was removed prior to presentation; however, a high suspicion for retained foreign body was maintained. Findings on CT were equivocal, but the diagnosis was confirmed on MRI. An incomplete cauda equina syndrome was noted on examination. She was taken to the operating room for removal of the wooden foreign body, repair of a durotomy, and repair of a CSF leak. At 8 months after surgery, the patient had fully recovered without sequelae. The roles of imaging modalities, prophylactic antibiotics, and surgery are discussed.

4767. Santiago, J., et al. (2021). "MALIGNANT HEMISPHERIC INFARCTION AFTER SUBTLE TRACHEAL RUPTURE." Chest **160**(4): A835.

TOPIC: Critical Care TYPE: Medical Student/Resident Case Reports INTRODUCTION: Tracheal rupture after endotracheal intubation is a rare but life-threatening complication with an incidence of approximately 0.005%. Predisposing factor can be a weakness of the membranous trachea secondary to chronic illness or steroid use. Herein

we present a case of a young woman who developed a distal tracheal rupture after emergent endotracheal intubation with devastating consequences. CASE PRESENTATION: A 48-year-old female with a medical history of hypertension, epilepsy, and panhypopituitarism secondary to a respected craniopharyngioma was admitted to the intensive care unit with a diagnostic impression of obstructive uropathy with septic shock and multiorgan failure. Supportive management with aggressive fluids resuscitation, antibiotics, dual vasopressor therapy, and endotracheal intubation was given. Hours later, the patient became hemodynamically unstable requiring increased vasopressor therapy with increased demand in ventilation parameters. Physical examination was positive for massive subcutaneous emphysema from her chest tracking through facial and neck planes. A chest computerized tomography (CT) scan was performed and showed a distal tracheal rupture as the most likely cause of the massive pneumothorax that progressed to tension subcutaneous emphysema. Upon acute neurological deterioration, a head CT scan was performed, revealing a left pan-hemispheric malignant ischemic stroke involving the left anterior, middle, and posterior cerebral arteries suggestive of a left internal carotid artery (ICA) complete occlusion. The patient had a National Institutes of Health Stroke Scale score above 20, a left hemisphere infarction, and a GCS 3/11, conferring a poor clinical outcome. As poor prognosis and poor quality of life were expected, the family members opted to withdraw life support. DISCUSSION: Malignant hemispheric infarction has a mortality rate as high as 80 percent with catastrophic neurologic sequelae. Its incidence is less than ten percent of all ischemic infarcts and it's generally caused by embolic occlusion of the ICA. CONCLUSIONS: To our knowledge, there are no malignant hemorrhagic strokes provoked by traumatic intubation resulted from tracheal rupture documented to this day. We presume the etiology of this event to be subcutaneous air that exerted enough pressure between the fascial and cervical planes to result in significant vascular compression. Tracheal rupture is one of the most feared immediate complications of intubation as it could result in increased morbidity and mortality. There is no established consensus for the treatment yet, but early surgical repair has been the mainstay of treatment. However, conservative management has been chosen in cases of small ruptures with similar outcomes. REFERENCE #1: JOSEPH, M. M., & LEWIS, S. (2002). Stroke after penetrating trauma of the oropharynx. Pediatric Emergency Care, 18(3), 179–181.doi:10.1097/00006565-200206000-00007 DISCLOSURES: No relevant relationships by Ian Da Silva Lugo, source=Web Response No relevant relationships by Juan Feliciano-FIgueroa, source=Web Response No relevant relationships by Hector Nunez Medina, source=Web Response No relevant relationships by Héctor Oliveras-Cordero, source=Web Response No relevant relationships by Juan Santiago, source=Web Response

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4768. Santiago, L. A., et al. (2012). "A clinical comparison of penetrating and blunt traumatic brain injuries." Brain injury **26**(2): 107-125.

BACKGROUND: Traumatic brain injury (TBI) is a leading cause of injury death and long-term disability in the USA. It commonly results from blunt (closed) or penetrating trauma. The majority of civilian TBI is caused by falls or motor vehicle collisions, whereas military TBI mainly results from explosions. Although penetrating injuries are less common than closed injuries in the civilian population, they are far more lethal. Unfortunately, the pathophysiologic differences between penetrating and closed TBI remain poorly understood due to the lack of studies on the subject. Many studies on the prognostic factors of mortality and functional outcome after TBI exclude penetrating brain injuries from their series because they are believed to have a different pathophysiology., METHODS: 125 Articles regarding brain injury were reviewed and summarized for this report., RESULTS: Despite the absence of a clear delineation between penetrating and blunt TBI, the current guidelines for penetrating TBI suggest defaulting to management strategies used for closed TBI with limited supportive evidence. Thus, injuries that appear to have different pathophysiologies and outcomes are managed equally and perhaps not optimally., CONCLUSION: In view of the incomplete understanding of the impact of mechanism of injury on TBI outcomes, as demonstrated in the current review, new research studies are required to improve evidence-based TBI guidelines tailored especially for penetrating injuries.

4769. Santiago-Dieppa, D. R., et al. (2019). "BB Gunshot Wound to the Head." The Journal of pediatrics **210**: 237.

4770. Santoro, R., et al. (2014). "Penetrating foreign body in the nasal floor through nasolacrimal duct." BMJ case reports **2014**.

Clinical otolaryngologists frequently encounter nasal foreign bodies (FBs) particularly among children. The removal of nasal FBs is a common otolaryngological practice. However, occasionally trauma results from FBs being lodged in the nasal cavity especially through the nasolacrimal duct. In this article we present an unusual case of a FB that

from the left medial canthus went inside the nasolacrimal duct, then through the inferior turbinate and stuck in the floor of the nose. We describe the transnasal endoscopic approach used and we recommend that the treatment be done as soon as possible to avoid complications. Copyright 2014 BMJ Publishing Group Ltd.

4771. Santos, C., et al. (2018). "Craniotomy and trans-orbital approach for an e-cigarette removal." Journal of neurosurgical anesthesiology **30**(4): 464-465.

Introduction: Traumatic brain injuries (TBIs) are considered a major cause of death in individuals younger than 45 years old. Male young adults, late teenagers, and elderly people are at the highest risk. TBIs can be blunt or penetrating. Even though blunt injuries occur more often, a penetrating trauma carries worse prognosis. We present a patient with a penetrating TBI who was admitted following a motor vehicle collision with a foreign body extending from the right medial orbit to middle fossa involving the right temporal lobe. Case Report: A 31-year-old male patient with unknown past medical history transferred from an outside hospital following a motor vehicle collision. Admitted due to a transorbital intracranial foreign body. Patient was ETOH intoxicated (147), with urine drug screen positive for amphetamines and cannabis. He was confused and combative, but moving all extremities. The right eye was swollen shut, dilated right pupil, and ophthalmoplegia observed. Unable to determine visual field due to combativeness. CT head showed an elongated metallic/plastic object that entered the right orbit via the medial canthus and penetrated intracranial by fracturing the orbital roof lateral to the optic canal (Fig. 1). CTA showed patent intracranial vessels without severe vascular injury. Neurosurgery indicated a level A dual approach, trans-orbital and craniotomy for a foreign body removal. Patient was transferred to the operating room and had general anesthesia with endotracheal tube and standard ASA monitors. Intraoperative period was unremarkable and patient was transferred to neurosurgical intensive care unit for postoperative care. Reevaluated by Ophthalmology 1 week after discharge, unable to see out of right eye, with intact extraocular movements, and normal intraocular pressure. Conclusions: Hundreds of patients are evaluated at daily basis in the Emergency Departments due to TBI. It is also known that motor vehicle collisions caused by intoxicated drivers are a major social/health problem that needs to be addressed aiming prevention based on education, and exemplary law enforcement/judiciary zero tolerance policies. Penetrating TBIs are less common than blunt traumas; however, they must be treated aggressively to decrease morbidity and mortality.

4772. Santos, G., et al. (2013). "Traumatic middle cerebral artery aneurysm secondary to a gunshot wound." Journal of neuroimaging : official journal of the American Society of Neuroimaging **23**(1): 115-117.

Traumatic intracranial aneurysms are rare lesions, accounting for less than 1% of all intracranial aneurysms. Formation of these lesions after a penetrating missile wound is very unusual, and diagnosis can be difficult due to the presence of associated lesions. In this article, we report a case of a woman who developed a middle cerebral artery aneurysm after a gunshot wound, and discuss potential pitfalls found during diagnostic work-up. Copyright © 2011 by the American Society of Neuroimaging.

4773. Santos, J. G. R. P. D., et al. (2018). "Effects of transcranial LED therapy on the cognitive rehabilitation for diffuse axonal injury due to severe acute traumatic brain injury: study protocol for a randomized controlled trial." Trials **19**(1): 249.

BACKGROUND: Photobiomodulation describes the use of red or near-infrared light to stimulate or regenerate tissue. It was discovered that near-infrared wavelengths (800-900 nm) and red (600 nm) light-emitting diodes (LED) are able to penetrate through the scalp and skull and have the potential to improve the subnormal cellular activity of compromised brain tissue. Different experimental and clinical studies were performed to test LED therapy for traumatic brain injury (TBI) with promising results. One of the proposals of this present study is to develop different approaches to maximize the positive effects of this therapy and improve the quality of life of TBI patients., METHODS/DESIGN: This is a double-blinded, randomized, controlled trial of patients with diffuse axonal injury (DAI) due to a severe TBI in an acute stage (less than 8 h). Thirty two patients will be randomized to active coil helmet and inactive coil (sham) groups in a 1:1 ratio. The protocol includes 18 sessions of transcranial LED stimulation (627 nm, 70 mW/cm2, 10 J/cm2) at four points of the frontal and parietal regions for 30 s each, totaling 120 s, three times per week for 6 weeks, lasting 30 min. Patients will be evaluated with the Glasgow Outcome Scale Extended (GOSE) before stimulation and 1, 3, and 6 months after the first stimulation. The study hypotheses are as follows: (1) transcranial LED therapy (TCLT) will improve the cognitive function of DAI patients and (2) TCLT will promote beneficial hemodynamic changes in cerebral circulation., DISCUSSION:

This study evaluates early and delayed effects of TCLT on the cognitive rehabilitation for DAI following severe acute TBI. There is a paucity of studies regarding the use of this therapy for cognitive improvement in TBI. There are some experimental studies and case series presenting interesting results for TBI cognitive improvement but no clinical trials., TRIAL REGISTRATION: ClinicalTrials.gov, NCT03281759 . Registered on 13 September 2017.

4774. Santos, M., et al. (2012). "Identification of a periorbital wooden foreign body as the cause of chronic ocular discharge in a horse." Australian veterinary journal **90**(3): 84-87.

The clinical, diagnostic and therapeutic features of a horse with a wooden foreign body embedded in the deep portion of the right masseter muscle adjacent to the right orbit are presented. The purpose of this report is to describe the clinical presentation, magnetic resonance imaging findings and treatment of a penetrating wooden foreign body in a horse that had no history of trauma or evidence of a puncture wound. This report documents the usefulness of magnetic resonance imaging to detect a wooden foreign body embedded in the soft tissues of a horse with a chronic copious ocular discharge. Two surgical procedures were necessary, which is a frequent complication encountered with wooden foreign bodies. Copyright © 2012 The Authors. Australian Veterinary Journal © 2012 Australian Veterinary Association.

4775. Santos, M. A. L., et al. (2018). "A rare case report of penetrating head trauma and internal carotid thrombosis caused by a domestic knife." Brazilian Neurosurgery **37**.

Background: Penetrating non-missile cerebral injuries are about 0,4% of all craniocerebral injuries. Although it is recommended to perform angiographic studies, vascular injuries are uncommon and there are only few cases reported in the literature, making the management of such lesions challenging. Case Description: In this case report, we present a 21-year-old male, victim of physical aggression with a domestic knife which penetrated the skull through the temporal bone and was stucked in his right cavernous sinus. Angiogram showed right internal carotid oclusion. We performed a two-step surgery, occluding the internal carotid at the cervical segment and at the supra-clinoidal segment. Then, we took off the knife under direct visualization. This approach was possible because the right middle cerebral artery had adequate flow from the contra lateral carotid. The patient had favorable outcome. Conclusion: This case report illustrate a rare condition where the surgical approach was the mainstay of treatment.

4776. Santos, T. d. S., et al. (2011). "Impacted foreign bodies in the maxillofacial region-diagnosis and treatment." The Journal of craniofacial surgery **22**(4): 1404-1408.

Foreign bodies are often encountered by oral and maxillofacial surgeons and may present a diagnostic challenge to the trauma surgeon due to many factors such as the size of the object, the difficult access, and a close anatomic relationship of the foreign body to vital structures. They are usually a result of injuries or operations. Fragments of broken instruments can be left behind and entire teeth or their fragments can be displaced during extraction. The approach to this kind of injury should be sequential and multidisciplinary, beginning with the trauma unit that will provide maintenance of the airways, hemodynamic stabilization, and, but only if necessary, neurologic, ophthalmologic, and vascular evaluation. With a view to illustrating and discussing the diagnosis and treatment of this kind of injury, this study reports impacted foreign bodies in oral and maxillofacial region. The following data were collected: age, sex, race, etiology, occurrence of fracture, anatomic location of the fracture, daytime of the traumatic event, type of the object, signal and symptoms, type of imaging examination used, type of anesthesia, approach, transoperative complication, period between surgery and hospital liberation, and the occurrence of death. Foreign body injuries in the maxillofacial region can place the patient's life at risk, so a correct initial treatment performed by a multidisciplinary team increases the survival of this kind of patient.

4777. Sanuki, R., et al. (2019). "Normal aging hyperactivates innate immunity and reduces the medical efficacy of minocycline in brain injury." Brain, behavior, and immunity **80**: 427-438.

Symptoms of many neurodegenerative diseases appear later in human life. However, young animal models for penetrating traumatic brain injury (pTBI) have been used to study neurodegenerative diseases and evaluate the efficacy of neuroprotective medicines. Possibly because of this discordance, effective neuroprotective drugs have still not been developed. For patients suffering from pTBI, aging is known to be a significant prognostic factor of mortality. In this study, we aimed to establish a model of aged pTBI animals using Drosophila melanogaster. We successfully generated

aged pTBI flies as a new pTBI model showing increased neurodegeneration and higher mortality. To elucidate the mechanism of increased vulnerability in aged pTBI animals, we analyzed the GenBank-deposited transcriptome data of young and aged flies, demonstrating the importance of innate immunity genes for higher mortality in aged pTBI models. We found that in the context of pTBI, normal aging strongly activated the expression of antimicrobial peptide genes and upregulated the nuclear factor-kappaB gene in the immune deficiency pathway, but not the Toll pathway. Moreover, we found that minocycline increased the survival of young pTBI flies, but not aged pTBI flies. These results suggested that immune system activation under neurodegenerative conditions was involved in normal aging, thereby inhibiting the medicinal efficacy of neuroprotective drugs effective for young flies in aged flies.

4778. Sanus, G. Z., et al. (2014). "Osteointegration of a bisphenol-a-glycidyl-dimethacrylate composite and its use in anterior skull base defects: an experimental study in an experimental design model of cerebrospinal fluid leak." The Journal of craniofacial surgery **25**(4): 1524-1528.

OBJECT: Promising clinical results were reported in watertight closure of anterior skull base defects (ASBDs) with bisphenol-a-glycidyl-dimethacrylate (bis-GMA)-based materials to prevent the cerebrospinal fluid leaks. However, interrelation of these materials with surrounding bones in histologic level, referred to as the osteointegration, has not been reported in the anterior skull base. In addition, an illustrative case with an ASBD that was repaired using a bis-GMA composite has been presented., METHODS: Twenty New Zealand rabbits were divided into 4 groups: control and sham groups consisted of 2 and 6 rabbits, respectively. The "skull base defect" group (n = 6) underwent a unifrontal craniectomy and an iatrogenic ASBD followed by creating a dural defect to obtain a cerebrospinal fluid leak. Similar bony and dural defects were acquired in the "repair with bis-GMA based allograft" group (n = 6), but the bony defect was closed with bis-GMA-based allograft., RESULTS: All animals in the "skull base defect" group died in 3 weeks after surgery. There were no animal losses in the "repair with bis-GMA based allograft" group at the sixth month. Histologic evaluation revealed complete osteointegration of bis-GMA composite with surrounding bones., CONCLUSIONS: bis-GMA based allograft achieved a watertight repair of the ASBD. Histologic findings of this study showed that bis-GMA composite is a reliable material to be used in the closure of anterior skull base bony defects.

4779. Sanus, G. Z., et al. (2008). "Use of Cortoss as an alternative material in calvarial defects: the first clinical results in cranioplasty." The Journal of craniofacial surgery **19**(1): 88-95.

A clinical series of 13 patients who underwent cranioplasty using a new quick setting material, namely Cortoss, was done over 3-year period. Thus, the primary objective of this study is to evaluate the role of Cortoss in the treatment calvarial defects which were mainly due to trauma (4 patients), tumor or tumor-like lesions (5 patients), middle cerebral infarction (3 patients), and gun shot wound (1 patient). The surgical technique was found to be simple and effective. Long-term follow-up (mean 24.3 months) demonstrated satisfactory results in terms of surgical (functional) and cosmetic outcomes. None of the patients developed complications including infections, foreign body reactions or material leakage. The results led us to suggest that the use of Cortoss in the case of calvarial defects seems to be safe, effective, quick, and a feasible method for cranioplasty. We conclude that the mechanical, immunologic, and technical-grafting properties of Cortoss, together with its superior esthetic and psychological effects, probably will make it the best material for cranioplasty.

4780. Sanz de la Torre, J. C. and M. Perez-Rios (1996). "[Neuropsychological evaluation of a case of organic personality disorder due to penetrating brain injury]." Evaluacion neuropsicologica de un caso de trastorno organico de la personalidad por lesion cerebral penetrante. **24**(130): 643-649.

In this paper, an organic personality disorder case by penetrating brain injury, predominantly localized in the right frontal lobe, is presented. Neuropsychological and neuroimaging (CT scan studies) were performed. We assessed the main cognitive aspect: orientation, attention, memory, intelligence, language, visual-spatial functioning, motor functioning, executive functioning and personality. The results obtained, point out disorders in the patient's behavior and in the executive functions. Likewise, other cognitive functions as: attention, memory, language and visual-spatial functioning, show specific deficits.

4781. Sapsford, W. (2003). "Penetrating brain injury in military conflict: does it merit more research?" Journal of the Royal Army Medical Corps **149**(1): 5-14.

4782. Saribeyoglu, K., et al. (2007). "Laparoscopy offers diagnosis and treatment in abdominal stab injuries." Surgical laparoscopy, endoscopy & percutaneous techniques **17**(5): 396-401.

PURPOSE: To assess the role of laparoscopy in the diagnosis and treatment of abdominal stab injuries (ASI)., METHODS: Patients who underwent laparoscopic procedures due to ASI were included in the study. Hemodynamic instability, injuries to the posterior trunk, concomitant severe cranial injuries, and prior abdominal operations were considered as contraindication for laparoscopy., RESULTS: From January 1997 to March 2006, 88 patients underwent laparoscopic management of ASI. In 45 patients (51.1%), there was no intra-abdominal pathology requiring surgical intervention (nontherapeutic laparoscopy) and 5 patients in this group had no peritoneal penetration (negative laparoscopy). In another 25 patients (28.4%), laparoscopic treatment was performed (therapeutic laparoscopy), including bleeding control in liver, colonic, gastric, and diaphragmatic repairs and intra-abdominal bleeding control. Laparotomy was avoided in a total of 70 (79.5%) patients. In 18 patients (20.5%), laparoscopy was converted to laparotomy. There was no mortality, and except one missed small bowel injury nor perioperative morbidity in patients undergoing laparoscopy. In the laparotomy group, major complications were seen in 7 patients., CONCLUSIONS: Laparoscopy is safe and efficient in the management of ASI and should be more frequently considered as a therapeutic tool.

4783. Sarkar, D., et al. (2009). "Expect the unexpected: two cases of penetrating head and neck trauma from Operation Iraqi Freedom." Ear, nose, & throat journal **88**(9): E19-21.

The protocol for treating penetrating head and neck trauma in a war zone differs from the standard protocol. Rather than first securing an airway, as is standard in civilian trauma cases, the primary emphasis is on assessing and controlling hemorrhage because it is the leading cause of morbidity and mortality in a battlefield setting. Once that has been addressed, we shift to standard advanced-trauma life-support protocols. We describe two cases we encountered at our combined medical clinic in Western Baghdad--one involving a 4-year old Iraqi child with an ammunition round lodged in her neck and one involving a 38-year-old female U.S. soldier with a round lodged in her right superolateral orbit. Both cases were transferred to combat support hospitals for further treatment after our initial assessment and treatment, and both had successful outcomes.

4784. Sarkar, K., et al. (2012). "Differences in rotterdam and gcs scores between adult and pediatric traumatic brain injury." Neurology **78**(1).

Objective: Assess if radiographic differences exist between adult and pediatric traumatic brain injury. Background Traumatic brain injury (TBI) represents one of the leading causes of hospitalization and death among pediatric patients. Admission computerized tomography(CT) scans play an important role in classifying and treating TBI,but little is known about the differences between CT findings in adult and pediatric populations. Design/Methods: This was a retrospective analysis of a TBI registry data from 1206 consecutive non-penetrating TBI patients treated at a Level 1 adult and pediatric trauma center from August 2008 to January 2011. Pediatric was defined as younger than 16. Non-accidental trauma and gun shot wounds were excluded. Admission CT scan were evaluated for the presence of skull fractures, different patterns of ICH, midline shift, and compression of basal cisterns. Results: Of 1206 patients in our registry, 349(28%) were pediatric. The distribution of gender, race, and GCS were similar between adult and pediatric populations ($P > 0.05$). The distribution of CT findings, however, was significantly different. Pediatric TBI patients were more likely to experience skull fractures (44% vs 20.71%) and epidural hematoma (17.3% vs 9.8%), and pediatric TBI was less likely to be associated with contusion, subdural hematoma, subarachnoid hemorrhage, or compression of basal cisterns ($p<0.05$). Rotterdam score were significantly less in the pediatric population(2.3 vs 2.6). Conclusions: Despite similarities in demographics and clinical severity between adult and pediatric TBI, there were significant differences in the pattern of CT findings. The Rotterdam CT Score differentiates these two populations more effectively than GCS. These findings may reflect differences between adult and pediatric anatomy, differences in biomechanical forces during injury, or differences in physiology and intracranial compliances. These differences may have a significant impact on clinical trial design and treatment strategies for patients in different age groups.

4785. Sarkar, K. and K. Shahlaie (2011). "Computed tomography characteristics of pediatric traumatic brain injury." Annals of neurology **70**: S46.

Little is known about the differences in CT findings between adult and pediatric TBI populations. A retrospective analysis of 1206 consecutive non-penetrating TBI patients treated at a Level 1 trauma center from August 2008 to January 2011 was performed. Admission CT scan were evaluated for skull fractures, ICH, midline shift, and basal cistern compression. Of 1206 patients in our registry 349(28.5%) were pediatric. Demographics and injury severity distribution were similar between the two populations (p> 0.05). The distribution of CT findings, however, was significantly different. Pediatric TBI patients were more likely to be associated with skull fractures (57.0% vs 23.4%) and EDH (17.2% vs 9.7%), and less likely to be associated with contusion, SDH, SAH, or basal cisterns compression (p<0.05). Despite similarities in demographic characteristics and clinical severity between adult and pediatric TBI, there were significant differences in the pattern of CT findings. These findings may reflect differences in anatomy (skull fractures), biomechanical forces during injury (ICH patterns), or intracranial compliances (mass effect). These differences may have a significant impact on clinical trial design and treatment strategies for patients in different age groups.

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4786. Sarkar, K., et al. (2011). "Computed tomography characteristics of pediatric traumatic brain injury." Neurocritical care **15**(1): S253.

Objective Traumatic brain injury (TBI) represents one of the leading causes of hospitalization and death among pediatric patients. Admission computerized tomography(CT) scans play an important role in classifying and treating TBI, but little is known about the differences between CT findings in adult and pediatric populations. Methods This was a retrospective analysis of a TBI registry data from 1206 consecutive non-penetrating TBI patients treated at a Level 1 adult and pediatric trauma center from August 2008 to January 2011. Pediatric was defined as younger than and including 15 Non-accidental trauma and gun shot wounds were excluded. Admission CT scan were evaluated for the presence of skull fractures, different patterns of ICH, midline shift, and compression of basal cisterns Results Of 1206 patients in our registry, 349(28%) were pediatric. The distribution of gender, race, and injury severity were similar between adult and pediatric populations (P > 0.05). The distribution of CT findings, however, was significantly different. Pediatric TBI patients were more likely to experience skull fractures (44% vs 20.71%) and epidural hematoma (17.3% vs 9.8%), and pediatric TBI was less likely to be associated with contusion, subdural hematoma, subarachnoid hemorrhage, or compression of basal cisterns (p<0.05). Discussion Despite similarities in demographic characteristics and clinical severity between adult and pediatric TBI, there were significant differences in the pattern of CT findings. These findings may reflect differences between adult and pediatric anatomy (skull fractures, EDH), differences in biomechanical forces during injury (ICH patterns), or differences in physiology and intracranial compliances (mass effect). Conclusion Radiographic findings are significantly different between adult versus pediatric TBI. These differences may have a significant impact on clinical trial design and treatment strategies for patients in different age groups.

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4787. Sarkar, K., et al. (2013). "Rotterdam CT score can detect differences between pediatric and adult TBI." Neurology **80**(1).

OBJECTIVE: To determine if radiographic differences can be measured using the Rotterdam CT Score between adult and pediatric traumatic brain injury (TBI). BACKGROUND: Traumatic brain injury (TBI) represents one of the leading causes of hospitalization and death among pediatric patients. Admission computerized tomography(CT) scans play an important role in classifying and treating TBI, but little is known about the differences between CT findings in adult and pediatric populations. DESIGN/METHODS: This is a retrospective analysis of TBI registry data from 1,206 consecutive non-penetrating TBI patients treated at a Level 1 adult and pediatric trauma center from August 2008 to January 2011. RESULTS: The distribution of gender, race, and GCS were not significantly different between adult and pediatric populations. The distribution of CT findings, however, was significantly different. Pediatric TBI patients were more likely to have skull fractures (OR 3.21, p<0.01) and epidural hematomas (OR 1.96, p<0.01). Pediatric TBI was less likely to be associated with contusion, subdural hematoma, subarachnoid hemorrhage, or compression of basal cisterns (p<0.05). Rotterdam CT scores were significantly lower(2.3 versus 2.6, p< 0.001). and distribution significantly different in the pediatric population. CONCLUSIONS: We found significant differences in CT scan findings in pediatric versus adult TBI, despite the fact that both groups were statistically similar with regard to clinical severity of injury as measured by the GCS score. These differences may be due to anatomical characteristics, biomechanics of injury, and/or differences in injury mechanisms between pediatric and adult patients. The unique characteristics of pediatric TBI warrant

consideration when designing clinical trial design, or predicting functional outcome using prognostic models developed from adult TBI data.

4788. Sarnaik, A. P., et al. (1989). "Role of aggressive intracranial pressure control in management of pediatric craniocerebral gunshot wounds with unfavorable features." The Journal of trauma **29**(10): 1434-1437.

During a 6-year period, 14 consecutive children with penetrating craniocerebral gunshot wounds (GSW) were studied. Eleven patients were comatose on admission. Five had an admission Glasgow Coma Scale (GCS) score of 4 or less and developed clinical signs of brain death within 12 hours despite maximum therapeutic efforts. The remaining six patients, all of whom had three or more of the previously described unfavorable prognostic features, were aggressively managed with prophylaxis and treatment of intracranial hypertension. Intracranial pressure (ICP) was controlled with mechanical hyperventilation, mannitol osmotherapy, pentobarbital, and surgical decompression. Substantial intracranial hypertension occurred for up to 10 days after admission. There were four survivors. Neurobehavioral and intellectual functions were evaluated over a period of 1 to 2 years. Although serious cognitive deficits were noted, all survivors had sufficient functional recovery to warrant aggressive cardiopulmonary resuscitation and measures to control ICP in the management of comatose victims of craniocerebral GSW.

4789. Sarron, J.-C., et al. (2004). "Dynamic effects of a 9 mm missile on cadaveric skull protected by aramid, polyethylene or aluminum plate: an experimental study." The Journal of trauma **57**(2): 236-243.

BACKGROUND: Most military helmets are designed to prevent penetration by small firearms using composite materials in their construction. However, the transient deformation of the composite helmet during a non penetrating impact may result in severe head injury., METHOD: Two experimental designs were undertaken to characterize the extend of injuries imparted by composite panels using in protective helmets. In the first series, 21 dry skulls were protected by polyethylene plates, with gaps between the protective plate and skull ranging from 12 to 15 mm. In another design, using 9 cadavers, heads were protected by aluminum, aramid, or polyethylene plates. Specimens were instrumented with pressure gauges to record the impact response. The ammunition used in these experiments was 9 mm caliber and had a velocity of 400 m/s. A macroscopic analysis of the specimens quantified fractures and injuries, which were then related to the measured pressures., RESULTS: Protective plates influenced both the levels of injury and the intracranial pressure. Injuries were accentuated as the plates was changed from aluminum to composite materials and ranged from skin laceration to extensive skull fractures and brain contusion. Fractures were associated with brain parenchymal pressures in excess of 560 kPa and cerebrospinal fluid pressure of 150 kPa. An air gap of a few millimeters between the plate and the head was sufficient to decrease these internal pressures by half, significantly reducing the level of injury., CONCLUSIONS: Ballistic helmets made of composite materials could be optimized to avoid extensive transient deformation and thus reduce the impact and blunt trauma to the head. However, this deformation cannot be completely removed, which is why the gap between the helmet and the head must be maintained at more than 12 mm.

4790. Sasaoka, Y., et al. (1995). "[Penetrating injury of the head, neck and chest by a nail-gun: a case report]." No shinkei geka. Neurological surgery **23**(12): 1099-1104.

A very rare case of directly penetrating injury of the head, neck and chest caused by a nail-gun was reported. A 56-year-old male was admitted to our critical care center due to chest injury. On admission, he showed numbness of the hand & leg, left hemiparesis and hypalgesia. Physical examination disclosed three nails on the left anterior chest, but other wounds or nails were not found. Chest films showed three nails penetrating the lung without reaching the heart, but other nails were found by skull and neck films. One nail had penetrated the cervical canal at the C1 level through the posterolateral cervical region. Two other nails were demonstrated at the right temporal and the left frontal region, Computed tomography revealed no massive cerebral hemorrhage and cerebral angiography showed no extravasation and no passage through main vessels. Emergency surgery was performed uneventfully and the nails in the chest, neck and head were totally removed. He was discharged one month after surgery. Some injuries caused by a nail-gun have been reported in the world literature but in Japan this multiple injury case was the first reported. Since nail-gun injuries can cause multiple damage, systemic X-ray examination was very important.

4791. Sasidharan, G. M. and A. Chauhan (2018). "Penetrating Injury Due to Bicycle Brake Handle Causing Middle Cerebral Artery Infarct." Indian Journal of Neurotrauma **15**(2-3): 67-69.

An 8-year-old boy was brought to the emergency room with history of fall from a bicycle he was riding. On examination, he had a swelling in the left orbit with a small laceration under the medial aspect of the left eyebrow. The Glasgow coma scale was E2M5V2. An emergency computed tomographic (CT) scan showed infarct causing mass effect in the territory of the left middle cerebral artery. CT angiogram showed that a branch of the middle cerebral artery was occluded at the end of track traversed by the bicycle brake handle. The patient underwent decompressive craniectomy. Initial methylmethacrylate cranioplasty had to be removed due to infection. Later, the patient underwent titanium cranioplasty. At last follow-up, he was going to school. Hemiparesis persisted. Children are vulnerable to penetrating injury by the relatively sharp brake handle when they fall from an adult bicycle. Previous reports include fatal injury by similar mechanism. In this case, it caused injury to the middle cerebral artery without causing bleed. Bicycle manufacturers could be advised to make the vehicle safer for children by twisting the end of the brake handle.

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4792. Sathish, K., et al. (2018). "Fatal Transorbital Intracranial Penetrating Injury Due to a Bicycle Brake Handle." The American journal of forensic medicine and pathology **39**(3): 253-256.

Transorbital intracranial injuries are uncommon and mostly accidental in nature. These injuries are usually associated with high mortality. The key to preventing this mortality involves an early diagnosis of intracranial injuries and immediate and appropriate management. Any delay can pose a serious risk to the patient's life. A case of a 55-year-old man who had experienced an accidental self-fall while riding a bicycle is presented. Initially, he was treated at a primary health center. He was referred to the tertiary care institute due to unavailability of ancillary investigation at the primary health center. He was declared dead on arrival at the casualty in the tertiary institute. On autopsy, it was observed that the injury above the right side of the upper eyelid was penetrating the right side roof of the orbit and the right cerebral cortex and brainstem. The highlighting feature of the case is that, despite the fatal penetrating brain injury, the eyeball did not sustain any major injury.

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4793. Satishchandran, S., et al. (2020). "An Algorithm for Management of Post-Traumatic Maxillofacial Pseudoaneurysms." Journal of oral and maxillofacial surgery **78**(10): e103.

Abstract: Purpose: A pseudoaneurysm (PA) results from the disruption of one or more layers of a blood vessel wall (arterial or venous). This situation leads to a localized collection of blood, which can result in a life-threatening episode of bleeding. The literature regarding post-traumatic maxillofacial PAs is scant; no algorithm or treatment guidelines exist. The purpose of this project is to discuss the treatment algorithm for the management of post-traumatic maxillofacial PAs. Patients and Methods: Patients who presented with post-traumatic maxillofacial PAs were evaluated by history, clinical examination, and imaging studies (computed tomography angiogram [CTA]). Demographics, medical history, injury-related history, radiographic findings, management (observation, interventional radiology [IR] assisted embolization or surgical ligation), and postoperative course are reported. All patients were treated by a collaborative interdisciplinary team consisting of interventional radiologists, oral and maxillofacial surgery (OMS), acute critical care surgery, and otolaryngology. Results: An algorithm for the management of maxillofacial PAs resulting from trauma is presented and exemplified by clinical cases. Case 1 consisted of a 12-year-old male who sustained a gunshot wound to the face, sustained mandible fracture, and immediately developed PA of the facial artery, which was embolized. Case 2 consisted of a 24-year-old male who was involved in an all-terrain vehicle collision with a fence, sustained midface fractures and immediately developed PA of descending palatine artery, which was surgically ligated. Case 3 consisted of a 25-year-old male who was involved in a motor vehicle collision, sustained Le Fort II, bilateral zygomatic complex fractures, and bilateral orbital floor fractures, and a month later, developed PA of the ophthalmic vein, which did not require intervention. Conclusion: PA is a potentially devastating sequela of maxillofacial trauma. It may appear immediately following the injury or at a later time. Although the diagnostic approach is similar, the management of PA varies according to location, vessel involved, size of PA, collateral supply, and the availability of various medical/surgical expertise and institutional resources. In this project, we suggest a treatment algorithm for the management of post-traumatic maxillofacial PAs.

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4794. Sato, M., et al. (1994). "A transorbital intracranial foreign body in an infant: A report of three cases." Japanese Journal of Neurosurgery **3**(4): 329-334.

A penetrating injury of the skull is not infrequently encountered in daily practice, although the presence of transorbital intracranial foreign bodies resulting from such injuries have been regarded as extremely rare. In this paper the authors discusse three cases of a transorbital intracranial foreign body found in infants treated at our clinic. These cases are described below. Case 1: This case involves a 1-year-old baby who sustained a stab wound of his left eye with a ball-point pen. Plain skull X-rays and plain computed tomographic (CT) scans reveal the presence of a foreign body in the left orbital and left frontal lobe. Case 2: This case concerns a 10-month-old baby who injured her right eye with a wooden chopstick. Plain CT showed a foreign body at the right superior orbital fissure. Case 3: In this case, a 3-year-old boy sustained a stab wound of his right eye with a wooden chopstick. Plain CT revealed a narrow, straight, low density mass extending from the right orbit via the cavernous sinus to the posterior clinoid process. A right carotid angiogram revealed an occlusion of the extracranial internal carotid artery. All three cases underwent an emergency operation using a subfrontal approach and the foreign body was removed. No complications occurred, such as meningitis and/or CSF rhinorrhea. In 2 of these cases, external occular movement and visual acuity did not return to their normal postoperative levels. In Case 3, however, recanalization of the internal carotid artery was noted. An orbital penetrating wound should be closely inspected, particularly in infants, even wounds that may look superficial and show no signs of intracranial complications during the early stage. In this regard, preoperative angiography is very important in order to confirm the presence of a vascular injury, such as an occluded internal carotid artery.

4795. Satoh, N., et al. (1985). "[Traumatic aneurysms--due to penetrating and nonpenetrating head injuries]." Rinsho hoshasen. Clinical radiography **30**(9): 1005-1008.

4796. Satyarthee, G. D., et al. (2009). "Transorbital penetrating cerebral injury with a ceramic stone: report of an interesting case." Neurology India **57**(3): 331-333.

Penetrating cranial injury is a potentially life-threatening condition. The majority of war injuries are high-velocity penetrating cranial injuries; but in civilian cases, most penetrating cranial wounds are low-velocity type. We report an interesting case of transorbital penetrating cranial injury with a knife-sharpening stone made up of ceramic in a 28-year-old male. The pertinent literature is reviewed and management of such cases is discussed.

4797. Sauaia, A., et al. (1995). "Epidemiology of trauma deaths: a reassessment." The Journal of trauma **38**(2): 185-193.

OBJECTIVE: Recognizing the impact of the 1977 San Francisco study of trauma deaths in trauma care, our purpose was to reassess those findings in a contemporary trauma system., DESIGN: Cross-sectional., MATERIAL AND METHODS: All trauma deaths occurring in Denver City and County during 1992 were reviewed; data were obtained by cross-referencing four databases: paramedic trip reports, trauma registries, coroner autopsy reports and police reports., MEASUREMENTS AND MAIN RESULTS: There were 289 postinjury fatalities; mean age was 36.8 +/- 1.2 years and mean Injury Severity Score (ISS) was 35.7 +/- 1.2. Predominant injury mechanisms were gunshot wounds in 121 (42%), motorvehicle accidents in 75 (38%) and falls in 23 (8%) cases. Seven (2%) individuals sustained lethal burns. Ninety eight (34%) deaths occurred in the pre-hospital setting. The remaining 191 (66%) patients were transported to the hospital. Of these, 154 (81%) died in the first 48 hours (acute), 11 (6%) within three to seven days (early) and 26 (14%) after seven days (late). Central nervous system injuries were the most frequent cause of death (42%), followed by exsanguination (39%) and organ failure (7%). While acute and early deaths were mostly due to the first two causes, organ failure was the most common cause of late death (61%)., CONCLUSIONS: In comparison with the previous report, we observed similar injury mechanisms, demographics and causes of death. However, in our experience, there was an improved access to the medical system, greater proportion of late deaths due to brain injury and lack of the classic trimodal distribution.

4798. Sauer, N. J. and S. S. Dunlap (1985). "The asymmetrical remodelling of two neurosurgical burr holes: a case study." Journal of forensic sciences **30**(3): 953-957.

A human skull identified as that of a 16-year-old female who had been reported missing about 3 years before the discovery of the specimen displayed evidence for the asymmetrical remodelling of bilateral neurosurgical burr holes. While one of the holes retained its original size and shape, gross evidence for the contralateral lesion had virtually disappeared. Initially, the open lesion was mistakenly suspected to be a recent bullet hole.

4799. Sauer, N. J., et al. (1988). "Medicolegal investigation of an eighteenth century homicide." The American journal of forensic medicine and pathology **9**(1): 66-73.

The skeleton of an adult man, recovered from an eighteenth century French fort site in Indiana, exhibited a series of sharp force wounds. The lesions, three cranial and one postcranial, had apparently been made by a heavy metal instrument similar to one of the European ax heads discovered elsewhere at the site. In this paper we describe the wounds, argue that the instrument used to create them was a European ax, and offer the opinion that the manner of death in this case was homicide.

4800. Saunders, S., et al. (2011). "Demonstrating the origin of cardiac air embolism using post-mortem computed tomography; an illustrated case." Legal medicine (Tokyo, Japan) **13**(2): 79-82.

An 83 year old female was found dead in her home. The deceased had been struck repeatedly to the head with at least one weapon, one of which was a hammer. The deceased had suffered both penetrating and non-penetrating blunt trauma to the head as a result of the assault. A multi-detector computed tomography (MDCT) scan was undertaken approximately 12h after death prior to the autopsy examination. This demonstrated the presence of a cardiac air embolus and continuity between the air embolus and the penetrating head injury. Air within the heart is a recognised post-mortem artefact frequently seen on MDCT scans and a common pitfall for inexperienced cadaveric MDCT reporters. This case builds upon a previous report by Kauczor, illustrating how MDCT can be used to demonstrate the origin and route of ingress of a genuine air embolism to the heart.

4801. Sauve, W., et al. (2017). "Neurological and psychiatric comorbidities assessment in the PRISM II study of extromethorphan/quinidine for treatment of pseudobulbar affect." CNS spectrums **22**(1): 104.

Objectives: Pseudobulbar affect (PBA) can occur secondary to certain neurological diseases or brain injury and is characterized by frequent, uncontrollable laughing/crying episodes. While PBA is distinct from mood disorders in which feelings of happiness or sadness can also lead to laughing or crying, persons with PBA may often have psychiatric comorbidities (e.g., depression or anxiety). A recently completed study (PRISM II) evaluated the effectiveness of dextromethorphan/quinidine (DM/Q) for the treatment of PBA in persons with dementia, stroke, and traumatic brain injury (TBI); we assessed the prevalence of comorbid neurological and psychiatric disorders among PRISM II patient cohorts. METHODS: Patients with PBA secondary to either dementia, stroke, or TBI, and a Center for Neurologic Study-Lability Scale (CNS-LS) score ≥ 13 were enrolled and treated with DM/Q 20/10mg BID, open-label for 90 days. Persons with severe dementia, stroke within ≤3 months, penetrating TBI, severe depressive disorders, or psychotic disorders were excluded. Concomitant medications for neuropsychiatric conditions were allowed provided doses were stable, and there were no contraindications to DM/Q use. Baseline assessments included PBA and depression ratings (CNS-LS, episode count, and PHQ-9) concomitant diseases and medications. RESULTS: A total of 367 patients were enrolled (n= 120 TBI, n =113 stroke, n= 134 dementia), 70.8% were receiving.1 psychiatric medication at baseline, most commonly antidepressants (48.5%), antipsychotics (18.0%), and sedatives/anxiolytics/hypnotics (33.8%). A total of 57.5% reported a depression diagnosis at baseline, including 61.7%, 50.4%, and 59.7% of the TBI, stllroke, and dementia populations, respectively; other reported CNS diagnoses included: anxiety disorders, 42.2% (50.0% TBI, 36.3% stroke, and 40.3% dementia, respectively); sleep disorders, 34.1% (40.8%, 29.2%, and 32.1%); cognitive impairment, 28.9% (25.8%, 18.6%, and 40.3%); headache disorder, 20.4% (37.5%, 15.9%, and 9.0%); seizures, 14.7% (17.5%, 16.8%, and 10.4%); post-traumatic stress disorder, 4.6% (13.3%, 0.9%, and 0.0%); Parkinson's disease, 5.2% (0.8%, 4.4%, 9.7%). The baseline mean PHQ-9 score was 13.5 (13.9, 13.4, and 13.2, respectively), suggesting moderate depression. CONCLUSIONS: Persons enrolling in this study of DM/Q for treatment of PBA subsequent to TBI, stroke, or dementia often had other CNS comorbidities, most commonly, depression and anxiety disorders. These findings underscore the importance of considering both neurologic and psychiatric causes in the differential diagnosis of affective symptoms such as uncontrollable laughing and crying. The fact that over 70% of our study population was already being treated for psychiatric comorbidity suggests that specific PBA treatment may still be required.

4802. Savar, A., et al. (2009). "Enucleation for open globe injury." American journal of ophthalmology **147**(4): 595-600.e591.

PURPOSE: To report the experience of enucleation after open globe at an ophthalmic trauma referral center., DESIGN: Retrospective, observational study., METHODS: In an ophthalmic trauma referral center the charts of all patients having suffered an open globe injury between January 1, 2000 and June 30, 2007 were reviewed. Variables assessed were age, gender, type of injury (rupture or laceration [penetrating, intraocular foreign body, or perforating]), ocular trauma score, visual acuity, subsequent enucleation, indication for and timing of enucleation, presence of sympathetic ophthalmia, and length of follow-up., RESULTS: Among 660 open globe injuries, 55 have undergone enucleation (including 4 eviscerations), 11 primarily and 44 secondarily. Eyes with ruptures were significantly more likely to be enucleated than those with injuries attributable to lacerations ($P < .001$). The most common reason for secondary enucleation was a blind, painful eye. Two patients (0.3%) developed sympathetic ophthalmia and have maintained good vision in the sympathizing eye., CONCLUSIONS: The vast majority of open globes can be repaired without requiring primary enucleation. Secondary enucleation is most commonly carried out for pain. Eyes with no light perception can be closely observed if the patient chooses.

4803. Savastio, G., et al. (1991). "[Cranial trauma: the predictability of the presentation symptoms as a screening for radiologic study]." Trauma cranico: predittivita dei sintomi di presentazione come screening per lo studio radiologico. **82**(6): 769-775.

A prospective study was performed on 4,262 consecutive patients who had had skull examinations for recent head trauma. Clinical signs and symptoms and patient history were correlated with skull fractures and intracranial sequelae as identified on CT studies, in order to evaluate the predictive value of each clinical finding and to identify high-yield referral criteria. Ninety-seven skull fractures (3%) and 32 intracranial sequelae (0.7%) were observed. All the intracranial complications were observed in patients with fractures and with altered consciousness of some degrees (Glasgow Coma Scale score less than 13). Most patients were asymptomatic (41%) or showed "low risk" symptoms (29%): among them, neither fractures nor complications were observed. High-risk clinical signs, mainly expressing basilar fractures (as rhinorrhea, otorrhea, focal neurologic signs, retroauricular hematoma) demonstrated high predictive value (100%) for intracranial sequelae. Other "moderate risk" findings for intracranial injury--i.e. loss of consciousness at any time, antegrade or retrograde amnesia, multiple trauma, and possible skull penetration--showed a high correlation with skull fractures and a slightly lower one with intracranial sequelae. The most predictive finding for brain injury was the depressed level of consciousness: brain injuries were never observed in fully conscious patients; in altered consciousness with GCS 15-13 we observed 4% of skull fractures with no sequelae; at GCS values 12-9, 61% of skull fractures and 20% of sequelae were present, whereas at GCS less than 8, 100% of complicated fracture were observed. The finding of skull fracture showed 33% of predictivity for brain damage, which was, however, always associated with "high or moderate risk" clinical signs. Therefore, the authors suggest some guidelines for the management of patients with recent head trauma, including referral criteria for X-rays or CT studies, based on signs and symptoms with high, intermediate and low risk of developing intracranial sequelae.

4804. Savin, I. A., et al. (2006). "[Transcutaneous dilation tracheostomy in the acute period in patients with penetrating craniofacial injury complicated by intracranial hypertension]." Anesteziologiia i reanimatologiia(6): 65-68.

Early tracheotomy is well founded in severe brain injury involving the facial skeleton and skull case. Intracranial hypertension interferes with the safe performance of an operation. The authors developed a procedure for safe paracentetic dilatation tracheostomy (PDT) in the acute phase of severe brain injury. The study covered 15 patients with severe brain craniofacial injury. Surgery was made under intravenous anesthesia (with hypnotics, myorelaxants, narcotic analgesics, and cholinolytic agents). PDT was performed by the combined procedure developed by Sigley and Griegse ("Portex and COOK") under endoscopic guidance (Karl Storz 11001 BN1), by displaying the images. The patient is put to bed, without placing a bolster under the shoulders, the bed head end being elevated at an angle of 30 degrees. Bronchoscopic monitoring was made discretely (20-60 sec) under artificial ventilation through a special connector. There were 3-6 sessions of bronchoscopies. Tracheostomy lasted as long as 24 hours in 5 patients, 48 hours in 12 patients; surgery was made in 7 patients on day 3 after injury. Prior to tracheostomy, a horizontalization test was conducted, which revealed an elevation of intracranial pressure (> or = 20 mm Hg). There were no episodes of intracranial hypertension during tracheostomy. PDT can be safely made in patients with intracranial hypertension when they are put

to bed, without placing a bolster under the shoulder, the bed head end being elevated at an angle of 30 degrees under discrete bronchoscopic guidance.

4805. Savioli, G., et al. (2021). "Major trauma in elderly patients: Worse mortality and outcomes in an Italian trauma center." Journal of Emergencies, Trauma and Shock **14**(2): 98-103.

Introduction: Major trauma is the leading cause of mortality in the world in patients younger than 40 years. However, the proportion of elderly people who suffer trauma has increased significantly. The purpose of this study is to assess the correlation of old age with mortality and other unfavorable outcomes. Methods: We assessed on one hand, anatomical criteria such as ISS values and the number of body regions affected, on the other hand, hemodynamic instability criteria, various shock indices, and Glasgow Coma Scale. Finally, we also evaluated biochemical parameters, such as lactate, BE, and pH values. We conducted a prospective and monocentric observational study of all the patients referred to the Emergency Department of the IRCCS Fondazione Policlinico S. Matteo in Pavia for major trauma in 13 consecutive months: January 1, 2018-January 30, 2019. We compared the elderly population (>75 years) and the younger population (≤75). Results: We included 501 patients, among which 10% were over the age of 75 years. The mortality rate was higher among the older patients than among the younger (4% vs. 1.33%; P = 0.050). Hemodynamic instability was more common in the older patients than in the younger (26% vs. 9%; P < 0.001). More older patients (44%) had an ISS >16, in comparison with 32% of younger patients (P = 0.01). Conclusions: The elderly showed worse outcomes in terms of mortality, hospitalization rate, hemodynamic instability criteria, and anatomical and biochemical parameters.

4806. Savitri, Q. M., et al. (2020). "Localized asymptomatic cerebellar abscess after penetrating brain injury by wooden foreign object with adequate antibiotics administration: A case report." International journal of surgery case reports **72**: 85-90.

INTRODUCTION: Brain abscess is a compilation of pus enclosed in capsule as a result of focal infection in brain parenchyma. It is one of several complications found in patients who suffered penetrating brain injury., CASE PRESENTATION: Thirty-four-year-old man suffered a penetrating brain injury after a 50 cm piece of wood penetrated through his facial skull and ended its tip in his cerebellum, the wood priorly ejected from a moulding machine. As a consequence, he had to undergo a craniotomy procedure to remove the foreign body object and its debris. Following the surgery, adequate antibiotics were administered. Postoperative enhanced head CT revealed a cystic mass formation in the left hemisphere of cerebellum, measured 20x28mm with blood density lesions and a visible ring enhancement. These features suggested a cerebellar abscess. The follow-up enhanced head CT later demonstrated that the size, shape, and location of the abscess were relatively consistent with the previous head CT., DISCUSSION: Penetrating brain injury (PBI) is the most life-threatening head trauma. Although the prevalence number was low compared to other head traumas, its morbidity and mortality number were higher. Brain abscess formation is one of the many PBI complications. Due to direct inoculation of foreign body and its debris, PBI commonly leads an infection process. However, the infection process is supposed to be overcome by administering broad-spectrum antibiotics prophylactically. This case presented an inevitable brain abscess despite of the adequate antibiotics administration., CONCLUSION: Despite adequate antibiotics has been administered, cerebellar abscess after penetrating brain injury is still found challenging to manage. Therefore, holistic-multidisciplinary approaches are needed.

4807. Sawatari, Y. and Y. Alshamrani (2019). "Concurrent hyoid bone fracture associated with multiple facial fractures secondary to assault: Case report and review of literature." Oral and Maxillofacial Surgery Cases **5**(4).

Introduction: Hyoid bone fractures are rarely reported as an isolated entity due to the infrequent occurrence accounting for only 0.002% of all head and neck fractures and 1.15 as the highest incidence. Strangulation remains the most common cause of isolated hyoid bone fractures with an incidence of 27–50%. However, blunt trauma, motor vehicle crash, sport related injuries, falls, assaults, and gunshot wounds are additional documented causes of hyoid bone fractures. Case report: A 23-year-old male who was assaulted to the face. He complained of pain to the face and neck, sore throat, dysphagia and changes in speech. The face and neck CT scans revealed multiple facial fractures along with a hyoid bone fracture. Patient was admitted to for observation and close monitoring for airway protection until the mandible and hyoid bone fractures were treated. ORIF of the mandibular fractures took place; we elected to treat the

hyoid bone fracture conservatively as it was asymptomatic. The patient's hospital course was unremarkable. Result: 56 articles were reviewed from 1949 to 2017, which revealed that isolated hyoid bone fractures and hyoid bone fractures associated with other facial fractures are very rare. Hyoid bone fractures due to direct trauma, road traffic accidents, falls, assault and gunshot wounds are more common in males than females. However, in strangulation and suicidal hanging, the incidence is higher in females than males. Multiple methods can be used to evaluate the hyoid bone fractures. The majority of hyoid bone fractures are treated conservatively

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4808. Sawyer, O. and C. P. O'Boyle (2017). "Brain tumour presenting with burns: Case report and discussion." Burns : journal of the International Society for Burn Injuries **43**(3): e31-e32.

Descriptions of burns as the presenting features of underlying neurological pathology are very rare, with only two previously published case reports available. Both of these reports featured meningioma as the pre-existing pathology and both described burn excision and wound healing, prior to surgical tumour ablation. The authors describe the case of a 35-year-old female, who presented with 25% total body surface area burns and recent global neurological deterioration. MRI imaging revealed a large intracranial tumour. Multidisciplinary management included rigorous non-surgical burn wound care and early craniotomy and tumour excision. This proceeded without complication. Burn excision and skin grafting was carried out successfully, two weeks later. This case differs from the previous two reported cases, which both described burn excision, as a pre-requisite to neurosurgery. This case establishes that the presence of a burn wound is not a total contra-indication to intracranial surgery. Copyright © 2016. Published by Elsevier Ltd.

4809. Saydam, F. A., et al. (2014). "Foot ischemia after a free fibula flap harvest: immediate salvage with an interpositional sapheneous vein graft." The Journal of craniofacial surgery **25**(5): 1784-1786.

The most dreaded major donor-site complication of free fibula flap is a foot ischemia, which is fortunately rare. Various authors have discussed the efficacy of the use of preoperative imaging methods including color Doppler, magnetic resonance angiography, and conventional angiography. A 25-year-old man presented with a 10-cm mandibular defect after a facial gunshot injury. Lower extremity color Doppler revealed triphasic peroneal, tibialis anterior, and posterior artery flows. A fibula osteocutaneous flap was harvested, and the mandible was reconstructed. However, the suture sites at the donor site began to demonstrate signs of necrosis, abscess formation, and widespread cellulitis beginning from postoperative day 9. Angiogram of the lower extremity on the 13th day demonstrated no flow in the right posterior tibial artery distal to the popliteal artery, whereas the anterior tibial artery had weak flow with collateral filling distally. An emergency bypass with a saphenous vein graft between the popliteal artery and the distal posterior tibial artery was performed. Repeated debridements, local wound care, and vacuum-assisted closure were applied. A skin graft was placed eventually. The extremity healed without severe functional disability. In conclusion, although the arterial anatomy is completely normal in preoperative evaluation, vascular complications may still ocur at the donor fibula free flap site. In addition, emergency cardiovascular bypass surgery, as we experienced, may be necessary for limb perfusion.

4810. Sayer, N. A., et al. (2008). "Characteristics and rehabilitation outcomes among patients with blast and other injuries sustained during the Global War on Terror." Archives of physical medicine and rehabilitation **89**(1): 163-170.

OBJECTIVE: To describe characteristics and rehabilitation outcomes among patients who received inpatient rehabilitation for blast and other injuries sustained in Iraq and Afghanistan during the Global War on Terror., DESIGN: Observational study based on chart review and Department of Veterans Affairs (VA) administrative data., SETTING: The 4 VA polytrauma rehabilitation centers (PRCs)., PARTICIPANTS: Service members (N=188) admitted to a PRC during the first 4 years of the Global War on Terror for injuries sustained during Operation Iraqi Freedom or Operation Enduring Freedom., INTERVENTION: Multidisciplinary comprehensive rehabilitation program., MAIN OUTCOMES MEASURES: Cognitive and motor FIM instrument gain scores and length of stay (LOS)., RESULTS: Most war-injured patients had traumatic brain injury, injuries to several other body systems and organs, and associated pain. Fifty-six percent had blast-related injuries, and the pattern of injuries was unique among those with injuries secondary to blasts. Soft tissue, eye, oral and maxillofacial, otologic, penetrating brain injuries, symptoms of post-traumatic stress disorder, and auditory impairments were more common in blast-injured patients than in those with war injuries of other etiologies. The mechanism of the injury did not predict functional outcomes. LOS was variable, particularly for those with blast injuries. Patients with low levels of independence at admissions made the most progress but remained more dependent at

discharge compared with other PRC patients. The rate of gain was slower in this low-functioning group., CONCLUSIONS: Blasts produce a unique constellation of injuries but do not make a unique contribution to functional gain scores. Findings underscore the need for assessment and treatment of pain and mental health problems among patients with polytrauma and blast-related injuries. Patients with polytrauma have lifelong needs, and future research should examine needs over time after community re-entry.

4811. Sayhan, M. B., et al. (2011). "Skull base osteomyelitis in the emergency department: A case report." Emergency medicine international **2011**.

Skull base osteomyelitis (SBO) is a rare clinical presentation and usually occurs as a complication of trauma or sinusitis. A 5-year-old child presented to the emergency department with a three-week history of fever associated with drowsiness and left parietal headache, and a week's history of swelling on the left frontoparietal soft tissue. He had suffered a penetrating scalp injury four month ago. On physical examination, there was a tender swelling with purulent stream on the lateral half of his scalp. His vital signs are within normal limits. Plain X-ray of the skull showed a lytic lesion on the left frontoparietal bone. A cranial computed tomography (CT) scan demonstrated a large subgaleal abscess at the left frontoparietal region. SBO possesses a high morbidity and mortality; therefore, prompt diagnosis and appropriate treatment are mandatory to prevent further complications and to reduce morbidity and mortality significantly. © 2011 Mustafa Burak Sayhan et al.

4812. Scanzera, A. C., et al. (2022). "Open globe injuries from projectile impact: Initial presentation and outcomes." Indian journal of ophthalmology **70**(3): 860-864.

PURPOSE: To describe the characteristics and correlates of open globe injuries secondary to projectile injury and outcomes following surgical open globe repair at an urban tertiary referral center., METHODS: Records of all patients with a history of open globe injury secondary to projectile injury and surgical open globe at a tertiary referral hospital between January 1, 2010 and December 31, 2016 were reviewed. Demographics, type of trauma, wound extent, presence of foreign body, and presenting clinical findings are reported. Outcomes for patients with greater than 6 months of follow-up included additional surgeries, final visual acuity, and clinical findings., RESULTS: Of 214 patients who underwent open globe repair, 73 (34.1%) were due to projectile impact. Mean age was 37.9 years and patients were primarily male (n = 66, P < 0.001). Most injuries resulted in globe laceration (68.5%, P < 0.001), and wound extent was zone 1 (45.2%), zone 2 (20.5%), zone 3 (27.4%), or unknown (6.8%). Associated findings included foreign body (35.6%) and orbital fracture (15%). Of 41 patients with at least 6 months of follow-up, 70% had additional surgeries following their initial surgical repair. Laceration injuries tended to be more anterior (P = 0.002) with better visual outcomes (P = 0.045) than those with globe rupture, and concomitant orbital fracture associated with poor visual outcomes. Overall, 58.5% of patients had 20/40 or better final best-corrected visual acuity., CONCLUSION: This is the largest report of open globe injury due to projectile impact. Visual prognosis in this population is very good, with most patients achieving better than 20/40 vision in our study.

4813. Scaparra, E., et al. (2016). "Detection of blood aspiration in deadly head gunshots comparing postmortem computed tomography (PMCT) and autopsy." European journal of medical research **21**(1): 43.

BACKGROUND: The aim of our study was to analyze the reliability of postmortem computed tomography (PMCT) versus autopsy in detecting signs of blood aspiration in a distinct group of patients following deadly head, mouth or floor of mouth gunshot injuries., METHODS: In this study, in 41 cases PMCT was compared to autopsy reports, the gold standard of postmortem exams, regarding detection of blood aspiration. PMCT was evaluated for the presence and level of typical signs of blood aspiration in the major airways and lung using a semi-quantitative scale ranging from level 0 (no aspiration) to 3 (significant aspiration) also taking density values of the described potential aspiratory changes into account., RESULTS: Overall, in 29 (70.7%) of 41 enrolled cases PMCT and autopsy revealed the same level of aspiration. A difference of one level between PMCT and autopsy resulted for 5 (12.2%) of the remaining 12 cases. More than one level difference between both methods resulted for 7 cases (17.2%). Autopsy described no signs of aspiration in 10 cases, compared to 31 cases with reported blood aspiration. In contrast, PMCT revealed no signs of blood aspiration in 15 cases whereas 26 cases were rated as positive for signs of aspiration in the major airways. In 18 of these 26 cases considered positive for blood aspiration by autopsy and PMCT, clear signs of aspiration signs were also described bilaterally by both methods., CONCLUSIONS: The presented study provides evidence for the assumption that PMCT

seems to be helpful in the detection of blood aspiration in cases of deadly head gunshots. In conclusion, it seems reasonable to suggest performing PMCT additionally to traditional postmortem exams in cases of suspected aspiration to rule out false-negative cases and to possibly allow for a more detailed and rather evidence based examination reconnoitering the cause of death. However, the adequate use of PMCT in this context needs further evaluation and the definition of an objective scale for aspiration detection on PMCT needs to be established in future studies.

4814. Scarfo, G. B., et al. (1990). "Oculocerebral perforating trauma by foreign objects: diagnosis and surgery." Journal of neurosurgical sciences **34**(2): 111-116.

Two unusual cases of perforating oculocerebral trauma by foreign bodies treated surgically are reported. Both were caused by industrial accidents. In the first a nail shot from a nail gun ricocheted off the target and crossed the right eyeball and the posterior wall of the orbit, lodging in the homolateral temporal lobe. In the second case a metal fragment expelled by an agricultural machine penetrated the left maxillary sinus, crossed the floor of the orbit, the eyeball and the roof of the orbit and lodged in the homolateral frontal lobe. After accurate neuroradiological examination the patients were operated using simultaneous transcranial and transorbital access. In our opinion this is the only approach which can minimize the risk of infection which is so dangerous in this type of trauma. The functional and aesthetic results, which were very satisfactory in both cases, seem to confirm the correctness of this approach.

4815. Scarpino, M., et al. (2017). "Predictive patterns of sensory evoked potentials in comatose brain injured patients evolving to brain death." Neurophysiologie clinique = Clinical neurophysiology **47**(1): 19-29.

OBJECTIVE: To assess whether Somatosensory Evoked Potentials (SEPs), recorded within 24h after ICU admission, are reliable predictors of brain death (BD) in comatose patients with acquired brain injury of various aetiologies., METHODS: SEPs were classified as absent (A), pathological (P), and normal (N). Considering SEP recordings from both hemispheres, 6 patterns were identified: NN, NP, PP, NA, AP, and AA. The final endpoint was BD., RESULTS: Of the 203 patients included in the study, 70 (34%) evolved toward BD. The survival analysis indicated that the combination of SEP patterns in a two-graded scale (grade 1: NN-NP-PP-NA, and grade 2: AP-AA), allowed for prediction of BD with the best accuracy. This aggregation predicted BD with a sensitivity of 75.7% (CI: 64-84), a specificity of 76.6% (CI: 68-83), a positive predictive value of 64.2% (CI: 53-74) and a negative predictive value of 84.3% (CI: 77-90) in overall patients, and with a sensitivity of 75.0% (CI: 63-84), a specificity of 84.9% (CI: 75-90), a positive predictive value of 77.5% (CI: 63-88) and a negative predictive value of 84.3% (CI: 74-91) when excluding cardiac arrest., CONCLUSION: It is worth including SEPs, in association with other investigations and clinical signs, in prognostic scores of BD. The early identification of patients at high risk of evolving towards BD could help physicians to optimise management.

4816. Scepi, M. (2007). "[Evaluation of the severity and extent of early complications in burns, multiple trauma, abdominal injuries, craniofacial injuries, injuries of the extremities, thoracic injuries, preceding injuries of soft tissues. Part 4--preceding injuries of soft tissues]." Evaluation de la gravite et recherche des complications precoces chez un brule, chez un polytraumatise, chez un traumatise abdominal, chez un traumatise cranio-facial, chez un traumatise des membres, chez un traumatise thoracique, devant une plaie des parties molles. 4e partie--Devant une plaie des parties molles. **57**(3): 337-343.

4817. Schaller, B. J. and M. Buchfelder (2006). "Delayed trigeminocardiac reflex induced by an intraorbital foreign body." Ophthalmologica. Journal international d'ophtalmologie. International journal of ophthalmology. Zeitschrift fur Augenheilkunde **220**(5): 348.

4818. Schaller, B. J., et al. (2008). "Industrial nail gun injury to the anterior skull base: a case report and review of the literature." The Journal of trauma **64**(3): E29-32.

4819. Schargus, M., et al. (2014). "[Management of suicidal orbital gunshot wounds to the temple]." Management suizidaler orbitaler Schlafen-Schussverletzungen. **111**(10): 965-969.

BACKGROUND: Orbital gunshot wounds are rarely found after suicide. A gunshot fired at point blank range into the temple has devastating effects on all intraorbital and neighboring structures., CASE REPORTS: This article reports on two cases of gunshot wounds to the lateral orbit in attempted suicides with different weapons from 2012 and 2013 and treated at the Ruhr University Eye Hospital in Bochum. In both cases treatment was carried out in cooperation with the department of oral and maxillofacial surgery, Ruhr University Hospital, Bochum. In the first case a 7.65 mm gun was used. The patient presented with a double penetration of both orbits with total destruction of both globes and a reconstruction was not possible. The second patient presented with multiple shots to the head from a small caliber gun (5.6 mm) where one bullet entered the right orbit behind the globe. The bullet could be localized using computed tomography (CT) and surgically removed with preservation of the globe and with a postoperative visual acuity of 20/60., CONCLUSION: The preservation of visual function after orbital gunshot wounds depends on both the projectile channel and the characteristics of the gun and bullet. Close collaboration in surgical management between ophthalmologists, maxillofacial surgeons and neurosurgeons in specialized centers is necessary because patients often present with multiple trauma and prompt interdisciplinary treatment is needed.

4820. Schauer, S. G., et al. (2019). "A descriptive analysis of casualties evacuated from the Africa area of operations." African Journal of Emergency Medicine **9**: S43-S46.

Introduction: The United States (US) military has expanded its area of operations into Africa. This medically immature theater is spread across a large region where prolonged field care (PFC) events are likely to occur. We describe trauma cases reported in the Africa Command (AFRICOM) area of operations to date within the Department of Defense Trauma Registry (DODTR). Methods: We queried the DODTR for all subjects evacuated from the AFRICOM area of operations from January 2002 to June 2017. Results: There were 49 subjects in the registry during our time frame from AFRICOM. Most of the evacuations came from Djibouti (53%). The median age was 29 years, most evacuees being male (92%). Non-battle injuries accounted for most of the injuries (82%), and most were US military (90%). All battle injuries were gunshot wounds (GSW). Composite injury scores were low (median 4, IQR 4–9.5). All subjects survived to hospital discharge. GSWs (22%) and sports injuries (24%) accounted for most evacuations. Serious injuries most frequently involved the extremities (18%) and the thorax (12%). The most frequent major injuries were open fractures (22%) and abdominal injuries (10%). The most frequent facility-based interventions performed were wound debridement (29%) and fracture/joint dislocation reduction (22%). Discussion: Based on this dataset, most of the injuries from AFRICOM were non-battle injuries. All battle injuries were GSWs. Our study highlights the differences in casualty care needs in this region which contrast the primary explosive-based injuries seen within United States Central Command (CENTCOM) operations. The limitations of this dataset highlight the potential value of a Joint Trauma Service (JTS) data collection mandate and resource support for units within this region to facilitate targeted improvements in medical care.

4821. Schauer, S. G., et al. (2015). "Multicenter, prospective study of out-of-hospital administration of analgesia in the combat theater in Afghanistan." Annals of emergency medicine **66**(4): S32-S33.

Study Objective: Early administration of analgesia has been reported to decrease morbidity after combat injuries. Currently limited data exists on analgesia administration practices in the out-of-hospital combat setting. In a previous study we reported the rate and type of analgesia in a out-of-hospital combat setting. However, that study was small, not stratified based on Injury Severity Score (ISS), injury pattern, or Glasgow Coma Scale (GCS), or report 30-day outcomes. In this study our goal was to determine whether these factors influence analgesia administration and 30-day outcomes in a large cohort. Methods: In this IRB-approved study, we collected life-saving interventions (LSIs) performed on patients who arrived to 6 combat hospitals from the field, treated by any provider type, and of any nationality. Military special interest patients were excluded. Trained site investigators evaluated patients on arrival and recorded demographics, vital signs, LSIs performed out-of-hospital, and analgesia administration. The agent, route and dose were documented. ISS of <=15 was mild and greater than 15 severe. For statistical analysis we compared the incidence with chi-square or Fisher's exact tests where appropriate. Shapiro-Wilks tests for normality were used. Wilcoxon and Kruskal-Wallis tests were used for non-parametric continuous variables. Percentages and frequencies are reported. $P < .05$ was significant. Results: Five hundred thirty-two patients were included-average age 27 years, 99% male, 40% US or coalition forces. Most procedures were performed by medics. We found no association between ISS score and administration of

analgesic agents. 71% of patients received analgesic agents (541 total administrations): ketamine 36%, fentanyl 30%, morphine 25%, hydromorphone 4%, acetaminophen 2%, ketorolac 2%, oxycodone <1%, and ibuprofen <1%. Those who received analgesics were more likely to have had a penetrating injury (89% vs 79%, P = .0057) and less likely to have a blast injury (87% vs 80%, P = .0394) or burn injury (84% vs 58%, P = .0372). Fentanyl was more likely to be administered for ISS >15 (P = .016). Ketamine was less likely to be given for suspected brain injury (P = .001). Injuries involving the chest and/or abdomen were more likely to receive an analgesic agent (P = .04). However, there was no association between the analgesic agent given and anatomical location of injuries. Our outcomes through 30 days post-injury were death 4%, receiving on-going treatment 75%, discharged home 17%, and unknown 4%. Those who received analgesics were more likely to be in continued medical care at 30 days post injury (87% vs 72%, P = .03). Conclusions: In our out-of-hospital study in the combat theater, we found no association between injury severity score and administration of analgesia. When injuries were more severe fentanyl was more likely to be given. In addition, those who received analgesics were more likely to have sustained a penetrating injury and require on-going care at 30 days. Ketamine was less likely to be used in patients with brain injury.

4822. Schellenberg, M., et al. (2022). "Penetrating injuries to the vertebral artery: interventions and outcomes from US Trauma Centers." European journal of trauma and emergency surgery : official publication of the European Trauma Society **48**(1): 481-488.

PURPOSE: Penetrating injuries to the vertebral artery are rare and incompletely studied. Operative, angioembolic, and nonoperative strategies are management options, although the association between management strategy and outcomes is unknown. This study endeavored to define the epidemiology, management strategy, and outcomes after penetrating injuries to the vertebral artery presenting to trauma centers nationwide., METHODS: Patients with veterbral artery injuries were identified from the National Trauma Data Bank (NTDB) (2016-2017) using ICD-10-CM codes. Only those with penetrating mechanisms of injury were included in the study. Transferred patients were excluded. Study groups were defined by management strategy (Operative management, OM; angioembolization, AE; and nonoperative management, NOM). Patient demographics, injury characteristics, and outcomes were compared between groups using univariate analysis. Multivariate analysis with logistic regression was used to examine independent risk factors for mortality and stroke., RESULTS: Penetrating injuries to the vertebral artery were rare (n = 476, < 1% of NTDB patient population). Median age was 28 [IQR 21-37] years and 81% (n = 385) of patients were male. Interpersonal violence was the most common injury intent (n = 374, 79%). Most patients were managed with NOM (n = 409, 86%), with AE and OM utilized less frequently (8% and 6%, respectively). Stab wounds were the most frequent mechanism of injury among patients managed with OM (62%), while gunshot wounds were most common among patients managed with NOM (84%) or AE (79%). Multivariate analysis of risk factors for stroke revealed only associated carotid artery injury (OR 4.236, 95% CI 1.284-13.970, p = 0.018) and AE (OR 6.342, 95% CI 1.417-28.399, p = 0.016) were independent predictors. Independent risk factors for mortality were advanced age (OR 1.026, 95% CI 1.001-1.052, p = 0.044); elevated ISS (OR 1.030, 95% CI 1.008-1.052, p = 0.006); and associated traumatic brain injury (OR 3.020, 95% CI 1.333-6.843, p = 0.008). Higher ED GCS was independently associated with reduced mortality (OR 0.788, 95% CI 0.731-0.849, p < 0.001)., CONCLUSIONS: Vertebral artery injuries after penetrating mechanisms are infrequent in the United States. Patients with these injuries tend to be young adult men who were injured by gunshot wounds as a result of interpersonal violence. The majority of these injuries were managed nonoperatively, with operative intervention required most commonly for patients injured by stab wounds. Risk factors for both stroke and mortality were principally due to patient factors and associated injuries. Increased risk of stroke among patients managed with angioembolization will need to be further investigated with future study to determine if this risk is imparted from the management strategy itself or from underlying injury characteristics.

4823. Scherer, L. R., 3rd (1995). "Diagnostic imaging in pediatric trauma." Seminars in pediatric surgery **4**(2): 100-108.

In the management of the critically injured pediatric trauma patient, the diagnostic armamentarium of the clinician includes a number of radiographic procedures to assist in determining the life-threatening and disabling injuries of the young patient. This article reviews the emergent and definitive systems radiographs helpful in diagnosing blunt and penetrating injuries. The clinician is provided a stepwise systematic process of evaluating life-threatening and complicated injuries of the head, thorax, abdomen, pelvis, and extremities.

4824. Schibilsky, D., et al. (2015). "Traumatic tracheobronchial injuries-incidence and outcome among 68.216 trauma patients derived from the traumaregister DGU®." Thoracic and Cardiovascular Surgeon **63**.

Objectives: Acute tracheobronchial injuries (TBI) resulting from blunt or penetrating trauma are rare, but potential life-threatening trauma sequelae. Up to now the incidence and mortality of these injuries are not well described. The aim of this study was to assess the incidence and outcome of traumatic TBI within the last decade. Methods: We performed a retrospective analysis of all trauma patients included in the TraumaRegisterDGU® between 2002 and 2012 who were 16 years or older and had an ISS (Injury Severity Score) ≥9. Results: Among 68.216 analyzed trauma patients, 238 had evidence of tracheobronchial injuries (0,3%). Those Patients were predominately male (73.8%) and had a mean age of 37.1 years and suffered from blunt trauma in 89.3% mainly caused by accidents (77.9%). Mortality rates were 21.4% in patients with an AIS = 2 and 53.3% in patients with an AIS = 5, respectively. Most patients died within the first 24 hours (71.6%), whereas in patients with an AIS = 5 35.5% died already within the first 6 hours after hospital admission. Patients demanding operation within the first 24h showed high mortality rates (AIS4: 46,7%, AIS5: 40%). The overall mortality of patients with TBI was 27.5% and therefore nearly doubled the control group (14% overall mortality rate). Conclusion: The Incidence of TBI in this large cohort of trauma patients is very low. However, the affected young and predominantly male patients showing a high mortality reaching nearly double numbers of the control group. The mortality was associated with higher AIS-Score and the need for operation within the first 24h.

4825. Schick, U. and W. Hassler (2003). "Late hydrocephalus in a case of wandering bullet into the pineal region." Acta neurochirurgica **145**(1): 79-81.

We report a patient in whom a bullet in the brain migrated into the pineal region causing hydrocephalus 3 months later. In patients undergoing surgical removal of intracerebral or intraventricular bullets, it is recommended to obtain an x-ray or CT scan on the day of operation. Late hydrocephalus may occur several months after migration of the bullet due to scar tissue.

4826. Schiffer, D., et al. (1991). "Relationship between glial reaction to a stab wound and tumor development after receiving transplacental ethylnitrosourea in the rat." Acta neuropathologica **83**(1): 30-38.

Fisher 344 rats born from mothers treated with ethylnitrosourea (ENU) 50 mg/kg intravenously were injured at the 1st and 2nd month of extrauterine life by a transcranial stab. The wound affected cerebral cortex, white matter and basal ganglia. The animals were killed 15 and 45 days and 5 months after injury and cell reaction was studied histologically and immunohistochemically. Bromodeoxyuridine (BrdUrd) was administered 1 h before sacrifice and the labeled cells were evaluated. In ENU-treated rats injured at 1 month of age only minor differences were found in comparison with injured controls. In ENU rats injured at 2 months of age and killed 15 days later, a higher number of BrdUrd-labeled cells was found in comparison with controls; 45 days after injury the cell reaction acquired the aspect of a microtumor, however, no microtumor unrelated with the needle track was present. In ENU rats killed 5 months after the injury, there was no difference between injured and not injured ENU-treated rats, as far as the aspect and the number of tumors were concerned. The tumor phenotype was, thus, anticipated by the cell response to trauma in ENU rats. The interpretation is that the additional cell division, in response to trauma, anticipate not only the phenotypic, but also the cell kinetics changes, as indicated by BrdUrd labeling.

4827. Schiffer, J., et al. (1985). "Posttraumatic meningioma." Neurosurgery **17**(1): 84-87.

This report concerns three patients with intracranial meningioma developing at the site of an old head injury with skull fracture. These cases, along with literature reports, suggest a causal relationship between head trauma and the subsequent development of meningioma.

4828. Schindler, C. R., et al. (2021). "Influence of Antibiotic Management on Microbial Selection and Infectious Complications After Trauma." Frontiers in medicine **8**.

Background: The inflammatory response and post-traumatic complications like infections play an important role in the pathophysiology of severe injuries. This study examines the microbiological aspects in anti-infective treatment of trauma patients and their inflammatory response in post-traumatic infections complications. Patients and Methods: A

retrospective analysis of prospectively collected data in trauma patients (ISS ≥ 16) over a 1-year period (01/2018 to 12/2018) is provided. Patient population was stratified into severely injured patients without post-traumatic infection (inf-PT), and severely injured patients who developed an infection (inf+PT). Results: Of 114 trauma patients, 45 suffered from post-traumatic infection during the first 10 days of hospitalization. Severely injured patients with concomitant traumatic brain injury (PT+TBI) showed the highest rate of post-traumatic infection. Pro-inflammatory reaction was tracked by levels of Interleukin (IL-)6 (day 3: inf+T 190.8 ± 359.4 pg/dL > inf-PT 56.2 ± 57.7 pg/mL (mean ± SD); p = 0.008) and C-Reactive-Protein (CRP, day 3: inf+PT 15.3 mg/dL > inf-PT 6.7 mg/dL, p = 0.001) which were significantly higher in trauma patients who develop an infectious complication and showed a significant positive correlation with the occurrence of infection. The leading entity of infection was pneumonia followed by infections of the urinary tract mainly caused by gram-negative Enterobacteriaceae. 67.5% of all trauma patients received single-shot antibiosis during initial care in trauma bay. The development of secondary colonization was not relevant positively correlated with single-shot antibiosis (r = 0.013, p = 0.895) and prophylactically calculated antibiotic administration (r = 0.066, p = 0.500). Conclusion: Severely injured trauma patients have an increased risk for development of infectious complications, which mainly is pneumonia followed by infection of the urinary tract mainly caused by gram-negative Enterobacteriaceae. Based on the data in this study, the one-time antibiotic and prophylactic calculated use of antibiotics, like Cephalosporins must be critically discussed in terms of their role in the development of post-traumatic infections and microbial selection.

4829. Schintu, S., et al. (2014). "Object and space perception - is it a matter of hemisphere?" Cortex; a journal devoted to the study of the nervous system and behavior **57**: 244-253.

In the 1980s, following Newcombe's observations, Ungerleider and Mishkin put forward the functional subdivision of the visual system into a ventral stream dedicated to object perception and a dorsal stream dedicated to space perception. Ten years after this discovery, the perception-action model re-defined the dorsal stream as responsible for non-conscious visual guidance, and most recently a tripartition has been suggested to account for a variety of visuospatial functions. Here, we investigated the neural underpinnings of object and space perception by combining the administration of the Visual Object Space Perception (VOSP) battery with a voxel-based lesion symptom mapping (VLSM) approach in a large sample of patients with penetrating traumatic brain injury (pTBI). First, our results provided new support for the complementary role of both hemispheres in object recognition. The right lateral occipital complex was found to be critical in early perceptual discrimination, whereas more anterior temporal and frontal regions in the left hemisphere were found to be critical in more complex forms of object discrimination and recognition. Second, our findings confirmed that space perception depended on the integrity of the right inferior parietal lobule (IPL) and revealed that a network linking the right IPL with the right premotor cortex was critical for the perception of spatial relationships in both 2D and 3D representations. Taken together, our results supported the functional subdivision of the visual system and shed new light on the specific processes involved along both the dorsal and the ventral streams.

4830. Schlag, H., et al. (2021). "Rupture of the Superior Sagittal Sinus in Penetrating Head Injury-Management of a Rare Trauma Mechanism." Journal of neurological surgery reports **83**(1): E3-E7.

Civilian penetrating head injury caused by foreign objects is rare in Germany (Europe), but can result in complex neurovascular damage. We report on a patient who in suicidal intent inflicted on himself a penetrating brain injury near the vertex with a captive bolt gun. A laceration at the junction of the middle to the posterior third of the superior sinus occurred by bolt and bone fragments leading to critical stenosis and subsequent thrombosis. Upon surgery, the proximal and distal sinus openings were completely thrombosed. The sinus laceration was closed by suture and the intraparenchymal bone fragments were retrieved. Postoperative angiography disclosed persistent occlusion of the superior sagittal sinus. The patient did not develop any symptoms due to venous congestion (edema, hemorrhage), suggesting sufficient collateral venous outflow. The patient completely recovered despite the complexity of the lesion.

4831. Schliamser, S. E., et al. (1988). "Intracranial abscesses in adults: an analysis of 54 consecutive cases." Scandinavian journal of infectious diseases **20**(1): 1-9.

A retrospective analysis was performed of 54 consecutive adult patients with intracranial abscesses hospitalized between 1973 and 1985. Clinical signs and symptoms were varying and no single symptom was found in more than 48%

of the patients. Also the laboratory findings were of limited diagnostic value. The etiology of the infections varied with the sources and could be identified in 42 of the patients. In patients with postoperative abscesses or infections after penetrating head injuries Staphylococcus aureus was the most commonly found causative agent. In patients with abscesses originating from sinus, dental or otogenic infections, anaerobic bacteria dominated and most patients had multiple bacterial isolates. A majority of patients (33/47) with diagnosed abscesses were treated with both surgical drainage and systemic antibiotics. 14 patients received antibiotics only, due to inoperable abscesses or spontaneous regression without surgery. 17 of the patients (31.5%) died from their intracranial infections and only 9 survived without sequelae. Important prognostic factors were missed diagnosis and presence of multiple or ruptured abscesses. One patient died of acute brain stem herniation after lumbar puncture, a procedure which was found to be of limited diagnostic value and which seems to be contraindicated in patients with intracranial abscesses.

4832. Schlosser, R. J. and W. E. Bolger (2002). "Traumatic cerebrospinal fluid rhinorrhea." Operative Techniques in Otolaryngology - Head and Neck Surgery **13**(4): 302-308.

Improved instrumentation and imaging for paranasal sinus and skull base surgery has led to minimally invasive endoscopic extracranial techniques to repair cerebrospinal fluid (CSF) leaks. Endoscopic repair has a higher success rate (approximately 90%) and lower morbidity than do traditional intracranial techniques for most defects and has become the standard of care.1-4 CSF leak can occur from a variety of traumatic causes. Blunt trauma from motor vehicle or industrial accident, gunshot wounds, and surgical trauma can impart a CSF leak. Each confers a typical pattern of injury with special management issues. Trauma is a frequent cause of CSF leak that the general otolaryngologist will encounter in clinical practice. This article will review the pre-, intra-, and postoperative management issues needed to care for patients with CSF leak resulting from trauma.

4833. Schmidt, P., et al. (2002). "[Practical application of the Injury Severity Score (ISS) in expert forensic testimony]." Zur praktischen Anwendung des Injury Severity Scores (ISS) in der forensischen Begutachtung. **210**(5-6): 172-177.

The retrospective analysis of the autopsy records of 50 homicides showed that the Injury Severity Score (ISS), a numerical scoring system initially developed to quantify the severity of injuries sustained in road traffic accidents, can also be useful for objectively describing and ranking the overall severity of trauma with regard to forensic issues. The present case report illustrates to what extent the ISS can help to assess the contribution of each assailant in homicides committed by several perpetrators. In the case presented the court was convinced that one perpetrator had inflicted four deep stab wounds to the victim's face (each with bony lesions), 2 stabs to the chest piercing the right lower pulmonary lobe and causing a haemothorax of 200 ml, an abdominal stab wound without involvement of a parenchymatous organ as well as multiple defence wounds of the arms. Thereafter, a second perpetrator was thought to have inflicted several heavy blows with a full water bottle causing severe contusions on the right side of the forehead, the chin, the left side of the face and a spider's web fracture of the frontal bone. Using the ISS an injury severity score of 24 was assigned to the first complex of injuries and a score of 10 to the second complex. The forensic conclusions with regard to prognosis and lethal outcome are discussed.

4834. Schmidt-Matthiesen, A., et al. (1999). "A prospective, randomised comparison of single- vs. multiple-dose antibiotic prophylaxis in penetrating trauma." Chemotherapy **45**(5): 380.

This study was designed to compare the clinical efficacy of a single dose of ceftriaxone with cefoxitin given 3 times a day for 3 days., METHODS: Patients had to have a penetrating injury to only one part of the body, reach the hospital within 2 h and be operated on within 16 h after the trauma. Patients were excluded if it appeared likely that they would require mechanical ventilation for more than 24 h. The same applies to open or grade II/III craniocerebral trauma. The end point was the occurrence of infections within 10 days. The costs of antibiotic treatment were also calculated., RESULTS: 96% of the ceftriaxone patients (n = 97) and 95% of the cefoxitin group (n = 98) remained infection-free. In neither treatment group was deep infection, abscess, phlegmon or sepsis seen. No additional surgery or intensive care due to infection was required. At $41.83 vs. $172.16, the average total cost of delivering antibiotic treatment was significantly lower in the ceftriaxone group ($p < 0.001$)., CONCLUSION: Prophylaxis in penetrating trauma with a single dose of ceftriaxone is safe and has considerable practical and economic advantages.

4835. Schmidt-Matthiesen, A., et al. (1999). "A prospective, randomised comparison of single- vs. multiple-dose antibiotic prophylaxis in penetrating trauma." Chemotherapy **45**(5): 380-391.

UNLABELLED: This study was designed to compare the clinical efficacy of a single dose of ceftriaxone with cefoxitin given 3 times a day for 3 days., METHODS: Patients had to have a penetrating injury to only one part of the body, reach the hospital within 2 h and be operated on within 16 h after the trauma. Patients were excluded if it appeared likely that they would require mechanical ventilation for more than 24 h. The same applies to open or grade II/III craniocerebral trauma. The end point was the occurrence of infections within 10 days. The costs of antibiotic treatment were also calculated., RESULTS: 96% of the ceftriaxone patients (n = 97) and 95% of the cefoxitin group (n = 98) remained infection-free. In neither treatment group was deep infection, abscess, phlegmon or sepsis seen. No additional surgery or intensive care due to infection was required. At $41.83 vs. $172.16, the average total cost of delivering antibiotic treatment was significantly lower in the ceftriaxone group ($p < 0.001$)., CONCLUSION: Prophylaxis in penetrating trauma with a single dose of ceftriaxone is safe and has considerable practical and economic advantages.

4836. Schmidt-Vanderheyden, W. and H. Backmund (1971). "[Angiographic observations of the development of a traumatic intracerebral aneurysm]." Angiographische Verlaufsbeobachtung eines traumatischen, intracerebralen Aneurysmas. **214**(1): 10-16.

4837. Schmitt, H. P. (1983). "[Trauma and tumor: malignant glioma in the area of a traumatic lesion of the brain with metal scales]." Trauma und Tumor: malignes Gliom nach Stecksplitterverletzung des Gehirns. **51**(6): 227-231.

Report of a 75 year-old male who sustained severe head injury by shell splinters during the second world war. 38 years later he died due to a malignant glioma which was localized exactly in the left and right frontal areas damaged by the shell. Multiple metal scales were still localized within these areas and the glioma. The reasons for the presumption of a causal relation between the trauma and the tumor will be discussed.

4838. Schmutz, B., et al. (2014). "Magnetic resonance imaging: an accurate, radiation-free, alternative to computed tomography for the primary imaging and three-dimensional reconstruction of the bony orbit." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **72**(3): 611-618.

PURPOSE: To determine the extent to which the accuracy of magnetic resonance imaging (MRI) based virtual 3-dimensional (3D) models of the intact orbit can approach that of the gold standard, computed tomography (CT) based models. The goal was to determine whether MRI is a viable alternative to CT scans in patients with isolated orbital fractures and penetrating eye injuries, pediatric patients, and patients requiring multiple scans in whom radiation exposure is ideally limited., MATERIALS AND METHODS: Patients who presented with unilateral orbital fractures to the Royal Brisbane and Women's Hospital from March 2011 to March 2012 were recruited to participate in this cross-sectional study. The primary predictor variable was the imaging technique (MRI vs CT). The outcome measurements were orbital volume (primary outcome) and geometric intraorbital surface deviations (secondary outcome) between the MRI- and CT-based 3D models., RESULTS: Eleven subjects (9 male) were enrolled. The patients' mean age was 30 years. On average, the MRI models underestimated the orbital volume of the CT models by 0.50 +/- 0.19 cm(3). The average intraorbital surface deviation between the MRI and CT models was 0.34 +/- 0.32 mm, with 78 +/- 2.7% of the surface within a tolerance of +/-0.5 mm., CONCLUSIONS: The volumetric differences of the MRI models are comparable to reported results from CT models. The intraorbital MRI surface deviations are smaller than the accepted tolerance for orbital surgical reconstructions. Therefore, the authors believe that MRI is an accurate radiation-free alternative to CT for the primary imaging and 3D reconstruction of the bony orbit.

4839. Schneider, R. A., et al. (2007). "20 years of experience in static intensity-modulated total-body irradiation and lung toxicity. Results in 257 consecutive patients." Strahlentherapie und Onkologie : Organ der Deutschen Rontgengesellschaft ... [et al] **183**(10): 545-551.

PURPOSE: To analyze lung complications after allogeneic or autologous transplantation following total-body irradiation (TBI) with compensators, so-called sIMRT (static intensity-modulated radiotherapy)., PATIENTS AND METHODS: Between 1983 and 1998, 257 patients with different hematologic malignancies underwent TBI in six fractions

to a total dose of 12 Gy within 3 consecutive days (212 with 11 Gy lung dose) prior to allogeneic (n=174) or autologous (n=83) transplantation. 40 patients were <16 years of age. Minimum follow-up time was 5 years. Median follow-up period was 110 months (13-231 months)., RESULTS: 5-year survival rate was 47.9%, 5-year tumor-related mortality 23%, 5-year treatment-related mortality 29.2% (12 Gy lung dose: 53.3%+/-14.6%, 11 Gy: 24.1%+/-5.7%). Interstitial pneumonitis (IP) developed in 28 of 257 patients (10.9% +/- 3.8%). IP incidences in the allogeneic and autologous groups were 14.4% (+/-5.6%) and 3.6% (0-7.6%), respectively. IP incidences with 12/11 Gy lung dose were 22% (+/-12%)/8.5% (+/-3.7%). IP mortality was 9.3% (+/-3.6%). 13 of 28 patients with IP had a cytomegalovirus infection, five an acute graft-versus-host disease grade IV of the lungs. IP incidences with 12/11 Gy lung dose were 25% (9-50%)/4.2% (0.2-19.1%) in patients <16 years, and 20.7% (9.4-37.4%) and 13.3% (+/-6.5%) in older patients after allogeneic transplantation., CONCLUSION: Compensator-generated static intensity-modulated TBI with a total dose of 12 Gy and a lung dose of 11 Gy is a modern and comfortable treatment with moderate lung toxicity, small dose inhomogeneities and little setup failure before transplantation. Especially patients <16 years of age benefit from lung dose reduction.

4840. Schneider, R. C., et al. (1972). "Blood vessel trauma following head and neck injuries." Clinical neurosurgery **19**: 312-354.

4841. Schneider, V. and H. Bratzke (1983). "[Malignant hyperthermia following an old gunshot head injury]." Maligne Hyperthermie nach alter Kopfschussverletzung. **90**(1): 71-80.

A case of symptomatic malignant hyperthermia is reported involving a 35-year-old man who suffered a serious cerebral injury after a gunshot to the head and who died from hyperthermia (41.5 degrees C) and tachycardia 1.5 days after dental treatment under general anesthesia. The sceletal muscles did not show any changes that would indicate a myopathy, the CPL value was normal, there was also no familial factor in this case. It is taken as an opportunity here to point out that such a case must not end fatally since there is a drug on the market in the meantime (Dantrolen) which is to be administered i.v. This medication acts causally on the membrane disturbances (release of calcium ions by appropriate trigger substances) which are the underlying cause of the malignant hyperthermia.

4842. Schnieders, J., et al. (2012). "Factors contributing to chronic fatigue after traumatic brain injury." The Journal of head trauma rehabilitation **27**(6): 404-412.

BACKGROUND: The annual incidence of traumatic brain injury in Europe amounts to 235 per 100 000 persons. About two-thirds will develop posttraumatic brain injury chronic fatigue (pTBI-CF)., AIM: To identify the reversible hormonal and nonhormonal causes of pTBI-CF., PATIENTS AND METHODS: Ninety patients with varying degrees of pTBI-CF underwent endocrine testing and an evaluation of sleep, attention, coping style, daily activity and dependency, physical performance, emotional well-being, and quality of life., RESULTS: Vitamin D deficiency was found in 65%, poor sleep quality in 54%, anxiety disorders in 36%, growth hormone deficiency in 16%, and gonadal hormone deficiencies in 9%. Fatigue severity was correlated with poor sleep ($R = +0.65$, $P < .0001$), serum 25-hydroxy vitamin D levels ($R = -0.50$, $P < .0001$), and anxiety ($R = +0.50$, $P < .0001$) but not with growth hormone deficiency or gonadal hormone deficiencies. The first 3 factors together explained 59% of the fatigue score variance., CONCLUSIONS: Poor sleep, vitamin D deficiency, and anxiety were the most important factors associated with pTBI-CF. Appropriate treatment of these disorders may help to reduce fatigue in these patients.

4843. Schober, M., et al. (2022). "EFFECTS OF DOCOSAHEXAENOIC ACID AND SEX ON EX VIVO PHAGOCYTIC CAPACITY AND OXIDATIVE POTENTIAL OF MICROGLIA AND MACROPHAGES IN RAT PUP BRAIN AFTER CONTROLLED CORTICAL IMPACT." Journal of neurotrauma **39**(11-12): A41.

Inflammation and oxidative stress adversely affect pediatric traumatic brain injury (pTBI). In our rat pup pTBI model using controlled cortical impact (CCI) Docosahexaenoic Acid (DHA) decreased microglial inflammatory markers, oxidative stress and adverse outcomes. Whether DHA affects microglial phagocytic capacity and oxidative potential after TBI in either sex is unknown. We hypothesized that CCI increases ex vivo phagocytosis and oxidative potential of microglia (mμ) and macrophages (MO) at Post Injury Day (PID) 1, 3 and 7, blunted by DHA and female sex. 17 day old male/ female rats received CCI/- SHAM followed by vehicle/ DHA.We sorted rat brain cells into CD11b +/CD45 hi/lo (MO/mμ) and CD11b(-)(NEGS, mainly neurons and astrocytes) after exposure to fluorescent beads or DHR123 to assess

phagocytic capacity and oxidative potential and assayed using Image- Stream® and flow cytometry. At PID1, CCI increased microglial phagocytic capacity relative to control (47±1.4 vs 29±1.4 % positive cells, p < 0.0001). Interestingly, microglia showed greater beads/cell than other CD11b+ cells. CCI increased oxidative potential in MO (25±4.2 vs 2.9±0.6% positive cells p = 0.003) and in an "intermediate" population we unexpectedly found at PID1 (not at 3 nor 7: CD11b+/CD45int) relative to controls (25±3.4 vs 3.4±0.6, p = 0.003). By histology and cytospin, these cells are not neutrophils but MO and monocytes. We report novel, ex vivo, functional assays of inflammation in the developing brain after TBI. We anticipate that DHA and female sex will blunt injury at PID 7 and PID1. We speculate that intermediates are blood monocytes that enter the brain transiently after CCI.

4844. Schoeneberg, C., et al. (2013). "Gender-specific differences in severely injured patients between 2002 and 2011: data analysis with matched-pair analysis." Critical care (London, England) **17**(6): R277.

INTRODUCTION: Previous studies reported divergent results concerning the effect of gender on patient outcome after severe injury. Results suggest that women have better outcomes because they have lower rates of sepsis and multi-organ failure. The objective of this analysis was to study gender differences in a Level 1 trauma center in Germany., METHODS: Patients who were admitted to hospital between 2002 and 2011 with an Injury Severity Score (ISS) >=16 were included. Data were collected from the Trauma Registry of the German Society for Trauma Surgery and from hospital records. The effects of gender on a variety of parameters were investigated. To eliminate the influence of differences in ISS, an analysis of groups with similar ISS was performed. Also, a matched-pair analysis of 422 patients was performed., RESULTS: A total of 962 patients met the inclusion criteria. The mortality rate was lower in male patients (25.4% versus 36.59%). Female patients had more severe head injuries, received less fluid volume and had a lower rate of sepsis. Men were more frequently involved in motorcycle accidents and sustained more penetrating trauma. Women were more frequently involved in pedestrian accidents and sustained more falls from under 3 m. The effects of gender were reduced when the data were analyzed by matching ISS. The mortality rate was significantly different in the ISS 26 to 35 group but in mostly all groups, the mortality rate was higher in women. In the matched-pair analysis, the rate of sepsis and the length of the ICU stay were significantly lower in women and the mortality rate showed no significant difference (28.1% for male patients versus 33.01% for female patients). Women died after an average of 5.22 days, and men died after an average of 9.02 days., CONCLUSIONS: Gender-based differences in patient outcome after severe trauma were observed in this study. Women are more likely to die in the first days after trauma. Upon extended hospital stay, women had a better survival rate because they had a lower rate of sepsis. No significant differences in mortality rate could be found, but there was a trend towards a higher rate in female patients.

4845. Schoenfeld, A. J., et al. (2013). "The nature and extent of war injuries sustained by combat specialty personnel killed and wounded in Afghanistan and Iraq, 2003-2011." The journal of trauma and acute care surgery **75**(2): 287-291.

BACKGROUND: Previous studies regarding combat wounding have a limited translational capacity due to inclusion of soldiers from all military branches and occupational specialties as well as a lack of information regarding soldiers who died in theater., METHODS: A search was performed of the Department of Defense Trauma Registry and Armed Forces Medical Examiner data set for the years 2003 to 2011 to identify all injured personnel with the military specialty 19D (cavalry scout). A manual search was conducted for each record identified, and age, rank, location and manner of injury, mechanism of injury, Injury Severity Score (ISS), and extent of wounding were abstracted. The incidence of injuries by body region and rates for specific types of wounds were determined. Statistically significant associations between rank, location of injury, manner of injury, body region involved, and injury mechanism were assessed using chi2 analysis. Associations between ISS, rank, manner of injury, and survival were evaluated by t test with Satterthwaite correction., RESULTS: A total of 701 casualties were identified with 3,189 distinct injuries. Mean (SD) age of injured personnel was 25.9 (6.0) years. Thirty-five percent of the cohort was composed of soldiers who died in theater. Explosions were the most common mechanism of injury (70%), while 18% of wounds occurred owing to gunshot. Extremity wounds and injuries to the head and neck represented 34% of casualty burden. Thoracic trauma occurred in 16%, and abdominal injuries occurred in 17%. Wounds with a frequency exceeding 5% included skin, extremity, facial, brain, and gastrointestinal injuries. Vascular injury occurred in 4%. Gunshot wounds were a greater cause of injury in Afghanistan (p = 0.001) and resulted in a higher percentage of thoracic injuries (p < 0.001)., CONCLUSION: The nature and extent of trauma sustained by combat-specific personnel seems to be different from that experienced by all soldiers deployed to a war zone.

4846. Schooler, C., et al. (2008). "Brain lesion and memory functioning: short-term memory deficit is independent of lesion location." Psychonomic bulletin & review **15**(3): 521-527.

We analyzed the effects of patterns of brain lesions from penetrating head injuries on memory performance in participants of the Vietnam Head Injury Study (Grafman et al., 1988). Classes of lesion patterns were determined by mixture modeling (L. K. Muthen & B. O. Muthen, 1998-2004). Memory performance was assessed for short-term memory (STM), semantic memory, verbal episodic memory, and visual episodic memory. The striking finding was that large STM deficits were observed in all classes of brain-injured individuals, regardless of lesion location pattern. These effects persist despite frequent concomitant effects of depressive symptomatology and substance dependence. Smaller deficits in semantic memory, verbal episodic memory, and visual episodic memory depended on lesion location, in a manner roughly consistent with the existing neuropsychological literature. The theoretical and clinical implications of the striking, seemingly permanent STM deficits in individuals with penetrating head injuries are discussed.

4847. Schrader, W., et al. (2000). "[Penetrating and perforating eye injuries in 343 patients due to auto accidents before and after compulsory seat belt legislation resulting in fines (1966-1998)]." Penetrierende und perforierende Augenverletzungen bei PKW-Unfallen von 343 Patienten vor und nach Einfuhrung des Bussgeldes fur "Gurtmuffel" (1966-1998). **217**(1): 23-29.

BACKGROUND: Constructional improvements of passengers safety in cars alone did not result in a significant decline of open globe injuries in traffic accidents. Only after compulsory seat belt legislation was introduced in Germany and Great Britain, a 60%-75% reduction in ocular injuries was observed. We examined, how the characteristics of severe eye injuries in car accidents changed during the last 28 years., PATIENTS AND METHODS: The case records of 343 patients, who suffered from open globe injuries during car accidents between 1966 and 1993 and were primarily admitted in the University Eye Hospitals of Freiburg and Wurzburg, have been analyzed retrospectively. Injuries were evaluated for their extent, time of injury (hour and season), age, sex and outcome of visual acuity after surgery., RESULTS: Between 1966 and 1984 wind-screen injuries declined slowly from 25/year to 16/year. Since the introduction of compulsory seat belt legislation in Germany in 1984 we observed a sudden reduction to 4 injuries/year, followed by an additional slow decline to 2.5 injuries/year. Male/female ratio changed from 2.1/1 before to 9/1 after 1984. Due to the seat belt legislation, injuries declined during summer season (april through september) by factor 7.6, during winter season (october through march) by factor 3.8. Injuries during daylight (6 a.m. to 6 p.m.) decreased more rapidly (by factor 14) than during nighttime (6 p.m. to 6 a.m.: factor 4). The decline of eye injuries was most pronounced among those with an age of less than 23 years (by factor 10.8) and those who were 31-50 years old (by factor 6.8), but least among those between 23 and 30 years of age (2.2). Since 1984, open globe injuries combined with mid-facial and cranial fractures increased resulting in a poorer visual outcome: 29% of eyes became blind before 1984 and 40% since then due to the higher survival probability of very severe accidents. A majority of injured persons still had not fastened their seat belt and about 50% were drunk., CONCLUSION: Compulsory seat belt legislation introduced in Germany in 1984 was most effective in preventing eye injuries among female passengers, during daytime or among persons younger than 23 years. However, 23-30 year old male drivers who had not fastened their seat belt, drove in darkness or during winter and had drunk alcohol, were still at highest risk for an open globe injury. The increase of victims with a combination of open globe injuries and midfacial injuries, polytrauma or cerebral trauma may be related to the airbag and other improved safety measures.

4848. Schreckinger, M., et al. (2011). "Transorbital penetrating injury: case series, review of the literature, and proposed management algorithm." Journal of neurosurgery **114**(1): 53-61.

Transorbital penetrating injury (TPI), an uncommon subset of head trauma, requires prompt multidisciplinary surgical intervention. While numerous case reports appear in the literature, there is a lack of discrete recommendations for initial evaluation, surgical intervention, and postoperative care of patients with TPI. A retrospective review of 4 cases of TPI at the University of Michigan Health System was undertaken to assess for diagnosis, treatment, and follow-up. In addition, a PubMed search using the terms "penetrating orbital trauma," "penetrating orbital injury," "transorbital penetration," and "transorbital penetrating injury" were used to search for articles discussing the presentation and management of penetrating orbital trauma. All 4 of the patients at the University of Michigan underwent focused physical examination performed by a multidisciplinary trauma team followed by dedicated maxillofacial and head CT scanning. The patients' treatments varied, depending on the mechanism and extent of the injury. An analysis of the case

series presented here as well as other published cases suggests an algorithm for diagnosis and treatment for patients with TPI, which includes focused evaluation, diagnostic imaging with maxillofacial CT scanning, and management of the injury that focuses on the path of penetration and the presence of the foreign body in situ at the time of presentation. Magnetic resonance imaging is indicated in patients who have indwelling wooden foreign bodies. Angiography should be performed in patients with suspected vascular injury. Treatment decisions should be made by a multidisciplinary team with input from neurosurgery, ophthalmology, otolaryngology, and maxillofacial surgery.

4849. Schreiber, M. A. (2019). "Prehospital tranexamic acid improves survival after traumatic brain injury in patients with intracranial hemorrhage." Shock **51**(6): 26.

Introduction: Tranexamic acid (TXA) has been shown to improve survival after trauma in patients at risk for major hemorrhage. There is also evidence to suggest that TXA may benefit patients with moderate to severe traumatic brain injury (TBI). We hypothesized that prehospital administration of TXA would result in a favorable neurologic outcome as measured by Glasgow Outcome Score-Extended (GOS-E) 6 months after injury in patients with moderate to severe TBI. Methods: We performed a prospective randomized doubleblind trial in 12 regions of North America served by 39 Emergency Medical Services (EMS) systems and 20 trauma centers within the Resuscitation Outcomes Consortium. The trial was approved by the FDA and Health Canada. Blinded kits containing TXA or placebo were stored on EMS units and the participating trauma centers. Patients with a suspected TBI, Glasgow Coma Scale (GCS) of 3-12, and systolic blood pressure ≥ 90 mmHg were eligible for inclusion by exception from informed consent. Patients were randomized to one of three arms: prehospital placebo bolus followed by an 8 hour in-hospital placebo infusion [placebo, (PCB)], 1-gram TXA prehospital bolus followed by an in-hospital 1-gram TXA infusion over 8 hours [bolus-maintenance, (BM)], or 2-gram TXA prehospital bolus followed by 8 hour in-hospital placebo infusion [bolus only, (BO)]. Our primary pre-specified analysis adjusted for regional site and combined the two TXA dosing regimens in order to increase power to detect a difference in unfavorable GOS-E at 6 months due to TXA administration. Additional primary aims included pairwise comparisons among the three groups related to GOS-E, survival, blood product requirements, thrombelastography (TEG) and complications. GOS-E and survival outcomes were compared using logistic regression. GOS-E and survival analyses other than the primary analysis were adjusted for age, gender, mechanism of injury, qualifying GCS, Injury Severity Score, and head Abbreviated Injury Scale score. Multiple imputation of the primary outcome in cases where the 6-month follow-up data were missing was performed based on our pre-specified analysis plan. Pre-specified subgroups analyzed included patients not lost to follow-up, patients meeting all eligibility criteria, patients with no infusion-related protocol deviations, and patients with an intracranial hemorrhage (ICH) on initial CT. Results: 967 patients were randomized and administered study drug; 309 PCB, 312 BM group and 346 BO group. The mean age in years (standard deviation) and incidence of penetrating trauma in the PCB, BM, and BO groups respectively was 40(18), 42(19), 43(19) and 5%, 4% and 1%. The mean GCS was 8 with a standard deviation of 3 in all groups. The incidence of ICH on initial CT was 57% in the PCB group, 58% in in the BM group, and 58% in the BO group. The prehospital dose was completely infused in 94% of patients in the PCB group, 93% in the BM group and 95% in the BO group. The estimated time from injury to start of the prehospital infusion was similar between the groups with a median time of approximately 40 minutes and about 75% of patients received the infusion within 1 hour of injury. The rates of complete infusion of the in-hospital dose were: 69% PCB, 73% BM, and 77% BO. Reasons for incomplete infusion included death, safety concerns such as seizure, withdrawal of consent, patient discharge, protocol non-compliance, and treatment unblinding due to indications for open-label TXA. Open-label TXA was administered to 4% of PCB patients, 2% of BM, and 1% of BO. There was no difference in TEG parameters on admission between groups with mean (SD) LY30 of 1.5(3.1), 1.8(4.9) and 1.5(4.1) in the PCB, BM and BO groups, respectively. Blood products were administered within 24 hours to 23%, 21%, and 16% in the PCB, BM, and BO groups, respectively. Among those receiving blood products within 24 hours, the mean (SD) infusion volume in liters was 2.4 (3.9), 2.1 (2.6), and 1.7 (2.1) in the PCB, BM and BO groups, respectively. The 6-month follow-up rates were 88% (PCB) and 84% for both the BM and BO groups. The rates of unfavorable GOS-E among patients not lost to follow-up were 40% (PCB), 42% (BM), and 39% (BO), and among all patients after multiple imputation were 38% (PCB), 36% (BM), and 34% (BO). GOS-E £ 4 at 6 months did not significantly differ for either the combined TXA group compared to placebo [odds ratio (95% CI) 0.86 (0.64, 1.16)] or for any pairwise comparison [BM vs PCB 0.92 (0.65, 1.30), BO vs PCB 0.82 (0.58, 1.14), BO vs BM 0.89 (0.63, 1.24)]. In the subset of patients with ICH on initial head CT, GOS-E £ 4 was lower in the BO group compared to the BM group: BM vs PCB 1.25 (0.73-2.12), BO vs PCB 0.69 (0.41, 1.17), BO vs BM 0.55 (0.33, 0.93). The 28-day mortality rates in the entire cohort were 17% (PCB), 17% (BM), and 12% (BO). Pairwise odds ratios for 28- day mortality were: BM vs PCB 1.12 (0.65, 1.93), BO vs PCB 0.66 (0.37, 1.17), BO vs BM 0.59 (0.34, 1.03). Among patients with ICH on initial CT, the BO group experienced lower

28-day mortality compared to both the BM and PCB groups: 27% (PCB), 25% (BM), and 17% (BO). Pairwise odds ratios (95% CI) for 28-day mortality were: BM vs PCB 1.02 (0.55, 1.89), BO vs PCB 0.49 (0.26, 0.95), BO vs BM 0.49 (0.25, 0.93). A greater portion of patients in the BO group experienced seizures (5% compared to 2% in both the BM and PCB groups); however, the groups did not differ significantly in seizures considered to be serious (1% PCB, 1% BM, 2% BO). Patients in the BM group experienced fewer thromboembolic events (4%) compared to the BO (9%) and the PCB (10%) groups. Conclusions: A prehospital 2 gram bolus of TXA or a prehospital 1 gram bolus followed by a 1 gram in-hospital infusion did not demonstrate superiority in either 6-month GOS-E or 28-day survival over placebo for all included patients. A prehospital 2 gram bolus of TXA resulted in improved 28-day survival compared to both placebo and a 1 gram prehospital bolus followed by a 1 gram in-hospital infusion in patients with CT confirmed ICH after TBI. A Phase III randomized controlled trial comparing 2 grams of prehospital TXA to placebo in patients with moderate to severe TBI is indicated.

4850. Schreuder, W. H., et al. (2011). "Civilian firearm injuries to the face in an urban hospital: Demographics, injury pattern, management and outcome." Journal of oral and maxillofacial surgery **69**(9): e95-e96.

Statement of the Problem: In an increasing violent civilization, more specialists will be confronted with firearm-related injuries from interpersonal violence and suicides. This study provides a 6-year retrospective view of nonfatal gunshot wounds to the face in an urban level I trauma center, with special emphasis on demographics, acute and late management to final outcome. Materials and Methods: This study was carried out in the Groote Schuur Hospital in Cape Town using different registration sources to trace patients treated for nonfatal gunshot wounds to the face. Clinical notes, operative notes and radiographic studies available in medical records were retrospectively reviewed for demographic information, injury pattern, the use of diagnostic studies, injured structures, resuscitation methods, amount and duration of admissions and the immediate and late management including reconstructive procedures. Methods of Data Analysis: A total of 80 patients were identified in the period from January 1999 until January 2005. Six of these patients were referred by rural centers at least 24 hours after injury for specific management of the maxillofacial injuries or reconstructive procedures. Results of Investigation: Most victims were male (94%) with a mean age of 26.7 years. Fifty-seven patients (71%) had isolated gunshot wounds to the head and neck area. Information on ballistic etiology and range of shot was not available. A total of 87 bullets injured the facial structures, most commonly entering through the midface (51%), after which most bullets lodged (38%) in the maxillofacial tissues. Ten traumatic vessel injuries were diagnosed in 29 patients (39%) receiving an angiogram at the initial trauma care. None needed surgical intervention. For securing the airway 18 patients (24%) underwent endotracheal intubation. In one patient a cricothyroidotomy was performed after intubation failed. A tracheostomy was indicated in 16 patients (22%), of which 4 were performed under local anesthesia. Considering the craniofacial skeleton, most patients suffered from a fracture of the mandible (58%), followed by dentoalveolar fractures (54%) and maxillary/zygomatical fractures (31%). Ocular injury was seen in 4 patients and 16 patients suffered nerve injury. Eighty-nine percent of the patients needed surgical intervention, most often including thorough debridement of the wound (73%), soft tissue repair (61%), extraction of fractured teeth (46%), and surgical removal of the bullet (35%). Patients with facial skeleton fractures were addressed by intermaxillary fixation and closed reduction (33%), archbars (10%) or ORIF (15%). Eight patients received reconstructive procedures, either immediate (4 patients, mean interval of 12 days) or delayed (4 patients, mean interval 68 days). One patient was referred for a reconstructive procedure after 562 days. The mean follow-up was 99 days (range 0-1,061 days). Most patients were discharged during follow-up. However, 24 patients did not return after a mean follow-up of 33 days post injury. In the follow-up period no complications or long-term sequelae were seen in only 24% of the patients. Conclusion: Gunshot wounds to the face are complex soft tissue and skeletal injuries, accompanied by many possible complications and long-term sequelae. Treatment by experienced surgeons is necessary, in order to prevent devastating functional and aesthetic consequences. After resuscitation, the current trend is to pursue early and comprehensive treatment if possible.

4851. Schrieff, L. E., et al. (2013). "Demographic profile of severe traumatic brain injury admissions to Red Cross War Memorial Children's Hospital, 2006 - 2011." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde **103**(9): 616-620.

BACKGROUND: Paediatric traumatic brain injury (PTBI) is a major public health problem. However, recent epidemiological data for PTBI in South Africa (SA) are lacking., OBJECTIVES: To establish a demographic profile of severe PTBI admissions to the Red Cross War Memorial Children's Hospital (RCWMCH) over a 5-year period, by investigating

trends in annual admissions, age, sex, language, time and day of injury, and aetiology. Methods. This retrospective, descriptive, quantitative study included children admitted to the RCWMCH with severe traumatic brain injury (TBI) between June 2006 and April 2011, who required intracranial monitoring. We used the Division of Paediatric Neurosurgery's TBI database to identify cases for inclusion in the study and to gather demographic and injury information., RESULTS: Descriptive statistics suggested that: (i) the number of annual admissions did not vary substantially across the study period; (ii) the peak admission age was 6 years; (iii) more boys than girls were admitted; (iv) the major mechanism of injury was pedestrian road traffic accidents; and (v) most injuries occurred on weekends. These results are discussed against the backdrop of international research on PTBI and reflect the extent to which epidemiological findings on TBI in high-income countries compare with those from low- and middle-income countries such as SA., CONCLUSION: The identification of aetiological factors and the description of demographic profiles of children sustaining TBI constitutes a basis for preventative policy administration and intervention strategies in SA.

4852. Schrieff-Elson, L. E., et al. (2015). "Low brain oxygenation and differences in neuropsychological outcomes following severe pediatric TBI." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **31**(12): 2257-2268.

PURPOSE: Traumatic brain injury (TBI) is a leading cause of morbidity and mortality in children. Preventing secondary injury by controlling physiological parameters (e.g. intracranial pressure [ICP], cerebral perfusion pressure [CPP] and brain tissue oxygen [PbtO2]) has a potential to improve outcome. Low PbtO2 is independently associated with poor clinical outcomes in both adults and children. However, no studies have investigated associations between low PbtO2 and neuropsychological and behavioural outcomes following severe pediatric TBI (pTBI)., METHODS: We used a quasi-experimental case-control design to investigate these relationships. A sample of 11 TBI patients with a Glasgow Coma Scale score <=8 who had PbtO2 and ICP monitoring at the Red Cross War Memorial Children's Hospital underwent neuropsychological evaluation >=1 year post-injury. Their performance was compared to that of 11 demographically matched healthy controls. We then assigned each TBI participant into one of two subgroups, (1) children who had experienced at least one episode of PbtO2 <= 10 mmHg or (2) children for whom PbtO2 > 10 mmHg throughout the monitoring period, and compared their results on neuropsychological evaluation., RESULTS: TBI participants performed significantly more poorly than controls in several cognitive domains (IQ, attention, visual memory, executive functions and expressive language) and behavioural (e.g. externalizing behaviour) domains. The PbtO2 <= 10 mmHg group performed significantly worse than the PbtO2 > 10 mmHg group in several cognitive domains (IQ, attention, verbal memory, executive functions and expressive language), but not on behavioural measures., CONCLUSION: Results demonstrate that low PbtO2 may be prognostic of not only mortality but also neuropsychological outcomes.

4853. Schubert, W., et al. (2002). "Incorporation of titanium mesh in orbital and midface reconstruction." Plastic and reconstructive surgery **110**(4): 1022-1022.

Several authors have demonstrated the safety and effectiveness of titanium in orbital reconstruction. One question posed by clinicians is what happens to large pieces of titanium in communication with the paranasal sinuses or nasal-oral-pharyngeal area. This question becomes increasingly relevant as titanium is used to reconstruct extensive defects for which the destruction of bony architecture requires the placement of mesh in proximity to these areas. The objective of this study was to examine the gross and histologic soft-tissue response to large segments of titanium mesh in the setting of orbital and midface reconstruction, particularly when exposed to the nasal-oral-pharyngeal area and paranasal sinuses. In this study, large segments of titanium mesh were used in eight patients to reconstruct orbital and midface defects, with direct communication between the mesh and nasal-oral-pharyngeal area and paranasal sinuses. Four patients had suffered self-inflicted gunshot wounds; as a result, much of their midface was missing, including the inferior and medial orbital floor, maxilla, nose, naso-orbital-ethmoid complex, and hard palate. Extensive sheets of titanium mesh were used to reconstruct their medial and inferior orbital walls, nasal bridge, and maxilla. In the fifth patient, titanium mesh was used to reconstruct the maxilla after resection of a squamous cell carcinoma of the nasolacrimal duct. In the sixth and seventh patients, mesh was used to reconstruct the nasal bridge after severely comminuted nasal fractures resulted in the loss of bone and mucosa. Finally, the eighth patient had titanium mesh used to replace cocaine-induced bone loss involving the left medial orbital floor and wall and part of the maxilla. On gross examination by either endoscopy or direct inspection, all eight patients had rapid soft-tissue incorporation of the titanium mesh. Initial examination typically revealed budding of soft tissue through mesh interstices, followed by progressive incorporation. One patient's mesh was covered in only 15 days. Two patients underwent biopsies of this

newly formed soft tissue. One had biopsies performed at 3, 15, and 31 months after the original operation. Biopsy examination at 3 months revealed incorporation of the titanium with fibrous soft tissue covered by ciliated respiratory epithelium, goblet cells, and squamous epithelium with metaplasia. In addition, the dense, acute inflammation present at 3 months evolved into mild, chronic inflammation at 31 months. The second patient had a single biopsy 4 months after secondary orbital reconstruction for delayed enophthalmos. Biopsy examination revealed a fibrous soft-tissue sheath lined by squamous epithelium with metaplasia. Again, mild chronic inflammation was present within the soft tissue. This study provides evidence of titanium's compatibility with soft tissue. The mesh underwent progressive incorporation with soft tissue that was then resurfaced by indigenous cells, including respiratory epithelia and goblet cells. This phenomenon occurred despite communication with the nasal-oral-pharyngeal area and paranasal sinuses.

4854. Schubiger, O., et al. (1986). "Temporal bone fractures and their complications. Examination with high resolution CT." Neuroradiology **28**(2): 93-99.

A total of 84 patients with 89 fractures of the temporal bone were examined with high resolution CT (HRCT) a few hours to 21 months after the initial trauma. Axial HRCT disclosed 63 longitudinal, 13 transverse, 10 complex and 3 atypical fractures. The diagnosis of a temporal bone fracture was established by axial HRCT in almost every case. However, for the precise topographic analysis of the course of the fracture, additional coronal HRCT proved helpful. The most common, surgically treatable complication of temporal bone fracture is disruption of the ossicular chain. Twenty-three such lesions were demonstrated by combined axial and coronal HRCT; 22 lesions of the facial canal could be demonstrated in 27 patients presenting with facial nerve palsy. The most common site of injury to the facial canal was the region of the geniculate ganglion. The only life-threatening complication of a temporal fracture may be otorhinoliquorrhea. This was present in 9 cases. The most common site of leakage identified was the tegmen tympani. With Metrizamide-HRCT precise localisation of the dural laceration was possible in 7 of these 9 cases.

4855. Schubl, S. D., et al. (2016). "Cervical spine immobilization may be of value following firearm injury to the head and neck." The American journal of emergency medicine **34**(4): 726-729.

BACKGROUND: Penetrating injuries to the head and neck may not be able to cause unstable fractures without concomitant spinal cord injury, rendering prehospital spinal immobilization (PHSI) ineffectual, and possibly harmful. However, this premise is based on reports including predominantly chest and abdominal injuries, which are unlikely to cause cervical spine (CS) injuries., METHODS: We performed a retrospective review of all patients presenting with a penetrating wound to the head or neck over a 4-year period at an urban, level 1 trauma center to determine if there was a benefit of PHSI., RESULTS: One hundred seventy-two patients were identified, of which 16 (9.3%) died prior to CS evaluation. Of 156 surviving patients, mechanism was gunshot wound (GSW) in 36 (28%) and stab wound (SW) in 120 (72%). Fifty-eight patients had PHSI placed (37%), and GSW patients' odds of having PHSI were greater than SW patients (OR 2.3; CI 1.08-4.9). Eight of 156 surviving patients eventually died (5.1%), and the odds of mortality were greater among those that had PHSI than those without (OR 5.54; CI 1.08-28.4). Six (3.8%; 5 GSW, 1 SW) patients had a CS fracture. Two GSW patients (5.6%) had unstable CS fractures with a normal neurological exam at initial evaluation., CONCLUSIONS: Of patients with a GSW to the head or neck that survived to be evaluated, 5.6% had unstable fractures without an initial neurologic deficit. PHSI may be appropriate in this population. Further studies are warranted prior to a determination that PHSI is unnecessary in penetrating head and neck injuries.

4856. Schultz, H., et al. (1993). "[Intrauterine stab injury with a knife in the head of a fetus in the 29th week of pregnancy]." Intrauterine Messerstichverletzung des Kopfes bei einem Feten in der 29. Schwangerschaftswoche. **61**(6): 215-218.

Penetrating head trauma in children causes uncommon and potentially life-threatening injuries. We report on a case of penetrating cranial stab wound to the right parietal region of the head to a 29-week fetus. The child was delivered by emergency Caesarian section. Neurosurgical intervention after birth was necessary. The injury caused a posthaemorrhagic hydrocephalus. Real-time ultrasound examination visualises the brain damage and the development of a hydrocephalus e vacuo.

4857. Schultz, R. C. and D. L. de Camara (1984). "Athletic facial injuries." JAMA **252**(24): 3395-3398.

Most facial injuries that occur during athletic activities are of a minor nature, consisting of lacerations, contusions, and abrasions. These are usually treated by a team physician or an emergency department physician. However, minor injuries must be differentiated from the more significant injuries, especially those involving facial bone fractures. Significant facial trauma must be diagnosed accurately and treated with precision to avoid permanent facial deformity. Soft-tissue trauma as well as fractures are included in this review, and evaluation of the injured athlete is emphasized. A systematic approach is developed for diagnosing and treating common facial injuries in athletes.

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4858. Schulz, C., et al. (2008). "Image-guided neurosurgery for secondary operative removal of projectiles after missile injury of the brain." Surgical neurology **69**(4): 364-368.

BACKGROUND: The primary treatment of penetrating missile injuries of the brain includes debridement of the scalp, fractured skull, and necrotic brain parenchyma. It is acceptable to remove all bony and metallic fragments that are accessible without additional trauma to nondamaged brain regions. Therefore, bone chips and bullets are often initially retained in the brain and are supposedly responsible for delayed cerebral infections and posttraumatic seizures., METHODS: We successfully operated on 3 patients electively to remove bony and metallic fragments secondarily after penetrating brain trauma. We used an electromagnetic neuronavigation system for preoperative planning and chose a less invasive approach for the exact intraoperative localization of the fragments., RESULTS: All fragments were extracted without any problems. No patients had any additional neurologic deficits, and no signs of cerebral infections or seizures occurred between 4 and 8 weeks after the operative revision., CONCLUSION: We recommend the implementation of neuronavigation techniques into the surgical strategy for secondary removal of retained missile fragments.

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4859. Schulz, M. R., et al. (1992). "[Conservative or surgical treatment for foreign body injuries of the brain]." Konservative oder operative Behandlung von Fremdkorperverletzungen des Gehirns. **53**(2): 69-73.

Presenting our patients with cerebral foreign body injuries since 1954 we find that surgical management is not absolutely indispensable. Criteria for conservative management are presented with illustrative cases.

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4860. Schumacher, M., et al. (1983). "[Intravital and postmortal CT examinations in cerebral gunshot injuries]." Intravitale und postmortale CT-Untersuchungen bei Hirnschussverletzungen. **139**(1): 58-62.

The value of CT was assessed in 24 patients who died of cerebral gunshot injuries and in two patients with more recent injuries in order to reconstruct the mode of injury and for adding forensic information. The post-mortem and intravital appearances described and are compared with ultrasound rotation compound scans of the isolated brains. CT showed good agreement with pathological findings. Ultrasound produced images with an accuracy between CT and photographs of the brain specimen. Both methods are regarded as valuable additions to the pathological and forensic information concerning gunshot injuries.

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4861. Schumacher, M., et al. (1985). "[Computer tomographic studies on wound ballistics of cranial gunshot injuries]." Computertomographische Untersuchungen zur Wundballistik kranialer Schussverletzungen. **43**: 95-101.

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4862. Schuster, J. M., et al. (1999). "Acute traumatic posteroinferior cerebellar artery aneurysms: report of three cases." Neurosurgery **45**(6): 1465-1468.

OBJECTIVE AND IMPORTANCE: Posterior fossa subarachnoid hemorrhage secondary to blunt head trauma is rarely associated with traumatic aneurysms of the posterior circulation., CLINICAL PRESENTATION: We present three cases of posterior fossa subarachnoid hemorrhage from ruptured posteroinferior cerebellar artery (PICA) aneurysms after blunt head trauma. In each case, there was no associated penetrating injury or cranial fracture. All three patients presented with acute hydrocephalus requiring ventriculostomy. Two of the three patients had a proximal PICA aneurysm visible on emergent angiography. The remaining patient's aneurysm, although not visible on his initial angiogram, was detected on a subsequent angiogram 72 hours later., INTERVENTION: All patients underwent successful surgical clipping of their aneurysms. Two cases required sacrificing of the parent vessels because of the friable nature of the false aneurysms. In each case, severe symptomatic vasospasm occurred, requiring angioplasty. All three patients also

required a ventriculoperitoneal shunt for persistent hydrocephalus., CONCLUSION: Features of these three cases and similar cases reported in the literature support the theory that vascular ruptures and traumatic aneurysms of the proximal PICA may be related to anatomic variability of the PICA as it transverses the brainstem. This variability predisposes individuals to vascular lesions, which occur in a continuum based on the severity of the injury. Posterior fossa subarachnoid hemorrhage after head injury requires a high index of suspicion and warrants aggressive diagnostic and therapeutic interventions.

4863. Schutzner, J., et al. (2017). "[Ruptures of the diaphragm]." Ruptury branice. **96**(12): 493-497.

INTRODUCTION: The diaphragm is a flat muscle that divides the thoracic and abdominal cavities, and it is one of the most important muscles involved in respiration. Traumas of the diaphragm include its rupture caused by an external force, resulting in blunt or penetrating injuries. Diaphragmatic rupture is associated with the risk of a prolapse (i.e. not a typical hernia) of abdominal organs into the pleural cavity. The rupture may occur due to a blunt injury of the chest or abdomen, or due to penetrating injuries (gunshots, stab wounds, foreign bodies) in the lower part of the chest and epigastrium. Ruptures never heal spontaneously and always require suture of the diaphragmatic defect. Most acute rupture cases are managed using laparotomy; thoracotomy is preferred for lately recognised ruptures to facilitate the removal of adhesions in the thoracic cavity developed between the diaphragmatic defect and a lung. Thirty one patients with diaphragmatic rupture were operated at the 3rd Department of Surgery of the 1st Faculty of Medicine, Charles University and University Hospital Motol between 2006 and 2016. Acute rupture was present in 60% of the cases and chronic in 40%. Right-sided rupture was found in 20% and left-sided in 80%., CONCLUSION: The authors describe surgical treatment of diaphragmatic ruptures. They recommend an early surgical treatment if diaphragmatic rupture is recognized. Generally, the prognosis of the patients depends on availability of professional health care; ideally, these patients should be treated at specialised traumacentres with specialists for abdominal and thoracic surgery. The authors advise against establishing injudicious thoracic drainage in cases where diaphragmatic rupture with herniation of abdominal organs into the thorax may be present.Key words: polytrauma - acute rupture of diaphragm - chronic rupture - suture - patch.

4864. Schuur, P. M., et al. (1997). "Use of random amplification of polymorphic DNA in a case of Pasteurella multocida meningitis that occurred following a cat scratch on the head." Clinical infectious diseases : an official publication of the Infectious Diseases Society of America **24**(5): 1004-1006.

We cultured Pasteurella multocida from the cerebrospinal fluid (CSF) of a 4-month-old infant who presented with meningitis. The patient had been scratched on the head by a cat. Culture of the cat's claws also yielded P. multocida. The isolates had identical biochemical patterns. Analysis of both strains by random amplification of polymorphic DNA and comparison of these strains with P. multocida strains isolated from other cats showed that the two strains were identical and completely different from the unrelated isolates. Our patient's meningitis most likely resulted from direct inoculation of P. multocida into the CSF.

4865. Schwab, K., et al. (1993). "Residual impairments and work status 15 years after penetrating head injury: report from the Vietnam Head Injury Study." Neurology **43**(1): 95-103.

We investigated the relationship of neurologic, neuropsychological, and social interaction impairments to the work status of a large sample of penetrating head-injured patients wounded some 15 years earlier during combat in Vietnam. Extensive standardized testing of neurologic, neuropsychological, and social functioning was done at follow-up on each head-injured patient (N = 520), as well as on a sample of uninjured controls (N = 85). Fifty-six percent of the head-injured patients were working at follow-up compared with 82% of the uninjured controls. Seven systematically defined impairments proved to be most correlated with work status. These were post-traumatic epilepsy, paresis, visual field loss, verbal memory loss, visual memory loss, psychological problems, and violent behavior. These disabilities had a cumulative and nearly equipotent effect upon the likelihood of work. We suggest that a simple summed score of the number of these seven disabilities can yield a residual "disability score" which may prove to be a practical tool for assessing the likelihood of return to work for patients in this population and perhaps in other brain-injured populations. These findings may also help to focus rehabilitation efforts on those disabilities most likely to affect return to work.

4866. Schwabenlander, M., et al. (2016). "Brain, Craniofacial, and Dental Lesions of a Free-ranging Gray Wolf (Canis lupus) Implicated in a Human Attack in Minnesota, USA." Journal of wildlife diseases **52**(1): 131-137.

We describe significant brain, craniofacial, and dental lesions in a free-ranging wolf (Canis lupus) involved in a human attack. On postmortem examination, the wolf presented asymmetric atrophy and bone remodeling affecting the mandible, incisive, maxilla, lacrimal, palatine, frontal, and ethmoid bones. There was an asymmetrical skeletal malocclusion and dental abnormalities including rotated, malpositioned, partially erupted teeth, and an odontogenic cyst associated with an unerupted canine tooth. Brain changes were bilateral loss and atrophy of extensive cortex regions including olfactory bulb, peduncles, and tract, and the frontal lobe. We highlight the relevance of a thorough postmortem examination of wildlife to elucidate disease-based abnormal behavior as the reason for human-animal conflict.

4867. Schwark, T. and N. von Wurmb-Schwark (2016). "Non-fatal impalement of the brain: A case report." Forensic science international **266**: e10-e13.

We present a rare case of a non-fatal impalement injury of the brain. A 13-year-old boy was found in his classroom unconsciously lying on floor. His classmates reported that they had been playing, and throwing building bricks, when suddenly the boy collapsed. The emergency physician did not find significant injuries. Upon admission to a hospital, CT imaging revealed a "blood path" through the brain. After clinical forensic examination, an impalement injury was diagnosed, with the entry wound just below the left eyebrow. Eventually, the police presented a variety of pointers that were suspected to have caused the injury. Forensic trace analysis revealed human blood on one of the pointers, and subsequent STR analysis linked the blood to the injured boy. Confronted with the results of the forensic examination, the classmates admitted that they had been playing "sword fights" using the pointers, and that the boy had been hit during the game. The case illustrates the difficulties of diagnosing impalement injuries, and identifying the exact cause of the injury.

4868. Schwartz, I., et al. (2008). "Cognitive and functional outcomes of terror victims who suffered from traumatic brain injury." Brain injury **22**(3): 255-263.

PRIMARY OBJECTIVE: To describe the outcomes of terror victims suffered from traumatic brain injury (TBI)., RESEARCH DESIGN: Retrospective chart review of 17 terror and 39 non-terror TBI patients treated in a rehabilitation department during the same period., METHODS AND PROCEDURE: Variables include demographic data, Injury Severity Scale (ISS), length of stay (LOS) and imaging results. ADL was measured using the Functional Independence Measurement (FIM), cognitive and memory functions were measured using the Loewenstein Occupational Therapy Cognitive Assessment (LOTCA) battery and the Rivermead Battery Memory Test (RBMT), respectively., MAIN OUTCOME AND RESULTS: Terror TBI patients were significantly younger, had higher ISS score and higher rates of intracerebral haemorrhage (ICH), brain surgery and penetrating brain injuries than the non-terror TBI group. There was no difference in mean LOS, mean FIM values, mean FIM gain and mean cognitive and memory improvement between groups. Terror victims suffered from a higher percentage of post-traumatic epilepsy (35% vs. 10%, p=0.05), whereas the rate of PTSD and the rate of return to previous occupation were similar between groups., CONCLUSIONS: Although TBI terror victims had more severe injury, they gained most of ADL functions and their rehabilitation outcomes were similar to non-terror TBI patients. These favourable results were achieved due to a comprehensive interdisciplinary approach to terror victims and also by national support which allowed an adequate period of treatment and sufficient resources as needed.

4869. Schwartz, J. A., et al. (1987). "Penetrating trauma of the internal carotid artery at the base of the skull." The Journal of cardiovascular surgery **28**(5): 542-545.

A 42-year-old female sustained a partial transection of the internal carotid artery at the base of the skull from a stab wound of the external ear. The clinical presentation and technical aspects of the surgical treatment are presented. The lesion could not be repaired and was successfully treated by ligation. The various techniques of operative exposure of challenging and unusual high carotid injuries which can be employed to eliminate the risk of cerebral embolism, false aneurysm formation, or carotid artery thrombosis associated with conservative management are reviewed.

4870. Schwarz, Y., et al. (2019). "Nasal blowing induces subcutaneous emphysema post penetrating mastoid tip trauma." International journal of pediatric otorhinolaryngology **117**: 48-50.

We describe the case of a child with an isolated penetrating trauma to the mastoid tip. Nasal blowing consequently induced air bubbles coming through the mastoid cutaneous fistula and causing extensive subcutaneous neck emphysema. A computed tomography (CT) demonstrated a right mastoid tip bone fracture with extensive cervical subcutaneous emphysema. The patient was treated conservatively with antibiotics and did not require operative intervention. His subsequent course was uncomplicated. This case emphasizes the importance of taking seriously even what seems to be a minor skin laceration.

4871. Schyma, C. (2012). "Wounding capacity of muzzle-gas pressure." International journal of legal medicine **126**(3): 371-376.

BACKGROUND: Suicidal gunshot wounds that are caused by ammunition fired from a 9-mm Luger pistol, with direct contact between the gun muzzle and the victim's head, present a serious injury pattern even with full metal jacket bullets. Wound ballistic experiments were performed to clarify whether muzzle gases from the firearm have an additional wounding potential., METHODS: Fifteen head models were prepared as follows: an acryl sphere measuring 14 cm in diameter was completely covered with a layer of silicon that was 3 mm thick. These spheres were filled with 10% gelatine. At 4degreeC, these models were fired at with a 9-mm Luger pistol, loaded with Quick Defense 1 expanding bullets. Five shots were fired with direct muzzle contact, one shot was fired from a distance of 10 cm, four shots were fired from a distance of 2 m, and five shots were fired from a distance of 4 m., RESULTS: Each projectile penetrated the model; all but one projectile deformed regularly. Each acryl sphere shattered into comminuted pieces but was held together by the silicon cover. The gelatine filling was then cut into slices 1 cm thick, and each slice was optically scanned. An evaluation was performed following both Fackler's Wound Profile method and the polygon procedure method. The pattern of gelatine disruption did not differ in shots from intermediate ranges, but the amount of gelatine destruction was always more extended in the case of muzzle contact shots. Depending on the section of the bullet path, crack lengths were 31% to 133% longer in contact shots. The first centimetre and the second half of the bullet path showed the greatest increase., CONCLUSION: The experimental findings prove the wounding capacity of muzzle gases.

4872. Schyma, C., et al. (1997). "The MEN frangible: study of a new bullet in gelatin. Metallwerk Elisenhutte Nassau." The American journal of forensic medicine and pathology **18**(4): 325-330.

Experimental gunshots were made with 9 x 19 mm (9-mm Luger) Frangible ammunition using skin, gelatin, and bones as targets. Direct gunshots penetrated 50 cm into gelatin blocks without mushrooming or fragmentation. Skull bone was easily perforated. Head models were penetrated by the bullets, which broke down to myriad fragments within or outside the head. Gunshots through windshields and steel plates led to dangerous bullet fragmentation with a high risk of injury. Gunshots perforating tibias produced comminuted fractures. In all soft tissues, except the direct gunshots into gelatin, high-resolution radiography revealed many metallic fragments along the bullet path. Clinical radiography can show the larger copper fragments, but the explosion-like distribution of metallic foreign bodies in soft tissue is a serious surgical problem.

4873. Schyma, C., et al. (2015). "The 'triple contrast' method in experimental wound ballistics and backspatter analysis." International journal of legal medicine **129**(5): 1027-1033.

In practical forensic casework, backspatter recovered from shooters' hands can be an indicator of self-inflicted gunshot wounds to the head. In such cases, backspatter retrieved from inside the barrel indicates that the weapon found at the death scene was involved in causing the injury to the head. However, systematic research on the aspects conditioning presence, amount and specific patterns of backspatter is lacking so far. Herein, a new concept of backspatter investigation is presented, comprising staining technique, weapon and target medium: the 'triple contrast method' was developed, tested and is introduced for experimental backspatter analysis. First, mixtures of various proportions of acrylic paint for optical detection, barium sulphate for radiocontrast imaging in computed tomography and fresh human blood for PCR-based DNA profiling were generated (triple mixture) and tested for DNA quantification and short tandem repeat (STR) typing success. All tested mixtures yielded sufficient DNA that produced full STR profiles suitable for forensic identification. Then, for backspatter analysis, sealed foil bags containing the triple mixture were attached to plastic bottles filled with 10% ballistic gelatine and covered by a 2-3-mm layer of silicone. To simulate

backspatter, close contact shots were fired at these models. Endoscopy of the barrel inside revealed coloured backspatter containing typable DNA and radiographic imaging showed a contrasted bullet path in the gelatine. Cross sections of the gelatine core exhibited cracks and fissures stained by the acrylic paint facilitating wound ballistic analysis.

4874. Scialpi, M., et al. (1996). "[Computerized tomography in craniocerebral, maxillofacial, cervical, and spinal gunshot wounds. Part II--Clinical contribution and medico- legal aspects]." La Tomografia Computerizzata nelle lesioni da colpi da arma da fuoco cranio-encefaliche, maxillo-facciali, del collo e vertebro-midollari. Parte II--Contributo clinico e aspetti medico-legali. **92**(6): 693-699.

To assess the diagnostic and medicolegal contribution of Computed Tomography (CT) in patients with craniocerebral, maxillofacial, neck and spine gunshot wounds, we submitted to CT 106 patients with gunshot wounds examined over a 7-year period (February, 1988 to December, 1994). Twenty-four of them had craniocerebral injuries (23%), 9 maxillofacial (8%), 8 neck (8%) and 10 vertebral (9%) injuries. Emergency CT demonstrated the mechanism of the injury, the bullet path and site, the site of bone and/or metallic fragments, and damage extent. In all perforating cranioencephalic injuries (n = 7) intracerebral or extrathecal bone fragments were demonstrated adjacent to the bullet entrance and exit holes, respectively. In injury monitoring. CT showed injury evolution, retained fragments and complications, thus enabling damage extent assessment. High Resolution Computed Tomography (HRCT) was useful in locating minute orbitary retrobulbar and intraspinal fragments. Magnetic Resonance (MR) Imaging in postoperative patients proved a valuable tool to assess the extent of spinal cord damage. To conclude, CT is a useful technique to examine the patients with gunshot wounds, which helps plan adequate treatment and solve complex medicolegal problems.

4875. Sclafani, A. P. and S. J. Sclafani (1996). "Angiography and transcatheter arterial embolization of vascular injuries of the face and neck." The Laryngoscope **106**(2 Pt 1): 168-173.

The condition of patients sustaining penetrating neck trauma often appears deceptively stable, even when major structures have been injured. The clinician must identify patients who require treatment and limit invasive procedures in those without significant injuries. Angiography is often used to search for vascular damage following penetration of the neck and face. The charts of 401 hemodynamically stable patients with penetrating cervicofacial wounds who were evaluated by angiography followed, when necessary by either transcatheter arterial embolization and observation or surgery were reviewed. One hundred twelve patients (27.9%) had 131 vascular injuries identified by angiography; 77 (68.8%) of these patients sustained injuries to zone III of the neck or the face. The most commonly injured vessels were the internal carotid artery (ICA), the vertebral artery, and the external carotid artery (ECA) system. Multiple vessel injuries were seen in 17 (15.2%) of 112 patients and were more likely in patients with wounds in zone III or above than in those wounded in zone II or below (20.8% vs. 2.9%, respectively; $P < .025$). Injuries to the internal maxillary artery (IMA) (60%), ECA (53.3%), and the ICA (30.8%) were also significantly more likely to be accompanied by additional vascular injuries ($P < .005$). No clinically significant venous injuries were missed. Complications were noted in only 4 patients, and no deaths occurred as a result of angiography. Angiography is a safe, effective modality in the head and neck trauma setting. Particular scrutiny should be given to patients with zone III or facial wounds, particularly those with documented ICA, IMA, and ECA injuries, since these patients have a higher incidence of multiple vascular injuries.

4876. Sclafani, S. J., et al. (1985). "The management of arterial injuries caused by penetration of zone III of the neck." The Journal of trauma **25**(9): 871-881.

Penetrating trauma of the neck has been divided into three anatomic locations. Zone III, the subject of this paper, is defined as the area between the base of the skull and the lower border of the mandible. Management of these injuries remains problematic. Clinical assessment may be misleading, exploration may damage surrounding neurovascular structures, and injuries may go undetected. This has led us and others to advocate mandatory angiography before any surgical exploration. This report reviews 46 patients with Zone III injuries with respect to types of injuries, therapy and outcome. Angiography was normal in 22 patients who were treated conservatively with no complications. The remaining 24 patients sustained 39 arterial injuries diagnosed by contrast studies. Eighteen internal carotid injuries were identified in 16 patients. At operation ligation was performed in four patients and revascularization in two patients. One of the repairs subsequently thrombosed. Ten patients were managed nonoperatively by observation (seven patients) or angiographic embolization (three patients). Catheter embolization of the external

carotid or its branches was performed to control bleeding (eight vessels) or close arteriovenous fistulas (two patients). Seven nonbleeding external vessels were successfully managed by observation. Two vertebral artery injuries were diagnosed. One required proximal embolization and distal ligation via occipital craniectomy to control a fistula between the vertebral artery and the jugular vein. Overall mortality was 8.6%. Three of the four deaths were in patients with neurologic deficit on admission. Another died of respiratory arrest. An air embolism resulting in hemiparesis was the only complication of the angiographic studies. We conclude that angiography is essential in Zone III neck wounds. It facilitates triage decisions and, combined with transcatheter embolization, enables the majority of these injuries to be managed without surgical exploration.

4877. Sclaroff, A., et al. (2000). "Dental implantation for restoration of posttraumatic deformities: avulsion injuries." Facial plastic surgery : FPS **16**(2): 153-167.

Soft and hard tissue defects of the cranio- and maxillofacial area, especially after an avulsion injury, are challenging to reconstruct. Sophisticated soft and hard tissue transfer techniques have allowed satisfactory reconstruction of the gross anatomic structure. However, these methods do not allow optimal restoration of fine anatomic detail or function. The advent of dental implants and modified dental implants for craniofacial applications has allowed maximization of cosmetic and functional restoration. Prosthodontists are capable of fabricating subunits of the cranio- and maxillofacial area with fine detail, reproducing the coloring, texture, and idiosyncrasies of a patient's native skin. Dental implant technology has allowed these prostheses to be bone anchored, yielding a reproducible and stable attachment. This method of attachment in turn allows flexibility in the design of the prosthesis, to maximize restoration, and imparts an increased sense of confidence to the patient. Illustrated are six examples demonstrating the versatility of dental implants in the reconstruction of avulsion injuries of the cranio- and maxillofacial complex.

4878. Scofield-Kaplan, S. M., et al. (2019). "Orbital wooden foreign body manifesting as hyperdensity on computed tomography." Journal of AAPOS : the official publication of the American Association for Pediatric Ophthalmology and Strabismus **23**(1): 45-47.

Detection of wooden foreign bodies within the orbit can be difficult on imaging, including computed tomography (CT). When visible, wood appears iso- or hypodense and can mimic air or fat. We report the case of a 3-year-old boy with progressive orbital cellulitis following a penetrating wood injury to the right lower lid. CT imaging revealed a linear hyperdensity contiguous with an orbital abscess. He underwent a right anterior orbitotomy with abscess drainage, during which exploration revealed a 2.3 cm retained wooden foreign body. The appearance of wood as hyperdense on imaging is unusual. In the appropriate context, high clinical suspicion for retained wood should be maintained with any irregularity on CT imaging.

4879. Scolozzi, P., et al. (2007). "Complex orbito-fronto-temporal reconstruction using computer-designed PEEK implant." The Journal of craniofacial surgery **18**(1): 224-228.

Cosmetic and functional reconstruction of large and complex calvarial defects remains a challenge for craniofacial surgeons. Computer-designed alloplastic implants have revolutionized the conceptualization and approach to these reconstructions and have become a reliable and irreplaceable part of the surgical armamentarium. We are reporting a case of complex orbito-fronto-temporal reconstruction using a computer-designed PEEK (polyetheretherketones)-Patient Specific Implant (PSI). To the best of our knowledge, no other similar cases regarding the use of these implants in cranial reconstruction have been reported previously.

4880. Scott, J., et al. (2017). "Video-assisted thoracic surgery for the management of pyothorax in dogs: 14 cases." Veterinary surgery : VS **46**(5): 722-730.

OBJECTIVE: To report the perioperative findings and outcome of dogs undergoing video-assisted thoracic surgery (VATS) for the management of pyothorax., DESIGN: Multi-institutional, retrospective study., ANIMALS: Client-owned dogs (n = 14)., METHODS: Medical records of dogs with pyothorax managed via VATS were reviewed for signalment, history, clinical signs, clinicopathological findings, diagnostic imaging results, surgical variables, bacterial culture and sensitivity results, post-operative management and outcome. VATS was performed after placing a

paraxyphoid endoscopic portal and 2-3 intercostal instrument portals. VATS exploration was followed by one or more of the following: mediastinal debridement, tissue sampling, pleural lavage, and placement of a thoracostomy tube., RESULTS: Two dogs (14%) required conversion from VATS to an open thoracotomy to completely resect proliferative mediastinal tissue. These dogs had severe pleural effusion on preoperative thoracic radiographs and one had severely thickened contrast-enhancing mediastinum on preoperative computed tomography (CT). The cause of pyothorax was identified as a penetrating gastric foreign body (n = 2), migrating plant material (n = 2), and idiopathic (n = 10). The median follow-up time was 143 days (range, 14-2402 days). All dogs were discharged from the hospital and their clinical signs resolved. One patient had recurrence of a pyothorax requiring revision surgery 17 months postoperatively., CONCLUSION: VATS allows minimally invasive treatment of uncomplicated canine pyothorax. Preoperative thoracic CT may help identify candidates for VATS among dogs with pyothorax.

4881. Scribano, P. V., et al. (1997). "Pediatric nonpowder firearm injuries: outcomes in an urban pediatric setting." Pediatrics **100**(4): E5.

BACKGROUND: Approximately 32 000 nonpowder firearm injuries are reported annually with more than 60% occurring in the pediatric population. Case reports of serious and fatal injuries have been described; however, no large inclusive series have been published. We reviewed an 11-year experience of an urban pediatric emergency department to evaluate the circumstances, spectrum of injuries, and outcomes attributable to nonpowder firearms., METHODS: A retrospective, descriptive case series of all children 18 years of age or younger evaluated at an urban children's hospital from January 1983 through December 1994 were eligible for study. Patients were identified using a computerized database, the National Electronic Injury Surveillance System, and the trauma registry in the department of surgery. Medical records were reviewed to collect demographic information, circumstances of injury, anatomic site and type of injury, treatment, and outcomes for nonpowder firearm injuries., RESULTS: One hundred eighty patients were identified, and a complete data set was available for 166 (92%). The mean age was 12 +/- 3.7 years, 24% of children were <10 years old, and 71% of the children were male. Three patients returned with a second nonpowder firearm injury during the study period. Forty-nine percent of injuries were intentional and 44% of all injuries occurred during the summer and early fall months. The most common sites of injury were the extremity/buttocks (39%), head and neck (33%), thorax (13%), and eye (8%). Serious injuries included intracranial hemorrhage, cardiac right ventricle laceration, hyphema, and abdominal visceral injury (liver laceration, pancreatic laceration, intestinal perforation). The majority of wounds required local wound care, and the children (74%) were discharged from the emergency department. Of the patients admitted to the hospital (27%), 45% required operative intervention. There were no deaths. Seven percent (12/166) of patients sustained some functional deficit with 42% (5/12) the result of an ocular injury., CONCLUSION: The majority of nonpowder firearm injuries are minor; however, the potential for serious injury should not be underestimated. Minor injuries can be treated with local wound care and tetanus prophylaxis, and patients can be discharged from the emergency department. Education of parents and children to the potential risks associated with these weapons is essential. Stricter regulations regarding ownership of nonpowder firearms and mandatory safety instruction should be considered.

4882. Scuric, I., et al. (2016). "Post-traumatic epilepsy among patients on stationary rehabilitation after traumatic brain injury." Brain injury **30**(5-6): 777.

Objectives: Trauma is one of the most common causes of symptomatic epilepsy, especially after severe traumatic brain injury (TBI). We analysed the incidence, causes and treatment of post-traumatic epilepsy/seizures (PTE) among patients at rehabilitation after TBI. Methods: We collected data for 102 consecutive patients with an average age 42 ± 17 years, of which 84% were men. The average duration of follow-up after TBI was 229 ± 136 days. In the majority (62 patients or 61%) it was a severe TBI and in 21 or 21% a moderate, the mean GCS after the injury was 7 ± 4. Results: Epileptic seizures occurred in 27 (26%) patients, of which 12 during the acute treatment; 12 patients had recurrent attacks during follow-up. Anti-epileptic therapy (AET) at admission was prescribed in 45 patients and in 10 it was introduced during rehabilitation. The most common AET at admission and at discharge was methylphenobarbital (69% at admission and 36% at discharge), followed by carbamazepine (11% vs 13%) and valproate (9%, both at admission and discharge). At discharge there was a higher prevalence of newer AETs (primarily lamotrigine; only 2% at admission, but 25% at discharge, topiramate 4% and levetiracetam 4%; oxcarbazepine was prescribed in 9% of patients at admission and discharge), only four patients required a combination of several drugs. At seven patients AET was discontinued

during rehabilitation and, for 10, more withdrawal was recommended; three patients continued AET drugs for psychiatric diagnoses. Although patients with PTE had higher incidence of cranial fracture with fragments depression, multiple or bilateral brain contusions and Glasgow coma score after trauma 8 or lower, the differences were not statistically significant. The frequency of subdural, epidural or subarachnoid haemorrhage, brain structures midline shift in the acute phase greater than 5 mm, diffuse axonal injury or penetrating injuries was equally common. The only statistically significant difference ($p < 0.001$) was in a higher incidence of severe disorders of consciousness (minimally conscious and persistent vegetative state) in patients with PTE on admission to rehabilitation. Conclusions: PTE has been reported in about a quarter of patients admitted to rehabilitation after TBI, more often in those with prolonged severe disorders of consciousness. Methylphenobarbital is most commonly used in the prevention and treatment of PTE, at the release there is a tendency of introducing newer AET.

4883. Sebag, J., et al. (1986). "Transorbital penetrating injuries to the frontal lobe." Ophthalmic surgery **17**(10): 631-634.

Three cases of transorbital penetrating trauma to the frontal lobe are reported. These cases are remarkable in that minimal ocular trauma was incurred and excellent vision was preserved. These cases underscore the importance of suspecting the possibility of intracranial injury when evaluating penetrating orbital trauma.

4884. Secer, M., et al. (2007). "Transorbital brain injury by a metallic fragment: a case report." Turkish neurosurgery **17**(2): 163-165.

Because of anatomical configuration of the orbit, the brain can be damaged by penetrating transorbital injuries. At first sight, this type of trauma can be thought of as a solitary eye trauma. In this paper, we report a case who suffered from brain injury by a metallic foreign body which passed into the brain through the orbit. He was operated on urgently at two stages and there was no complication after 14 months of follow-up. Any neurological deficit or deterioration of consciousness would be marked. These types of injuries have to be evaluated systemically. Finally, detailed history, neuroradiological investigations, early surgical exploration and multidisciplinary studies are very important to obtain a good outcome.

4885. Secer, M., et al. (2015). "Penetrating shrapnel injuries of the posterior fossa." European journal of trauma and emergency surgery : official publication of the European Trauma Society **41**(2): 157-160.

BACKGROUND: Gunshot injuries of the posterior fossa are rare and may follow a fatal course. In posterior fossa gunshot injuries, cerebellar hematoma, contusion, obstruction of cerebrospinal fluid (CSF) circulation by the shrapnel, and intracranial hypertension caused by autoregulation loss lead to mortality in the early stage., METHODS: In this study, four cases of patients who underwent surgical intervention after penetrating shrapnel injuries of the pure posterior fossa were evaluated., RESULTS: All of the patients were male; their mean age was 26.5 +/- 5 years. The lowest and highest Glasgow Coma Scale scores were 4 and 12, respectively. Neural injury was detected by computed tomography performed after systemic and neurological examination following admission to the emergency service. The shrapnel was found in the cerebellar tissue in three cases and in the fourth ventricle in one case. Following preoperative procedures, surgery was performed with the patient in the prone position. Postoperative monitoring revealed no CSF fistula, meningitis, or hydrocephalus. None of the patients required revision surgery. There were no postoperative mortalities., CONCLUSION: Due to the small volume of the posterior fossa, acute pathologies may lead to rapid neurological deterioration and death. Early surgical intervention and close postoperative follow-up after penetrating shrapnel injuries of the posterior fossa play a significant role in reducing mortality and morbidity.

4886. Sedney, C. L., et al. (2012). "Penetrating injury to the superior sagittal sinus by a nail in a 4-year-old child: a case report." Pediatric emergency care **28**(11): 1220-1223.

Penetrating head injuries are rare in children, with most injuries being accidental as a result of unsupervised use of sharp objects by young children. We present the case of a 4-year-old boy brought to our emergency department with a nail embedded through a wooden board and into his skull. The nail was determined to be entering the superior sagittal sinus through radiographic imaging. Thus, surgical removal of the nail was determined to be necessary. Inspection revealed a likely through-and-through injury to the sinus, and therefore, because sinus reconstruction was not deemed possible, the sinus was occluded with suture ties both in front and behind the nail before nail removal. Postoperatively,

the patient did well and remained neurologically intact. Investigation for possible nonaccidental trauma was conducted. Although most commonly accidental in nature, nonaccidental penetrating traumas have been reported in both pediatric and adult populations. This patient did well after occlusion of his superior sagittal sinus at the coronal suture after penetrating injury by a nail. Penetrating injury in the pediatric population is predominantly thought to be accidental, but a high index of suspicion should be maintained for possible nonaccidental etiology.

4887. Seex, K., et al. (1997). "Trans-orbital penetrating head injury with a door key." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **25**(6): 353-355.

We report a unique case of transorbital penetrating head injury with a door-key. The case highlights the difficulties of preoperative ophthalmological assessment in the presence of a retained object and discusses the management of this and related injuries.

4888. Segal, D. H., et al. (1994). "Neurological recovery after cranioplasty." Neurosurgery **34**(4): 729-731.

A patient who sustained a gunshot wound to the head was successfully treated with acute neurosurgical intervention. Six months after the injury, cranioplasty was used to repair a large skull defect. After cranioplasty, the patient developed significant improvement in motor function in his left upper extremity, which had been plegic after his injury. Although the mechanism of neurological recovery after cranioplasty is controversial, the occurrence of such improvement may be a sufficient indication for cranioplasty in certain patients.

4889. Segal, J. A., et al. (1999). "Aminoglycoside neurotoxicity involves NMDA receptor activation." Brain research **815**(2): 270-277.

Previous studies have led to the hypothesis that the ototoxicity produced by aminoglycoside antibiotics involves the excitotoxic activation of cochlear NMDA receptors. If this hypothesis is correct, then these antibiotics should also injure neurons within the brain. Because aminoglycosides do not readily penetrate the blood brain barrier, we examined the effects of the aminoglycoside neomycin following intrastriatal injection. Neomycin (10-250 nmol) produced dose-dependent striatal damage manifested as an increased gliosis as measured by: (1) [3H]PK-11195 binding, (2) staining for the astrocytic marker glial fibrillary acidic protein (GFAP) and (3) staining for OX-6, an MHC class II antigen expressed by microglia and macrophages. Co-injection of subthreshhold doses of NMDA potentiates the striatal damage produced by neomycin (10 nmol). Moreover, neomycin-induced striatal damage is attenuated by a combination of the NMDA antagonists ifenprodil and 5, 7-dichlorokynurenic acid. Intrastriatal administration of compounds structurally related to neomycin, but devoid of modulatory actions at NMDA receptors (paromamine and 2-deoxystreptamine), fail to produce neuronal damage. These data support the hypothesis that aminoglycoside-induced ototoxicity is, in part, an excitotoxic process involving the activation of NMDA receptors. Moreover, aminoglycosides may damage the central nervous system in individuals with compromised blood brain barriers. Copyright 1999 Published by Elsevier Science B.V.

4890. Segal, S., et al. (2007). "Gaze-evoked amaurosis secondary to an intraorbital foreign body." Canadian journal of ophthalmology. Journal canadien d'ophtalmologie **42**(1): 147-148.

CASE REPORT: Gaze-evoked amaurosis (GEA) is a transient loss of vision upon eccentric gaze. With return to the primary position of gaze, the process promptly resolves., COMMENTS: We present the first reported case of GEA secondary to an intraorbital foreign body that was resolved surgically in the immediate posttraumatic period.

4891. Segura, T., et al. (2002). "[Prolonged clinical pattern of brain death in patients under barbiturate sedation: usefulness of transcranial Doppler]." Patron clinico de muerte cerebral prolongado en paciente bajo sedacion barbiturica: utilidad del Doppler transcraneal. **17**(4): 219-222.

INTRODUCTION: Throughout the world, is fully accepted that a person is dead when brain death exists. In most situations, neurological criteria permit the diagnosis of brain death, but in some instances, as when high-dose barbiturate therapy has been used, confirmatory testing are required by law., CLINICAL CASE: We report the case of a 17 year-old women who suffered high-dose barbiturate therapy due to post traumatic intracranial hypertension. During the period of the barbiturate infusion and until six days after the suppression of this therapy, neurological exploration and

EEG findings seem to confirm brain death, while transcranial Doppler (TCD) study remained normal., CONCLUSIONS: TCD is a fast, simple and accurate confirmatory testing in the determination of brain death and its findings are not affected by high-dose barbiturate therapy. We think that TCD must be present in all hospitals where mechanical ventilation and support of patients are carried out.

4892. Seidel, B. U., et al. (1983). "[Computed tomographic findings and controls in craniocerebral gunshot wounds]." Computertomographische Befunde und Verlaufskontrollen bei Schadel-Hirn-Schussverletzungen. **26**(6): 172-176.

31 patients with craniocerebral gunshot wounds were examined in the acute phase and 14 out of 22 survivors followed up for a period of up to 3 years. The clinical and CT findings as well as treatment measures are explained. The value of CT is convincingly demonstrated with this type of injury, as with others, but its prognostic value including prediction of follow-up results remains limited.

4893. Seidel, G., et al. (1993). "Transcranial color-coded duplex sonography of intracerebral hematomas in adults." Stroke **24**(10): 1519-1527.

BACKGROUND AND PURPOSE: It is well established from pediatric experience and animal experiments that intracerebral blood can be demonstrated by B-mode real-time duplex scanning. This has recently become feasible in adults as well. The present study investigated the changes in the sonographic appearance of intracerebral hematomas over the course of time., METHODS: Starting in May 1991, 23 consecutive patients with intracerebral hematoma confirmed by computed tomography (21 spontaneous and 2 traumatic hematomas) were investigated within 1 year. They were monitored by repeated ultrasound scanning via the transtemporal approach. The sonographic appearance of the hematomas on B-mode scans and the angle-corrected blood flow velocity in the basal cerebral arteries were assessed., RESULTS: There was unequivocal localization of the hematoma in 18 patients (78%). In 3 cases (13%), an adequate acoustic window could not be found. One small intracerebral hemorrhage was overlooked, and one extensive hemorrhage in the basal ganglia was misdiagnosed as a lobar hematoma. There was an alteration of the appearance of the hematoma with time. This was divided into three sonographic stages (initial stage, days 1 to 5; intermediate stage, days 6 to 10; and capsular stage, from day 10). In 14 of the 20 patients with an appropriate acoustic bony echo window, the blood flow velocity in the middle cerebral artery could be measured; in 1 of these patients, the signs of increasing intracranial pressure were apparent from Doppler frequency spectrum. In 5 patients, the intracerebral hematoma could be imaged but not the ipsilateral middle cerebral artery. One female patient showed cerebral circulatory arrest at the time of examination, which took place within 24 hours after the onset of clinical symptoms., CONCLUSIONS: Most intracerebral hematomas in adults can be imaged in B-mode. Their sonographic appearance changes over the course of the disease. The advantages of this noninvasive method are its easy bedside operation and its suitability for follow-up; it is also less stressful than other imaging procedures. It yields a combination of structural and functional diagnostic information. In approximately 13% of the cases, the investigation was not feasible because of inadequate ultrasonic penetration of the intact skull.

4894. Seider, N., et al. (2006). "Delayed presentation of orbito-cerebral abscess caused by pencil-tip injury." Ophthalmic plastic and reconstructive surgery **22**(4): 316-317.

This report describes the clinical and radiologic findings of a child who was stabbed with a pencil tip in his right upper eyelid, in what initially appeared to be an innocuous injury. The child presented again 3 weeks later with a combined orbital and frontal lobe brain abscess. The mechanism of injury is discussed, the orbital and neuro-surgical interventions are detailed, and the medical treatment is presented. Ophthalmologists should have a high index of suspicion for orbital foreign bodies and possible intracranial injury in cases of penetrating eyelid trauma.

4895. Seifert, L. B., et al. (2019). "Transoral Penetrating Knife Injury in the Oral, Maxillofacial Region: A Case Report." Craniomaxillofacial Trauma and Reconstruction Open **3**(1): E51-E55.

Penetrating injuries are a rare yet complex variety of oral and maxillofacial trauma and often require a multidisciplinary approach to treatment. The primary survey is always the first step in trauma management prior to proceeding with further evaluation and treatment. The following case report discusses the clinical strategy for a rare transoral and trans-spinal penetrating injury. A 42-year-old man presented with a penetrating metal injury through the

oral cavity. A computed tomography scan revealed a 12.8-cm-long knife penetrating through the tongue, floor of the mouth, and hypopharynx reaching the spinal cord in close proximity to the right vertebral artery. The patient did not present with any neurological malfunctions. An emergency tracheotomy was performed for airway protection. A balloon catheter was inserted into the right vertebral artery using interventional angiography to prevent massive bleeding prior to extraction. The knife was then surgically removed, and soft tissue reconstruction was performed without major bleeding. Postoperative magnetic resonance imaging angiography showed no bleeding of the right vertebral artery, but there was mild cerebellar infarction. Early isolated paresis of the right arm returned to nearly normal function within 1 week. This case demonstrates that complex penetrating injuries of the oral and maxillofacial region require a structured and multidisciplinary approach to prevent further side effects and obtain an ideal clinical outcome.

4896. Seikaly, H., et al. (1997). "The clavipectoral osteomyocutaneous free flap." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **117**(5): 547-554.

Microvascular free tissue transfer has revolutionized head and neck reconstruction and currently is considered the most successful and reliable method of primary oromandibular reconstruction. This study was designed to assess the feasibility of full thickness free vascularized transfer of the clavicle based on the clavicular branch of the thoracoacromial artery and the soft tissue component associated with the thoracoacromial axis. Forty dissections of the pectoral region were performed on 26 cadavers. The anatomic relations of the region and the thoracoacromial arterial and venous systems were documented in detail. Selective ink injections of the thoracoacromial arterial branches were also performed on fresh cadavers. The clavicle was supplied mainly by the clavicular artery (medial three quarters), with minor contribution from the deltoid artery (lateral quarter). An average of 16.1 cm (range of 12 to 20 cm) was obtained with total clavicular harvest and the clavicle had sufficient width and height to support dental implants. Two soft tissue donor sites were associated with the thoracoacromial artery: the sternocostal head of the pectoralis major muscle, with the overlying skin supplied by the pectoral artery, and the clavicular head of the pectoralis major muscle, with the overlying skin supplied by the deltoid and clavicular arteries. Sensory innervation of the upper chest was supplied through the supraclavicular nerves, whereas the lateral pectoral nerve supplied motor innervation to both heads of the pectoralis major muscle. The anatomy of the clavipectoral donor site and the first case of full thickness free clavicular transfer for mandibular reconstruction in the English literature are presented. The donor site is an excellent source of well vascularized, thin, pliable, hairless, potentially innervated (motor and sensory) soft tissue, along with up to 20 cm of clavicular bone. The surgical anatomy is familiar to the head and neck surgeon. The harvesting does not require repositioning of the patient and is amenable to a two-team, simultaneous approach. The functional and cosmetic donor site morbidity is minimal even with clavicular harvest. The major disadvantage of this flap is the relatively short pedicle. The authors conclude that the thoracoacromial system provides a free flap with osseous and soft tissue components that are well suited for oromandibular reconstruction.

4897. Seikaly, H., et al. (2007). "Clavipectoral osteomyocutaneous free flap in oromandibular reconstruction." The Journal of otolaryngology **36**(3): 186-190.

INTRODUCTION: Mandibular reconstruction continues to challenge most head and neck reconstructive surgeons despite the tremendous advances in surgical and fixation techniques. We recently described the clavipectoral osteocutaneous flap for mandibular reconstruction. This flap encompasses the clavicle and the clavicular head of the pectoralis major with overlying skin., OBJECTIVES: The purpose of this article is to report our prospective clinical experience with the use of clavipectoral osteocutaneous flap in the reconstruction of oromandibular defects., STUDY DESIGN: Prospective case series., METHODS: Five patients with significant mandibular defects underwent reconstruction using the newly described clavipectoral flap. All patients had shoulder range of motion testing preoperatively and at 3 and 6 months postoperatively. Panorex and bone scans were obtained on the seventh postoperative day., RESULTS: All five flaps survived. The transferred clavicles demonstrated good vascularity on the postoperative bone scans. The shoulder morbidity was minimal, with all patients resuming their preoperative level of activity., CONCLUSIONS: The clavipectoral flap has bone and soft tissue components that are especially suited for composite mandibular defects, but it should be used as a second-line flap owing to the short pedicle and the regular need for vein grafts.

4898. Seitelman, E., et al. (2009). "Young man with fishing injury. Intracranial fishing line sinker." Annals of emergency medicine **54**(6): 854-864.

4899. Seitz, I. A., et al. (2014). "Unusual sequela from a pencil stab wound reveals a retained graphite foreign body." Pediatric emergency care **30**(8): 568-570.

Penetrating pencil-tip injuries are common among children and usually resolve without long-term sequelae. However, failure to detect and remove embedded pencil fragments can result in increased morbidity or misdiagnoses of other, more serious, conditions. We report on the case of a 10-year-old boy stabbed with a pencil on his right chin. Initial treatment in the emergency department included irrigation and closure of the laceration. Following suture removal, the patient returned to the emergency department (with bright-purple drainage from the wound site). Radiographic evaluation led to the discovery of an embedded foreign body requiring surgical removal.

4900. Sejpal, K., et al. (2013). "Cultivated limbal epithelial transplantation in children with ocular surface burns." JAMA ophthalmology **131**(6): 731-736.

IMPORTANCE: Although several reports are available on the use of conventional and cultured limbal epithelium using various substrates in the treatment of limbal stem cell deficiency (LSCD), the patient populations studied have been largely adults. Thus, to our knowledge, the outcomes of this procedure exclusively in a pediatric population have not been reported previously., OBJECTIVE: To report the outcomes of autologous ex vivo cultivated limbal epithelial transplantation (CLET) in pediatric patients with LSCD after ocular burns., DESIGN AND SETTING: A retrospective, interventional case series of patients treated at the L. V. Prasad Eye Institute, Hyderabad, India., PARTICIPANTS: Children up to 15 years with LSCD secondary to chemical or thermal injury who underwent CLET from April 1, 2001, through June 31, 2010, with a follow-up of at least 1 year, were included in the study., INTERVENTION: After a limbal biopsy specimen obtained from a healthy area of the limbus, the limbal epithelial cells were cultured on a denuded human amniotic membrane substrate using a xeno-free explant culture technique. A monolayer of cultivated epithelial cells along with the amniotic membrane was transplanted on the patient's affected eye after pannus excision. In cases of failure, the same procedure was repeated., MAIN OUTCOMES AND MEASURES: Ocular surface stability and visual improvement were the primary and secondary outcome measures, respectively. Success was defined as a stable corneal epithelium without conjunctivalization. Eyes with conjunctivalization and persistent epithelial defects were classified as failures., RESULTS: Of the 107 eyes of 107 patients included in this study, 73 eyes (68.2%) underwent 1 and 34 eyes (31.8%) underwent 2 autologous CLET procedures. At a mean follow-up of 3.4 years, 50 eyes (46.7%) achieved completely epithelialized, avascular, and stable ocular surfaces. At the final visit, 58 eyes (54.2%) had improvement in visual acuity of 0.2 or more logMAR units., CONCLUSIONS: Autologous CLET was successful in restoring the ocular surface and improving vision in almost half of the children blinded by ocular burns.

4901. Sekula-Perlman, A., et al. (1998). "Three unusual cases of multiple suicidal gunshot wounds to the head." The American journal of forensic medicine and pathology **19**(1): 23-29.

We describe three unusual cases of suicide involving multiple gunshot wounds, in which all of the victims suffered gunshot wounds to the head, yet none was rendered immediately incapacitated. Injuries were confined to the same area in two of the cases and were located in different areas in the other case. Two of the cases initially appeared to be homicides rather than suicides.

4902. Selden, B. S., et al. (1988). "Outcome of self-inflicted gunshot wounds of the brain." Annals of emergency medicine **17**(3): 247-253.

A consecutive series of 67 patients who had sustained self-inflicted gunshot wounds of the brain was reviewed retrospectively to evaluate factors determining outcome. Weapon caliber, site of bullet entry, degree of brain wounding on computerized tomographic scan, and presenting Glasgow Coma Scale (GCS) score were examined. Overall mortality, degree of disability in survivors, and survival time after injury in fatally wounded patients were assessed. Ninety-eight percent of all patients with an initial GCS score of 8 or less died. When the GCS score was more than 8, 91% of patients survived (P less than .0001). Survival rate was significantly increased in patients with injury limited to one lobe of the brain, compared with patients with brain wounds of greater severity demonstrated on computerized tomographic scan (P less than .05), while a missile crossing both vertical anatomic planes of the brain or coming to rest in the posterior fossa was lethal in 100% of cases. Survivors scored relatively well on the Glasgow Outcome Scale. Almost all (98%) fatally

injured patients maintained vital functions for a time ample for transportation and evaluation at a major referral center. These findings hold important implications for trauma center and critical care resource allocation as well as organ transplantation programs.

4903. Selesnick, S. H. and A. Patwardhan (1994). "Acute facial paralysis: evaluation and early management." American journal of otolaryngology **15**(6): 387-408.

4904. Seleye-Fubara, D. and E. N. Etebu (2012). "Pathology of cause of death from penetrating weapons in the Niger Delta region of Nigeria: an autopsy study of 254 cases." The Nigerian postgraduate medical journal **19**(2): 107-110.

AIMS AND OBJECTIVES: To study the pattern of death caused by penetrating weapons. This is a prospective autopsy study of 254 cases over 8 years (1995 - 2002), SUBJECTS AND METHODS: A retrospective analysis of all the medico-legal autopsies performed by the authors on bodies in which the circumstances of death suggested the use of penetrating weapons over a period of 8 years was carried out by the authors., RESULTS: A total of 254 bodies that died during close combat, communal clashes, militant attacks and armed banditry of penetrating weapons were recorded. The youngest was 2 years old male while the oldest was 75 years old male. The highest death toll occurred between the ages of 20-49 years 197(77.6% cases) with a peak at the age group 20 - 29 years 75(29.5%) cases. There were 218(85.8%) males and 36 (14.2%) females giving a male to female ratio of 6:1. The most common cause of penetrating death was gunshot missiles 136(53.5%), while the most common anatomic site of the wound was the chest wall 85(33.5%). Instant death occurred in 179(70.5%) cases and haemorrhagic shock caused the death of 229(90.2%) cases, while the brain was the most common organ lacerated 61(24.0%)., CONCLUSION: Penetrating wounds were commonly sustained in close combats, during communal clashes, militant and armed robbery attacks, and youth restiveness in the Niger Delta region of Nigeria. Guns which are prohibited by law and other sharp and pointed instruments were freely used. The condition is preventable by enforcing stringent laws, but it resulted into a lot of mortalities.

4905. Selladurai, B. M. (2011). "Epilepsy in head injury." Neurology Asia **16**(SUPPL. 1): 13-15.

Posttraumatic epilepsy accounts for about 20% of symptomatic epilepsy in the general population and about 5% patients referred to epilepsy centers. Mechanisms that can provoke posttraumatic seizures are still not well understood. The extent of focal tissue destruction is one of the key determinants of risk of seizures. Early posttraumatic seizures can worsen ischemic injury and increase intracranial pressure. Adverse sequelae of late posttraumatic seizures include a higher mortality and personality disorders. Whilst anticonvulsant prophylaxis of early seizures is recommended, such therapy is yet to be proven to prevent late posttraumatic seizures.

4906. Sellon, D. C., et al. (2000). "Hepatic abscesses in three horses." Journal of the American Veterinary Medical Association **216**(6): 882-885.

Hepatic abscesses were diagnosed in 3 adult horses. Two were < 4 years old and had evidence of concurrent immune-mediated conditions, including aseptic arthritis, immune-mediated thrombocytopenia, and immune-mediated anemia. Predisposing factors for hepatic abscess formation in these horses included prior abdominal surgery, proximal duodenitis/jejunitis, inflammatory bowel disease, and a penetrating foreign body in the large colon. Serum hepatic enzyme activities were within or slightly greater then reference limits in all 3 horses. The most pronounced and consistent abnormalities on CBC and serum biochemical analyses were hyperproteinemia, hyperglobulinemia, and a decreased albumin-to-globulin concentration ratio. Hepatic ultrasonography identified hepatic abscesses in all 3 horses. A variety of bacteria were isolated from these abscesses, including Staphylococus aureus and Bacteroides fragilis. One horse developed septic tibiotarsal arthritis, presumably as a result of intermittent bacteremia. Despite aggressive medical treatment, all horses were euthanatized because of a worsening condition and poor prognosis.

4907. Selvanathan, S., et al. (2007). "Penetrating craniocerebral injuries from nail-gun use." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **14**(7): 678-683.

Three patients with penetrating craniocerebral nail-gun injuries are described. In the first patient the nail was impinging on the internal carotid artery (ICA) in the carotid canal. On removal of the nail, the patient developed a false

aneurysm at the site. To our knowledge, this is the first reported case of nail-gun injury affecting the ICA and also the first case of penetrating head injury affecting the ICA in the carotid canal. The second patient had seven intracranial nails in the frontal area. Three nails penetrated the left orbit, one of which perforated the globe. One nail damaged the optic nerve resulting in optic neuropathy. In the third patient the nail extended through the squamous temporal bone into the temporal lobe. All three were managed successfully via closed gentle traction without craniotomy and/or endovascular intervention. The literature is reviewed and management options for penetrating head injuries are discussed.

4908. Selvarajah, S., et al. (2014). "The burden of pediatric spinal cord injury in the united states." Neurology **82**(10).

Objective: To update the epidemiology and burden of pediatric traumatic spinal cord injury (TSCI) in the U.S.Background: The burden of acute TSCI among U.S. children was last described between 1997 and 2000 using inpatient data. Improved estimates using current national emergency department (ED) data will inform resource utilization and injury prevention.Design/Methods: We analyzed the prospectively maintained Nationwide Emergency Department Sample (2007-2010). Persons age <18 years with a diagnosis of acute TSCI were identified using ICD-9 diagnosis codes 806.∗and 952.∗(N=6,132), and weighted to produce U.S. national estimates. Outcomes include incidence of pediatric TSCI, mortality, discharge disposition, and inflation-adjusted charges in 2010 USD.Results: The cumulative incidence of pediatric TSCI remained steady between 2007 and 2010, averaging17.5 per million-population. The median age at presentation was 15 years (Interquartile range IQR=12-16) with majority being males (72.5%). C1-C4 injuries were predominant in children <5 years (47.4%), whereas adolescents aged 16-17 years, were more likely to sustain thoracic level injuries (26.6%), P<0.001. Children <5 years presented with higher injury severity scores (22, IQR=13-29), and concurrent brain injury (24%) compared to older children, P<0.001. Children <5 years were more likely to be injured from a RTA (50.9%) compared to older children. Firearms were implicated in 8.3% of injuries, of which 94.7% were in adolescents aged 13-18 years. Of 35 TSCI-related deaths in the ED, 40% were children aged <5 years. Inpatient admission was necessary in 62.4% of patients. Despite stable incidence rates, average ED treatment charges per visit increased significantly from $3,495 in 2007 to $4,889 in 2010 (P<0.008). The overall cumulative pediatric TSCI ED charge was $17.7 million.Conclusions: The average treatment charge per pediatric TSCI ED visit increased by $1,394 (40%) between 2007 and 2010, although incidence held steady. RTA-related TSCI disproportionately affects young children while firearm-related TSCI is most common among adolescents aged 13-18 years. These findings inform TSCI prevention strategies and support efforts at reducing firearm injuries.

4909. Semkin, V. A., et al. (1996). "[The use of titanium plates and endoprostheses for the mandibular condyles in reconstructive surgery of the mandible]." Ispol'zovanie titanovykh plastin i endoprotezov myshchelkovykh otrostkov v rekonstruktivnoi khirurgii nizhnei cheliusti. **75**(3): 27-29.

Potentialities of titanium plates and endoprostheses of the condyle processes in replacement of the postoperative defects of mandibular bone tissue are discussed. A recently developed Russian kit of titanium plates and instruments and specificities of plasty to repair bone defects using this kit are described. The results of surgical repair in 5 patients subjected to resection of the mandible with exarticulation for tumors or osteomyelitis aftereffects were good: the oval of the face and mandibular function were repaired.

4910. Semple, B., et al. (2016). "Sex-dependent social behavior deficits and neuronal morphology after pediatric brain injury." Journal of neurotrauma **33**: A8-A9.

Chronic social behavior problems after pediatric traumatic brain injury (pTBI) significantly contribute to poor quality of life for survivors, however, the mechanisms underlying such deficits have not been elucidated. We hypothesized that interconnected brain regions comprising the 'social brain network' undergo aberrant neuroplasticity changes during development following pTBI, to influence social functioning at adulthood. We therefore asked whether pTBI influences neuronal morphology in the medial prefrontal cortex (mPFC), a region involved in social cognition and behavior, prior to the development of social problems. Littermate male and female C57Bl/6 mice were subjected to a unilateral controlled cortical impact or sham-operation at postnatal day 21, approximating TBI during early childhood. One cohort were euthanized at 3 weeks post-surgery for Golgi-Cox staining (n = 5/group); a second cohort were maintained until 8 weeks post-surgery for the evaluation of psychosocial and neurocognitive function (n = 8-10/group). Morphological analysis of layer III pyramidal neurons in the ipsilateral mPFC revealed a reduction in dendritic complexity at adolescence after pTBI in male mice compared to sham controls, including fewer branch nodes and ends, as well as

reduced basal dendritic length. By adulthood, consistent with previous studies, male pTBI mice showed deficits in social and sociosexual behaviors. In contrast, mPFC neuroanatomy was unaffected by pTBI in female mice, which also showed a more limited profile of social dysfunction. pTBI mice exhibited robust hyperactivity across multiple paradigms, to a greater extent in males compared to females. Together, our findings demonstrate changes in neuronal morphology, remote from the injury site, several weeks after pTBI in male mice, and associated with the subsequent emergence of social behavior deficits. Sex is a determinant of both regional neuroplasticity and social outcomes after pTBI. It remains unclear whether these changes are an indirect, stress-related consequence of pTBI, or a direct result of aberrant connectivity of the social brain network.

4911. Semple, P. L. and Z. Domingo (2001). "Craniocerebral gunshot injuries in South Africa--a suggested management strategy." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde **91**(2): 141-145.

OBJECTIVE: To determine the outcome of craniocerebral gunshot injuries, analyse factors that affect prognosis and suggest a management protocol., DESIGN: A retrospective analysis of civilian craniocerebral gunshot injuries treated over a 7-year period., SETTING: Groote Schuur Hospital's neurosurgery and trauma unit service., PATIENTS: One hundred and eighty-one patients with craniocerebral gunshot injuries were admitted to the Department of Neurosurgery, Groote Schuur Hospital, University of Cape Town, over a 7-year period and a retrospective analysis of these patient records with regard to outcome and prognostic factors was carried out., RESULTS: Seventy-six patients sustained non-penetrating injuries, 8 (11%) of whom had underlying cerebral injury on computed tomography (CT) scan. The prognosis was good in the case of non-penetrating injuries. One hundred and five patients sustained penetrating injuries and 57% (62) had a poor outcome. A Glasgow Coma Score (GCS) of 5 or less following resuscitation was associated with a 98% mortality rate. CT scan evidence of transventricular injury was associated with 100% mortality, bihemispheric injury with 90% mortality, and diffuse cerebral swelling with 81% mortality., CONCLUSION: Patients with non-penetrating craniocerebral gunshot injuries should all undergo a CT scan as 10% will have cerebral injury. The prognosis is normally good. In penetrating craniocerebral gunshot injuries a GCS of 5 or less, or a GCS of 8 or less with CT scan findings of transventricular or bihemispheric injury have such a poor outcome that conservative treatment is indicated.

4912. Senel, A., et al. (1998). "Pediatric civilian gunshot wounds of the cranium." Ondokuz Mayis Universitesi Tip Dergisi **15**(3): 227-234.

Pediatric civilian gunshot wounds of the cranium is relatively rare condition in the neurosurgical practice. The medical records of pediatric patients at our Neurosurgery Clinic (Ondokuz Mayis University, Medical Faculty, Department of Neurosurgery) treated for civilian gunshot wounds of the cranium were reviewed to determine the clinical, pathological and radiological features, and the outcome of these lesions. In total, 14 (8 boys and 6 girls) children were cared for between 1990 and 1996. The agressive surgical treatment (urgent craniotomy, meticulous wound debridment and the removal of all accessible bone and bullet fragments, as well as other foreign materials, decompression, and evacuation of the hematoma) were performed all patients exept six patients who in condition of neurological areflexic and respiratuar arrest. 7 (%50) patients died. 3 (21%) patients with no neurological deficite, 2 (14%) patients with hemiplegic, and 2 (14%) patients with persistent vegetative state were discharged. The postoperative complications included scalp wound infection and subcutaneous cerebrospinal fluid leaks (One patient, 7%), intracerebral apse (one patient, 7%), and subdural ampiyem (one patient, 7%). The agressive surgical treatment of the gunshot wounds of the cranium is controversial, particularly the patient was brought deep comatose and unresponsive (areflexic) state. The prognostic factors included that the neurological state on arrival, radiological features, motivation for the shooting, and missile velocity. We have reviewed our experience over a period of 6 years with 14 pediatric patients. Our experience has led us to purpose a agressive operative approach for patients with a Glasgow coma score of 6 to 15 on arrival. The patients having bihemisphere injuries with a Glasgow coma score of 3 to 5 on arrival, and particularly when combined with scattering of bone and metal fragments away from the bullet track, had worse prognose in our series. We believe that operative approach is unnecessary for patients having bihemisphere injuries with a Glasgow Coma Score of 3 to 5 on arrival, exept large defect of the scalp and skull.

4913. Seniow, J., et al. (2003). "The cognitive impairments due to the occipito-parietal brain injury after gunshot. A successful neurorehabiliation case study." Brain injury **17**(8): 701-713.

OBJECTIVE: The presented case study describes the beneficial results of the neuropsychological rehabilitation of a gunshot victim, even with late initialization of the therapy--over 1 year after head trauma., DESIGN: A case study of DE, a victim with bilateral damage of the parietal-occipital regions of the brain due to a gunshot., METHODS: Neuropsychological rehabilitation, first preceded by an initial neuropsychological examination (standard psychological tests: WAIS-R, RAVLT, Rey's CFT, BVRT and clinical experiments tailored to DE's condition), was initiated 1 year after trauma. The rehabilitation programme consisted of computer-based tasks, paper-and-pencil exercises, and occupational therapy. The patient's progress was assessed as improvement in performance in standardized tests and computer-based tasks., RESULTS: DE was diagnosed with complex cognitive deficits syndrome, including visual associative agnosia, apraxia, visuospatial and constructive disorders and linguistic defects. After 1 year of rehabilitation the patient's functioning significantly improved as measured by psychological tests and computer-based tasks ($p<0.05$) as well as the evaluation of the patient's quality of life., CONCLUSIONS: The case study demonstrates beneficial effects of neurorehabilitation even initialized at the so-called 'late stage' after a brain injury.

4914. Senoglu, M., et al. (2018). "Neurological recovery after traumatic Cauda Equina syndrome due to glass fragments: An unusual case." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES **24**(1): 82-84.

Penetrating spinal injuries with foreign bodies are exceedingly rare. To date, pathological problems due to glass fragments in the spinal canal have rarely been reported. In this report, the case presenting with a back laceration, leg pain, and leg weakness was found to have glass frag-ments in the spinal canal at the L2-L3 level by lumbar computed tomography and magnetic resonance imaging. After L2 total laminectomy and retrieval of the glass fragments, the dura was re-paired. The patient was discharged from the hospital after complete neurological recovery. In cases of spinal canal injuries due to foreign bodies, early operative decompression of the neural elements is the treatment of choice. Patients with Cauda Equina syndrome due to glass fragments have a good prognosis for functional recovery.

4915. Senol Guven, G. and S. Uckan (2016). "Alveolar transport distraction osteogenesis and implant placement: A new frontier." Journal of oral and maxillofacial surgery **74**(9): e6.

Vertical Alveolar Distraction Osteogenesis (VADO) has been used successfully to increase the height of the alveolus for 2 decades. In large defects VADO planning is sometimes impossible as the amount of native bone over the anatomic structures may not be enough. Onlay bone grafting to these large defects is mostly unsuccessful due to the limited amount of thin mucosa covering the graft. Alveolar transport distraction osteogenesis (ATDO) is a relatively new method and indications, technique, and complications are not well known. ATDO was performed on 10 patients (4 male, 6 female) with 12 defects (3 cleft lip-palate, 3 benign tumor resection, 1 posttraumatic, 2 gunshot injury, 3 post extraction severe atrophy). The location of the defects was the anterior mandible (1), posterior mandible (4), anterior maxilla (5), and posterior maxilla (2). 12 distractors were inserted (2 of them were bilateral, 10 of them were unilateral). The mean age of the patients was 39.1 years. All of the surgical procedures were performed by the same surgeon, and, average bone length gained was 18.2 mm (10-26). One or two teeth were distracted with the alveolar bone depending on the position of the teeth. Implants inserted following 3 months of consolidation period. Three patients needed additional horizontal bone grafting from symphyseal area and to these patients implants were inserted 5 months after onlay bone grafting. The length and diameter of the implants were 11.5-13 mm long and 3.5-4 mm wide. Final prosthetic rehabilitation was performed 3 months after implant insertion. Radiographic examination (panoramic, cephalometric radiographs, CBCT) was performed before and after implant insertion. Photographs were taken of these patients for visual examination. After a mean follow-up of 45 months (range 6-96 months) the survival rate of the 25 implants was 91.4% (2 implant failure). All failures occurred during the early healing period (within 3 months after distraction). ATDO is an alternative treatment used to obtain sufficient alveolar bone and mucosa. No donor site is needed, the amount of augmentation can be controlled and implant insertion time will be reduced. It can be concluded that ATDO can be an effective and reliable method for reconstructing wide alveolar defects with dental implants.

4916. Senthilkumaran, S., et al. (2010). "Penetrating head injury from angle grinder: A cautionary tale." Journal of neurosciences in rural practice **1**(1): 26-29.

Penetrating cranial injury is a potentially life-threatening condition. Injuries resulting from the use of angle grinders are numerous and cause high-velocity penetrating cranial injuries. We present a series of two penetrating head

injuries associated with improper use of angle grinder, which resulted in shattering of disc into high velocity missiles with reference to management and prevention. One of those hit on the forehead of the operator and the other on the occipital region of the co-worker at a distance of five meters. The pathophysiological consequence of penetrating head injuries depends on the kinetic energy and trajectory of the object. In the nearby healthcare center the impacted broken disc was removed without realising the consequences and the wound was packed. As the conscious level declined in both, they were referred. CT brain revealed fracture in skull and changes in the brain in both. Expeditious removal of the penetrating foreign body and focal debridement of the scalp, skull, dura, and involved parenchyma and Watertight dural closure were carried out. The most important thing is not to remove the impacted foreign body at the site of accident. Craniectomy around the foreign body, debridement and removal of foreign body without zigzag motion are needed. Removal should be done following original direction of projectile injury. The neurological sequelae following the non missile penetrating head injuries are determined by the severity and location of initial injury as well as the rapidity of the exploration and fastidious debridement.

4917. Seo, B.-R., et al. (2009). "An unusual stab wound causing a traumatic pseudomeningocele at the craniocervical junction." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **16**(10): 1365-1367.

A stab wound to the craniocervical junction complicated by a pseudomeningocele has been reported rarely. A 65-year-old man was stabbed with a knife, and the blade penetrated the space between the occipital bone and the atlas. On admission, he presented with quadriparesis; the left arm was predominantly affected. The sensory level was at C2 on the left side. T2-weighted MRI showed a focal area of hyperintensity at the cervicomedullary junction, localized to the left of the spinal cord. The wound was carefully cleaned and closed. Follow-up MRI revealed a large pseudomeningocele along the trajectory, which resorbed completely without intervention. The quadriparesis improved progressively, except for the left arm, which improved only slightly. The asymptomatic insignificant meningocele completely improved spontaneously without surgery.

4918. Seo, D. W. and G. Y. Chang (2005). "Missing nail for 22 years." Neurology **64**(6): 1066.

4919. Seok, H., et al. (2021). "Reconstruction of anterior skull base fracture using autologous fractured fragments: A simple stitching-up technique." Korean journal of neurotrauma **17**(1).

Objective: A displaced fracture in the anterior cranial base may be complicated by cerebrospinal fluid (CSF) rhinorrhea and enophthalmos. This study introduces a reconstruction technique with direct dural repair and reduction and fixation of the autologous fractured fragments. Methods: Displaced fractures in the anterior cranial base were reconstructed using a stitching-up technique: A bicoronal scalp incision and frontal craniotomy was performed and the displaced bone was withdrawn. The lacerated dura was repaired primarily using a graft. Small holes were created in the intact cranial bones and the displaced harvest bone. Black silk was passed through the holes and the displaced bone was repositioned on tying the silk. Lumbar drain was not placed in any of the cases. The feasibility and outcome were evaluated. Results: Five patients with displaced skull fractures of the anterior cranial base were included. All cases were men who had a direct impact on the forehead and/or eye. All the displaced fractures occurred in the orbital roof, and ethmoid bone fractures were present in 4 cases. Dural laceration was involved in 4 cases and repaired by placing artificial dura in 3 cases and a pericranial graft in 1 case. Following surgery, all cases were uneventful, and the anterior cranial fossa was well reconstructed. CSF leakage or enophthalmos did not occur in any of the cases. Conclusion: Direct dural repair and autologous stitching-up reconstruction using the fractured fragment could be an effective method to prevent CSF leakage and enophthalmos in displaced fractures of the anterior cranial base.

4920. Seok, H., et al. (2021). "Reconstruction of Anterior Skull Base Fracture Using Autologous Fractured Fragments: A Simple Stitching-Up Technique." Korean journal of neurotrauma **17**(1): 25-33.

OBJECTIVE: A displaced fracture in the anterior cranial base may be complicated by cerebrospinal fluid (CSF) rhinorrhea and enophthalmos. This study introduces a reconstruction technique with direct dural repair and reduction and fixation of the autologous fractured fragments., METHODS: Displaced fractures in the anterior cranial base were reconstructed using a stitching-up technique: A bicoronal scalp incision and frontal craniotomy was performed and the displaced bone was withdrawn. The lacerated dura was repaired primarily using a graft. Small holes were created in the

intact cranial bones and the displaced harvest bone. Black silk was passed through the holes and the displaced bone was repositioned on tying the silk. Lumbar drain was not placed in any of the cases. The feasibility and outcome were evaluated., RESULTS: Five patients with displaced skull fractures of the anterior cranial base were included. All cases were men who had a direct impact on the forehead and/or eye. All the displaced fractures occurred in the orbital roof, and ethmoid bone fractures were present in 4 cases. Dural laceration was involved in 4 cases and repaired by placing artificial dura in 3 cases and a pericranial graft in 1 case. Following surgery, all cases were uneventful, and the anterior cranial fossa was well reconstructed. CSF leakage or enophthalmos did not occur in any of the cases., CONCLUSION: Direct dural repair and autologous stitching-up reconstruction using the fractured fragment could be an effective method to prevent CSF leakage and enophthalmos in displaced fractures of the anterior cranial base. Copyright © 2021 Korean Neurotraumatology Society.

4921. Sepehr, A., et al. (2010). "Novel endoscopic management of penetrating intracranial trauma." The Annals of otology, rhinology, and laryngology **119**(11): 786-788.

We report a unique case of minimally invasive endoscopic removal of a penetrating orbitocranial foreign body (POCFB), and present a review of the literature. A 12-year-old boy was impaled in the orbit with a gate latch. Neurosurgical consultation ascertained that removal via bifrontal craniotomy would necessitate extensive brain retraction and result in permanent anosmia. Attempting nasal endoscopic removal was deemed prudent, given this morbidity and a lack of brain parenchymal violation. The patient recovered without a cerebrospinal fluid leak or other neurologic sequelae. To date, craniotomy is the only reported management of POCFBs in the literature. We herein report the first nasal endoscopic removal of a POCFB.

4922. Seroto, P. M., et al. (2021). "The role of tertiary neurosurgical intervention in non-missile penetrating injuries of the spine." European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society **30**(6): 1397-1401.

PURPOSE: The objective of the study was to determine whether all patients with spinal non-missile penetrating injuries (NMPIs) need to be managed at a tertiary neurosurgical centre., METHODS: A retrospective analysis of clinical, demographic, and imaging records was performed on all NMPI patients referred to the Department of Neurosurgery at Tygerberg Academic Hospital in Cape Town, South Africa, between 1 January 2016 and 31 December 2019., RESULTS: Ninety-six patients were identified (94 males and 2 females) with 35 cervical, 60 thoracic, and 1 lumbar spinal stab. Eighty-six had an incomplete spinal cord injury. Six patients presented with cerebrospinal fluid (CSF) leak, all of which resolved spontaneously. MRI was performed in nine patients. Six patients had retained blades, of which 5 were removed in the emergency room (ER). Surgery was performed in two patients (cervical intramedullary abscess and a retained blade). Two patients developed meningitis, and one an intramedullary abscess. Twenty-two patients had associated injuries (pneumothorax, bowel injury). The average length of stay was 17 days, with 81% being unchanged neurologically. The average time from discharge to leaving the hospital was 11 days., CONCLUSION: Early management of NMPI should include prophylactic antibiotics and wound debridement and X-ray imaging to exclude retained blades. Bowel and lung injury must be managed accordingly. Tertiary neurosurgical referral is not routinely necessary and is only warranted for deteriorating neurology, retained blades not removable in the ER, and respiratory failure secondary to spinal cord injury. Complications include meningitis and persistent CSF leak, which should be referred timeously. Copyright © 2020. Springer-Verlag GmbH Germany, part of Springer Nature.

4923. Serramito-Garcia, R., et al. (2009). "[Epidural haematoma due to an headrest in an adult]." Hematoma epidural secundario al empleo de cabezal autoestatico en un adulto. **20**(6): 567-570.

A head fixation device with pins is commonly used for immobilization of the patients during neurosurgical procedures. Despite its appropriate management, it may be the cause of some serious complications such as skull perforation and intracranial injuries. We report the case of a 19-years-old young admitted for a endoscopic third ventriculostomy who developed an epidural haematoma due to the penetration of the skull by a pin.

4924. Sersar, S. I., et al. (2016). "Impacted thoracic foreign bodies after penetrating chest trauma." Asian cardiovascular & thoracic annals **24**(8): 782-787.

BACKGROUND: Retained foreign bodies in the chest may include shell fragments, bullets, shrapnel, pieces of clothing, bones, and rib fragments. The risks of removal of foreign bodies must be weighed against the complications of leaving them inside the chest., METHODS: We treated 90 cases of retained intrathoracic foreign bodies in patients admitted to 3 tertiary centers in Saudi Arabia between March 2015 and March 2016. Sixty patients were injured by shrapnel, 26 had one or more bullets, 3 had broken rib fragments, and one had a metal screw. The chest wall was site of impaction in 48 cases, the lungs in 24, pleura in 14, and mediastinum in 4., RESULTS: Removal of the retained foreign body was carried out in 12 patients only: bullets in 9 cases, bone fragments in 2, and a metal screw in one. The predictors for removal were bullets, female sex, and mediastinal position with bilateral chest injury, especially with fracture ribs., CONCLUSION: Retained intrathoracic foreign bodies due to penetrating chest trauma are treated mainly conservatively unless there is another indication for chest exploration. Copyright © The Author(s) 2016.

4925. Sertbaş, İ. and M. Karatay (2020). "The effect of the delay between injury and surgery on mortality, morbidity, and complications in craniospinal gunshot wounding." Trauma (United Kingdom) **22**(3): 193-200.

Introduction: The effect of the surgical approach and the duration between the trauma and surgery on the complications, morbidity, and mortality in cranial and spinal penetrating gunshot injuries are investigated. Methods: Evaluation of 63 patients from the Libyan civil war who were referred to the İstanbul Yeni Yüzyıl University Gaziosmanpaşa Hospital neurosurgery clinic for the treatment and surgery between 2015 and 2017. Results: Complications such as meningitis, superficial infection, and abscess developed in 31% of the patients who underwent surgery within the initial 24 h, 58% of the patients who underwent surgery between 24 and 72 h and in all patients who underwent surgery after 72 h. While an improvement was seen in all 14 patients who had preoperative paresis and underwent surgery within 24 h or between 24 and 72 h, only one of the six patients who had paresis and underwent surgery after 72 h improved. One of the patients who underwent surgery within 24 h, three of those who underwent surgery between 24 and 72 h, and four of those who underwent surgery after 72 h died. Conclusion: The complications, morbidity, and mortality increase with a prolonged duration between the injury and surgery after craniospinal gunshot wounding.

4926. Sethi, J. M. and B. Rozdilsky (1978). "Internal carotid artery embolism by shotgun pellet." The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques **5**(3): 325-326.

Various examples of foreign body embolization of cerebral arteries, usually followed by serious consequences, have been reported (Lindberg et al., 1961; Chason et al., 1963; Steele et al., 1972; Wetli et al., 1972). However, a shotgun pellet entering the left atrium of the heart through a gunshot wound of the chest with subsequent embolic occlusion of one of the carotid arteries appears to be unique. It is the subject of this short communication.

4927. Setkowicz, Z. and K. Janeczko (2003). "Long-term changes in susceptibility to pilocarpine-induced status epilepticus following neocortical injuries in the rat at different developmental stages." Epilepsy research **53**(3): 216-224.

In the brain, injury-induced gliosis and axonal sprouting have been regarded as age-dependent repairing processes with, unfortunately, epileptogenic effects. The present study examines whether brains injured at different developmental stages become more or less susceptible to experimentally-induced status epilepticus. In 6- and 30-day-old Wistar rats (P6s and P30s, respectively), a mechanical injury was performed in the cortex of the left cerebral hemisphere. On postnatal day 60, all the animals and naive controls received single intraperitoneally pilocarpine injections to evoke status epilepticus. During a 6-h period following the injection, the animals were observed continuously and motor manifestations of seizure activity were recorded and rated. Seven days after pilocarpine injection, the animals were perfused and their body and brain weights recorded. When compared to controls, P6s showed neither significant variations in their epileptic behavior nor in brain and body weights. In relation to controls and to P6s, P30s presented an extremely high mortality, a significant loss of body weight and much longer-lasting seizures of much higher intensity. The data provide evidence that the long-term variations in susceptibility to experimentally-induced status epilepticus are determined by differences in the brain response to injury at different stages of postnatal development.

4928. Sevillano Torrado, C. and V. Rodriguez Lopez (2015). "Primum non nocere." Ophthalmic plastic and reconstructive surgery **31**(1): e24.

4929. Sezer, C., et al. (2021). "Spontaneous migration of a bullet in the cerebrum." Journal of Surgical Case Reports **2021**(4).

Herein, we report the case of a 32-year-old man who experienced spontaneous migration of a bullet within the brain following a gunshot injury. Emergent computed tomography revealed the bullet located in the posterosuperior side of mesencephalon. During follow-up after 10 days, the neurological status of the patient had worsened. Computed tomography revealed that the bullet had migrated posteriorly and lodged in the occipital lobe. Although a few studies have reported on the spontaneous migration of a bullet within the brain, the present case is unique as the patient examination changed with migration. We recommend serial imaging and surgery in cases of bullet migration in the brain.

4930. Sh, M. E., et al. (2017). "Management of naso-orbito-ethmoid fractures: A 10-year review." Trauma Monthly **22**(3).

Context: The naso-orbito-ethmoid (NOE) area is an intricate structure composed of the nasal, lacrimal, maxillary, frontal, and ethmoid bones. The treatment of NOE fractures is one of the most challenging issues in the management of maxillofacial injuries. The management of these fractures requires a thorough knowledge of midfacial anatomy, surgical techniques, and the available implements in order to obtain optimal aesthetic and functional results. The aim of this study was to review current knowledge (i.e., from the past ten years) concerning NOE fractures and the related surgical techniques. Evidence Acquisition: An extensive electronic literature search was performed via international and national databases, including MEDLINE/PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), DOAJ, Iranian Science Information database (SID), Iranmedex, and Irandoc. Literature published between October 2004 and October 2014 was searched for using specific keywords. The references from each study were also searched. Finally, all articles relevant to the selected keywords and the topic of the study were reviewed. Results: High-energy blunt or penetrating traumas are themostcommoncause of NOEfractures. NOEfractures account forsome5% and 15% of adult and pediatric facial fractures, respectively. These fractures are characterized by three major post-injury symptoms, namely increased intercanthal distance, diminished nasal projection, and impaired nasofrontal and lacrimal drainage. The prompt management of NOE fractures is of the utmost importance in avoiding secondary deformities. Surgical treatment is guided by the pattern and classification of the injury. The surgical approach also varies according to the fracture type and other concomitant facial injuries. If the fractured fragment cannot be reduced satisfactorily by closed reduction, the operation should be converted into an open reduction and internal fixation. The most common method for medial canthopexy is transnasal wiring. Conclusions: Nowadays, advances in radiographic imaging along with the evolution in minimally invasive surgical techniques have led to more conservative treatment modalities thatmayminimize post-injury complications and improve aesthetic outcomes.

4931. Shackford, S. R., et al. (1993). "The epidemiology of traumatic death. A population-based analysis." Archives of surgery (Chicago, Ill. : 1960) **128**(5): 571-575.

Despite the proliferation of trauma systems, there are no population-based data describing the epidemiology of traumatic death. To provide these data, we reviewed all trauma deaths occurring in San Diego (California) County during 1 year. There were 625 traumatic deaths during the study (27.3 deaths per 100,000 population per year). Motor vehicle trauma was the most common cause of injury leading to death (N = 344 [55.2%]; 15.0 annual deaths per 100,000 population). Central nervous system injuries were the most common cause of death (48.5%, or 13.2 deaths per 100,000 population per year). Sepsis was responsible for only 2.5% of the overall mortality. Based on life-table data, traumatic death resulted in an annual loss of 1091 years of life per 100,000 and an annual loss of 492 years of productivity per 100,000. Injury continues to account for an enormous loss of life despite improvements in survival wrought by trauma systems.

4932. Shacklett, R. S., et al. (1974). "A "piggy-back" bullet wound of the head." The American journal of roentgenology, radium therapy, and nuclear medicine **122**(3): 576-579.

4933. Shadid, O., et al. (2008). "Penetrating injury of the maxillofacial region with an arrow: an unsuccessful attempt of suicide." The British journal of oral & maxillofacial surgery **46**(3): 244-246.

We present an unusual case of a penetrating injury, which was an unsuccessful attempt of suicide.

4934. Shadymov, A. B., et al. (2020). "[Actualization of assessment of morphologic features of incisions and chop wounds of 'barrier' tissues of the head]." Aktualizatsiia otsenki morfologicheskikh osobennostei rezanykh i rublenykh povrezhdenii 'bar'ernykh' tkanei golovy. **63**(1): 15-19.

Aim of this study is to determine the influence of the basic conditions of the traumatic interaction of cutting and chopping objects with 'barrier' tissues of the scalp on the formation of morphological signs of damage. It was suggested to perform the comparative analysis of the morphological signs of incised and chopped scalp tissue wounds obtained by changing one given parameter in experimental damage modeling. The influence of the basic conditions of the traumatic interaction of cutting and chopping objects with the 'barrier' tissues of the scalp on the formation of morphological signs of the resulting damage was determined. The effectiveness of the proposed comparative analysis of morphological signs of incised and chopped lesions was confirmed.

4935. Shaffrey, M. E., et al. (1992). "Classification of civilian craniocerebral gunshot wounds: a multivariate analysis predictive of mortality." Journal of neurotrauma **9 Suppl 1**: S279-285.

Management of cerebral gunshot injuries has changed considerably since Cushing's (1916) and Matson's (1948) classification schemes, developed during World War I and World War II, respectively. These military injuries are characterized by either very high mass, low-velocity shrapnel wounds or by high muzzle velocity missiles causing extensive destruction of tissue. The preponderance of low muzzle velocity weapons seen in clinical practice and the availability of computed tomographic (CT) evaluation within minutes after presentation has altered the range of prognostic indicators available to the neurosurgeon and the amount of relative importance placed on each factor. Raimondi and Samuelson (1970) noted this difference in wound ballistics and offered a classification scheme based on initial neurologic assessment. No well-defined classification system for civilian craniocerebral gunshot wounds has been proposed that evaluates and integrates clinical, laboratory, and neuroradiologic data. A retrospective study was performed on all 62 civilians with gunshot wounds to the head admitted to the University of Virginia Hospital between December, 1984, and November, 1990. The patient population consists of 86% males and 14% females, with an age range of 10-72 years; 60% self-inflicted wounds and 32% patients who died en route or immediately upon arrival at the hospital. The overall mortality rate was 55% at 1 week postinjury. Although we have demonstrated an association between some previously defined factors and prognosis in civilian injury, such as admission Glasgow Coma Scale (GCS) (p = 0.001) and initial pupillary response (p less than 0.001), we have also defined other significant predictors of outcome including abnormal coagulation states on admission (p less than 0.001) and the neuroradiologic examination.(ABSTRACT TRUNCATED AT 250 WORDS)

4936. Shagets, F. W., et al. (1986). "Use of temporalis muscle flaps in complicated defects of the head and face." Archives of otolaryngology--head & neck surgery **112**(1): 60-65.

Large defects in the upper two thirds of the face, skull, and skull base pose challenging reconstructive problems. There are a number of applicable reconstructive techniques, all with various advantages and disadvantages, available to otolaryngologists-head and neck surgeons. One method, originally described in the late 1800s, was evaluated by us. Applications of the technique included reconstruction of large defects of the forehead, dura, and anterior skull base, closure of orbital defects, and soft-tissue augmentation of the face. Advantages of this reconstructive technique are the flap's proximity to the defects and its simplicity of execution.

4937. Shagoury, C. and J. Fazio (1990). "Case review. A 23-year-old man with an unusual impalement injury." Journal of emergency nursing **16**(6): 379-381.

4938. Shah, A., et al. (2020). "Impact of World War I on brain mapping." Journal of neurosurgical sciences **64**(1): 113-116.

Although much tragedy was experienced during World War I (WWI), the nature of the war and the advancements of weaponry led to a change in the quality and quantity of injuries which were conducive for study. This paper discusses how trauma during WWI led to advances in brain mapping from occipital injuries. Gordon Holmes was a British neurologist who was able to create a retinotopic map of the visual cortex from studying more than 400 cases of occipital injuries; his work has contributed immensely to our understanding of visual processing. There have been many extensions from Holmes' work in regard to how we analyze other sensory modalities and in researching how the brain processes complex stimuli such as faces. Aside from the scholastic benefit, brain mapping also has functional use and can be used for neurosurgical planning to preserve important structures. With the advent of more advanced modalities for analyzing the brain, there have been initiatives in total brain mapping which has added significantly to the body of work started by Holmes during WWI. This paper reviews the history during WWI that led to advances in brain mapping, the lasting scholastic and functional impact from these advancements, and future improvements.

4939. Shah, A. D. and C. Decock (2011). "Occult orbito-cranial penetrating injury by pencil: role of beta tracer protein as a marker for cerebrospinal fluid leakage." Indian journal of ophthalmology **59**(6): 505-507.

Orbito-cranial foreign bodies present a treacherous situation that can escape detection. The only evidence of these foreign bodies may be the entry wound in the form of a small lid laceration. A two-year-old boy presented with right upper lid laceration following a fall two hours back. Analysis of the fluid around the wound revealed a beta-tracer protein (beta-TP) value of 33.5 mg/l suggestive of cerebrospinal fluid (CSF). Three-dimensional computed tomography (CT) scan revealed a foreign body measuring 4.2 cm x 0.8 cm passing from the orbital roof to the frontal lobe. The foreign body tract was explored through the eyelid laceration and a broken pencil was removed followed by dural patch graft. The patient developed no ocular or intracranial complications. Beta-TP, a highly specific marker of CSF is routinely used in screening patients of neurosurgery and otolaryngology with CSF leaks, however, its use has never been reported in ophthalmic literature based on an online PubMed search.

4940. Shah, H. Y., et al. (2022). "Endoscopic endonasal retrieval of air gun pellet retained in the frontal sinus: A case report." International journal of surgery case reports **96**.

Introduction and importance: Foreign bodies in paranasal sinuses are rarely encountered and most commonly present in the maxillary sinus. Guidelines for managing paranasal sinus object removal are limited due to its rarity. However, there are three major management options: open surgery, endoscopic sinus surgery, and observation. Case presentation: We report a rare case of an 18-year-old boy who underwent extended frontal sinus surgery to retrieve a retained air gun pellet in the right frontal sinus and repair the skull base defect resulting from the air gun pellet. Clinical discussion: Physicians commonly use endoscopic sinus surgery (ESS) for improving sinus drainage in recurrent chronic and acute infective sinusitis. Extended sinus surgery aims to maximize the communication between the paranasal sinuses and the nasal cavity. This extended communication helps improve access to the sinus, enhance drainage, and improve the delivery of topical medications. In addition, the use of ESS with the modified Lothrop procedure allows for better exposure of the skull base, which can help with the repair of a CSF leak. Conclusion: Based on our experience with this patient and similar literature, ESS should be considered a treatment option for patients with retained foreign objects in the frontal sinus.

4941. Shah, K., et al. (2022). "Frequency and Etiology of Maxillofacial Fractures in Tertiary Care Hospital." Pakistan Journal of Medical and Health Sciences **16**(5): 429-431.

Trauma is a global issue that causes illness and death. Maxillofacial fractures are common following trauma. Aims: To determine the frequency and etiology of maxillofacial fractures in oral and maxillofacial trauma patients. Study Design: Descriptive cross-sectional. Methodology: The entire study population was adult having oral and maxillofacial trauma visiting the outpatient/emergency department at Hayatabad Medical Complex, Peshawar from April to October 2018. Patients (n=205) were enrolled. Detailed history with examination was done. An OPG (orthopantomogram) radiographic confirmation of maxillofacial fracture was performed, PA face (Reverse Towne's view open mouth), occipitomental (OM) view, sub-mentovertex (SMV) view and computerized tomography (CT) scan when needed. All this information was recorded on Performa. Statistical analysis: Data was analyzed using SPSS version 26. Results were

presented as frequency and percentage. Results: Majority of patients (56.1%) suffered from road traffic accidents, 3.4% patients had few of them (3.4%) had sports injuries, 11.7% patients had interpersonal violence or firearm injuries while rest (18.1%) had injures from animals. As per maxillofacial surgeries, 3.9% patients had maxilla fractures, 10.7% patients had mandible fractures, 17.8% patients had zygomatic complex fractures, 13.2% naso-orbital fractures, 13.2% orbit fractures, 16.6% had frontal bone fractures, and 34.6% had nasal bone fractures. Conclusion: The study concluded that the most common supporting maxillofacial trauma is young men with a common etiological condition of road accidents.

4942. Shah, M. U., et al. (2012). "Retained crossbow bolt after penetrating facial trauma." Otolaryngology - Head and Neck Surgery (United States) **147**: P129.

Objective: 1) Describe a challenging case of removal of a retained crossbow bolt from the maxillofacial region. 2) Review the surgical management techniques. 3) Review of the literature on crossbow injuries to the head and neck. Method: Case report is of a unique mechanism of penetrating maxillofacial trauma with retained foreign body threatening airway and neurovascular injury. Pertinent literature is reviewed. Results: A 31-year-old man presented after being shot twice in the head with crossbow bolts. He was stable on clinical evaluation, and CT revealed an 8.5-cm retained crossbow bolt extending from the right infratemporal fossa through the pterygopalatine fossa, traversing the nasopharynx with the tip just medial to the left mandibular ramus. There was no apparent vascular injury on CT angiogram. After awake tracheostomy for airway control, the bolt was removed by mandibular swing approach combined with nasal endoscopic assistance. Postoperative course was uneventful and follow-up showed excellent wound healing without complications. Conclusion: Otolaryngologists often encounter penetrating injuries and retained foreign bodies to the maxillofacial region. The unique shape of a crossbow bolt, along with threat of airway and neurovascular injury, created a management challenge. Herein we discuss various surgical approaches and review the literature on crossbow injuries to the head and neck.

4943. Shah, M. U., et al. (2016). "Retained crossbow bolt after penetrating facial trauma." Ear, nose, & throat journal **95**(1): E1-4.

We present an unusual case of a retained crossbow bolt in the maxillofacial area of a 31-year-old man. While crossbow injuries are rare, this case is of interest because otolaryngologists are often faced with treating retained foreign objects after penetrating facial trauma. These cases are difficult to manage because of the complexity and variety of injuries that can occur during both the initial trauma and the removal. We focus on the management of the bolt's removal and provide a brief discussion of the relevant literature on crossbow injuries to the head and neck.

4944. Shah, R. N., et al. (2009). "Endoscopic pedicled nasoseptal flap reconstruction for pediatric skull base defects." The Laryngoscope **119**(6): 1067-1075.

OBJECTIVES/HYPOTHESIS: A prospective study of endoscopic expanded endonasal approaches (EEA) with nasoseptal flap reconstructions revealed anecdotal evidence of less available relative septal length in pediatric patients. Our goal is to use radioanatomic analysis of computed tomography (CT) scans to determine limitations of the nasoseptal flap in pediatric skull base reconstruction and to describe clinical outcomes after using the nasoseptal flap in six pediatric patients., STUDY DESIGN: Six pediatric patients who underwent EEA with nasoseptal flap reconstruction were prospectively analyzed for flap coverage and postoperative cerebrospinal fluid (CSF) leak. Fifty maxillofacial CTs of individuals <18 years of age and 10 adult images underwent radioanatomic analysis., METHODS: Measurements included potential nasoseptal flap dimensions and dimensions required to reconstruct an anterior skull base defect, a trans-sellar defect, and a transclival defect. Measurements were compared to determine if flap size would be sufficient to cover independent EEA defects within different age groups., RESULTS: Two out of three patients <14 years of age had inadequate flap coverage; one had a postoperative CSF leak. Patients >14 years of age had adequate flap coverage. Average potential flap length is less than average anterior skull base length until age 9 years to 10 years, and less than average trans-sellar defect length until age 6 years to 7 years. Septal growth is most rapid between 10 years and 13 years., CONCLUSIONS: : The pedicled nasoseptal flap may not be a viable option for EEA reconstruction in children <10 years of age. This flap is a reliable option in patients >14 years of age, as their septums are comparable to adults. Patients 10 years to 13 years of age require careful consideration of facial analysis and preoperative radioanatomic evaluation on an individual basis. Laryngoscope, 2009.

4945. Shah, S. A., et al. (2022). "Types of Fractures in Cranial Vault Followed by a Head Injury: A Retrospective Cross Sectional Study." Pakistan Journal of Medical and Health Sciences **16**(1): 761-763.

Aim: To assess the types of fracture of cranial vault followed by head injury. Study Design: Retrospective cross-sectional study Place and duration: This study was conducted at Pakistan Institute of Medical Sciences Islamabad, Pakistan from June 2020 to June 2021. Methodology: A total of 125 patients with head injury were considered in this study. Total 69 (55.2%) patients were from rural areas and 56 (44.8%) were from urban areas. Types of cranial vault fractures, their radiological findings and cause of injury were analyzed. Result: Out of 125 patients, 102 were identified with severe head injuries. 53 (42.4%) had a fracture in the frontal bone. 49 (39.2%) patients had got injured due to violent assault. Conclusion: Most of the patients who had received a head injury and frontal bone fracture were from rural areas. The most commonly fractured bone in these cases is the frontal bone. The commonest cause of injury in the head was a violent assault.

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4946. Shah, V. N., et al. (2021). "Chronic sinonasal symptoms due to retained bullet fragments in the skull base." Otolaryngology Case Reports **19**.

Intranasal foreign bodies (FB) are a rare cause of chronic rhinosinusitis in adults. This report describes a unique case of bullet fragments embedded in the sphenoid bone and clivus for 34 years after a gunshot wound (GSW) to the face, leading to chronic rhinosinusitis. Recurrent acute infections were managed with antibiotics; however long-term cure required surgical intervention and removal of the largest bullet fragment. Surgery had been avoided on the patient for decades because of the proximity to critical neurovascular structures in the paracentral skull base, more specifically the sphenoid bone and clivus. Conservative endoscopic sinus surgery with left partial posterior ethmoidectomy and left maxillary antrostomy, followed by drilling of the sphenoid bone and clivus was performed to remove the FB. Bacterial cultures of surgical specimens revealed the presence of Proteus Mirabilis. The patient reported complete resolution of symptoms following surgery, which was maintained at six months follow-up. This case presents a patient with a metallic foreign body in the skull base for greater than 30 years. Removal of the retained metallic fragment addressed the patient's symptoms effectively. Despite the risks of the procedure related to the location of the foreign body, this case highlights the importance of addressing foreign bodies as underlying cause of chronic rhinosinusitis-like symptoms. Endonasal sinus surgery primarily for removal of a foreign body, also allows opening sinus outflow tracts and removing chronically infected bone and soft tissue.

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4947. Shah, V. R. (2008). "Aggressive management of multiorgan donor." Transplantation proceedings **40**(4): 1087-1090.

Transplantation of vital human organs is a lifesaving therapy for patients with end-stage organ failure who are medically fit to undergo the surgical procedure. However, deceased donor management remains one of the most neglected areas in transplantation medicine. Brainstem death leads to hemodynamic, metabolic, and immune consequences. Failure to recognize them and provide adequate physiological support accounts for loss of the scarce source of valuable donor organs. Donor optimization leads to increased organ procurement and contributes to improved organ function in the recipient. This article reviews the management advances and controversies of the brainstem-dead donor in an intensive care unit.

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4948. Shahpurkar, V. V. and A. Agrawal (2008). "Fatal orbitocranial injury by fencing and spectacle sidebar." Indian journal of ophthalmology **56**(4): 345-346.

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4949. Shahpurkar, V. V., et al. (2009). "Intracranial nail insertion as a manoeuvre of witchcraft." Singapore medical journal **50**(4): 443-444.

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4950. Shahzad, M., et al. (2013). "Pattern of mandibular fractures reported at Liaquat University Hospital Hyderabad." Medical Forum Monthly **24**(6): 91-94.

Objective: The study was conducted to analyze the frequency, gender distribution, age groups, mechanism of accident and site involvement of mandibular fractures reported at liaquat university hospital Hyderabad. Study Design:

Retrospective study. Place and Duration of Study: The study was conducted in Department of Oral & Maxillofacial Surgery Liaquat University Hospital Hyderabad from March 2012 to March 2013. Materials and Methods: A data of 228 of patients who had been diagnosed with a mandibular fracture between March 2012 and March 2013 at the Liaquat University Hospital of Hyderabad, Oral & Maxillofacial Surgery Department was retrospectively reviewed. Patients data including gender, age, mechanism of accident, fracture sites were analysed. Results: 166 (72%) male patients and 62(27%) female patients were reported with mandibular fracture. Most common age group was between 30-40 years. Most common mechanism of accident was RTA in 153 (67%)cases followed by fall from height 42(18%) cases. Most common site involved was Parasymphysis in 112(49%) cases followed by angle in 51(22%) cases. Conclusion: The result of this study shows that road traffic accident is most common cause of mandibular fractures in this region.

4951. Shaikh, M. Y., et al. (2018). "Factors predicting poor outcome in gunshot injuries to brain." Medical Forum Monthly **29**(9): 80-83.

Objective: In view of the recent rise in the incidence of gunshot injuries, it is quite mandatory for scientific studies evaluating the prognostic factors contributing to the outcome of such patients. This study aims to identify such factors and evaluate them clinically Study Design: Retrospective study Place and Duration of Study: This study was conducted at the Department of Neurosurgery, Liaquat National Hospital & Medical College, Karachi from July 2012 to July 2017. Materials and Methods: All patients that suffered gunshot injury from July 2012 to July 2017 were included in the study. Exclusion criteria included all patients that were brought dead or expired within two hours of surgery. Duration of stay, CT scan findings and GOS (Glasgow outcome score) were used to evaluate the prognosis of the patients. The prognostic factors evaluated in the study included age, sex, time of presentation and GCS on presentation. Results: This study included a total sample size of 45 patients after inclusion and exclusion based on established criteria. The average age of the patients was 32 years. About 15% of them were female while 85 % were male. Majority of the patients presented more than 24 hours after the incident (71%). Overall mortality was 6 %(3 patients). On further analysis, higher GCS was associated with a better outcome (<0.05). Our study also showed that extensive brain injury was associated with a poor outcome with a statistically significant difference (<0.05) Conclusion: Gunshot injuries to brain represent a high mortality and neurosurgical emergency. Admitting GCS and number of lobes involved were identified to be the most important predictors of poor outcome but if managed aggressively will have favorable outcomes.

4952. Shakir, A., et al. (2003). "A review of nail gun suicides and an atypical case report." Journal of forensic sciences **48**(2): 409-413.

The nail gun was designed as a powerful industrial tool to drive nails into various hard surfaces with ease. Serious injuries associated with the tool are uncommon and deaths are rare. Unintentional injuries normally occur from misuse of the tool or from ricocheting nails. The intentional use of a nail gun to commit suicide is unusual. This paper will review successful and unsuccessful suicide attempts by use of a nail gun. We will present an atypical case of suicide committed with a nail gun by a 46-year-old depressed male investigated by the Allegheny County Coroner's Office in Allegheny County, Pennsylvania in April 2002. This case reports for the first time a unique pathological finding of a ring of bone traveling with the nail, which has not been seen in wounds of the head caused by other types of projectiles.

4953. Shakir, S., et al. (2022). "Anterior Cranial Base Reconstruction in Complex Craniomaxillofacial Trauma: An Algorithmic Approach and Single-Surgeon's Experience." Archives of plastic surgery **49**(2): 174-183.

Management of traumatic skull base fractures and associated complications pose a unique reconstructive challenge. The goals of skull base reconstruction include structural support for the brain and orbit, separation of the central nervous system from the aerodigestive tract, volume to decrease dead space, and restoration of the three-dimensional appearance of the face and cranium with bone and soft tissues. An open bicoronal approach is the most commonly used technique for craniofacial disassembly of the bifrontal region, with evacuation of intracranial hemorrhage and dural repair performed prior to reconstruction. Depending on the defect size and underlying patient and operative factors, reconstruction may involve bony reconstruction using autografts, allografts, or prosthetics in addition to soft tissue reconstruction using vascularized local or distant tissues. The vast majority of traumatic anterior cranial fossa (ACF) injuries resulting in smaller defects of the cranial base itself can be successfully reconstructed using local pedicled pericranial or galeal flaps. Compared with historical nonvascularized ACF reconstructive options,

vascularized reconstruction using pericranial and/or galeal flaps has decreased the rate of cerebrospinal fluid (CSF) leak from 25 to 6.5%. We review the existing literature on this uncommon entity and present our case series of n = 6 patients undergoing traumatic reconstruction of the ACF at an urban Level 1 trauma center from 2016 to 2018. There were no postoperative CSF leaks, mucoceles, episodes of meningitis, or deaths during the study follow-up period. In conclusion, use of pericranial, galeal, and free flaps, as indicated, can provide reliable and durable reconstruction of a wide variety of injuries.

4954. Shaltakova, G. C. and M. A. Mateev (2009). "[Reconstructive operations for post-burn face and neck cicatricial deformities]." Khirurgiia(6): 58-60.

31 patients with post-burn face and neck cicatricial deformities were operated on during the period of 2005-2007. Triangle and trapeziform skin-fascial flap plasty was performed in 24 patients, 7 patients were treated using vascularized tissue flap transplantation. The choice of the method was based on the author's classification of post-burn skin defects. Flap engraftment was observed in 96,8% patients.

4955. Shandra, O. and S. Robel (2020). "Inducing Post-Traumatic Epilepsy in a Mouse Model of Repetitive Diffuse Traumatic Brain Injury." Journal of visualized experiments : JoVE(156).

Traumatic brain injury (TBI) is a leading cause of acquired epilepsy. TBI can result in a focal or diffuse brain injury. Focal injury is a result of direct mechanical forces, sometimes penetrating through the cranium, creating a direct lesion in the brain tissue. These are visible during brain imaging as areas with contusion, laceration, and hemorrhage. Focal lesions induce neuronal death and glial scar formation and are present in 20%-25% of all people who incur a TBI. However, in the majority of TBI cases, injury is caused by acceleration-deceleration forces and subsequent tissue shearing, resulting in nonfocal, diffuse damage. A subpopulation of TBI patients continues to develop post-traumatic epilepsy (PTE) after a latency period of months or years. Currently, it is impossible to predict which patients will develop PTE, and seizures in PTE patients are challenging to control, necessitating further research. Until recently, the field was limited to only two animal/rodent models with validated spontaneous post-traumatic seizures, both presenting with large focal lesions with massive tissue loss in the cortex and sometimes subcortical structures. In contrast to these approaches, it was determined that diffuse TBI induced using a modified weight drop model is sufficient to initiate development of spontaneous convulsive and non-convulsive seizures, even in the absence of focal lesions or tissue loss. Similar to human patients with acquired post-traumatic epilepsy, this model presents with a latency period after injury before seizure onset. In this protocol, the community will be provided with a new model of post-traumatic epilepsy, detailing how to induce diffuse non-lesional TBI followed by continuous long-term video-electroencephalographic animal monitoring over the course of several months. This protocol will detail animal handling, the weight drop procedure, the electrode placement for two acquisition systems, and the frequent challenges encountered during each of the steps of surgery, postoperative monitoring, and data acquisition.

4956. Shang, E. K., et al. (2013). "Endovascular treatment of a symptomatic extracranial vertebral artery aneurysm." Journal of vascular surgery **58**(5): 1391-1393.

Aneurysms of the extracranial vertebral artery are uncommon, with most cases attributed to penetrating head and neck trauma. We report a 29-year-old man with a symptomatic proximal extracranial vertebral artery aneurysm of unclear etiology. This patient's aneurysm was definitively treated after a successful balloon occlusion test of his affected vertebral artery. An endovascular approach was used combining coil embolization of the distal vertebral artery and a covered stent graft in the subclavian. Although aneurysms of this size and location are traditionally repaired with open aneurysmectomy, we show that endovascular approaches can be a safe and effective alternative.

4957. Shankar, S., et al. (2016). "A rare case of Candida brain abscess secondary to metastatic tongue cancer on initial presentation." Chest **150**(4): 448A.

INTRODUCTION: Fungal brain abscesses are rare causes for altered sensorium and they are often resistant to treatment, resulting in high morbidity and mortality. Brain abscesses are commonly caused due to fungal organisms, especially Candida species. CASE PRESENTATION: A 53 year old man with past medical history of diabetes presented to

the emergency department after being found on the floor. The patient was alert and oriented only to place and person. Patient was diagnosed with diabetic ketoacidosis, acute kidney injury, acute pancreatitis for which he was appropriately treated. Computed tomography (CT) abdomen was consistent with left pyelonephritis and prostatic abscess. Initial urine, blood and stool cultures revealed Candida albicans. Intravenous micafungin and fluconazole were instituted based on culture reports. HIV test was negative. Magnetic resonance Imaging (MRI) of brain demonstrated ring enhancing lesions with vasogenic edema and abnormal restricted diffusion (Figure 1A & 1B). Lumbar puncture was noncontributory. Treatment was changed from micafungin to liposomal amphotericin B with fluconazole with which patient demonstrated both clinical and radiological improvement (Figure 2A &2B). Further evaluation showed an enhancing tongue mass with cervical lymphadenopathy. Biopsy proved the presence of Stage IVA squamous cell cancer of the tongue. Early neoplastic markers, Anti-Hu and Anti-Yo antibodies were negative. DISCUSSION: Candida cerebral abscess are mostly diagnosed at autopsy. An autopsy series demonstrated that up to 6% of patients with systemic candidiasis have evidence of undiagnosed CNS involvement as well. Risk factors include penetrating trauma, neurosurgical intervention, IV drug abuse, corticosteroid use, and malignancies. Candida brain abscesses can also be secondary to the infection of the adjacent structures or be secondary to hematogenous spread from endocarditis, intrabdominal or genitourinary tract infections as in our case. Risk factors present in our patient included diabetes mellitus and malignancy. Only 55% of blood cultures and 23% of lumbar puncture are positive for Candida1. CT and MRI are the preferred imaging modalities for diagnosing brain lesions and monitoring response to therapy. A definitive diagnosis can be achieved from stereotactic brain biopsy, although this is rarely reported. Infectious diseases society of America recommends liposomal Amphotericin B with flucytosine for several weeks to manage Candida brain abscess, switching to azole based therapy. CONCLUSIONS: This case demonstrates the need to consider fungal brain abscesses, as differentials for altered mental status and that with the aid of MRI and effective management, patients may improve neurologically as seen in this patient.

4958. Shannon, R. J., et al. (2014). "Monitoring vigabatrin in head injury patients by cerebral microdialysis: obtaining pharmacokinetic measurements in a neurocritical care setting." British journal of clinical pharmacology **78**(5): 981-995.

AIMS: The aims were to determine blood-brain barrier penetration and brain extracellular pharmacokinetics for the anticonvulsant vigabatrin (VGB; gamma-vinyl-gamma-aminobutyric acid) in brain extracellular fluid and plasma from severe traumatic brain injury (TBI) patients, and to measure the response of gamma-aminobutyric acid (GABA) concentration in brain extracellular fluid., METHODS: Severe TBI patients (n = 10) received VGB (0.5 g enterally, every 12 h). Each patient had a cerebral microdialysis catheter; two patients had a second catheter in a different region of the brain. Plasma samples were collected 0.5 h before and 2, 4 and 11.5 h after the first VGB dose. Cerebral microdialysis commenced before the first VGB dose and continued through at least three doses of VGB. Controls were seven severe TBI patients with microdialysis, without VGB., RESULTS: After the first VGB dose, the maximum concentration of VGB (Cmax) was 31.7 (26.9-42.6) mumol l(-1) (median and interquartile range for eight patients) in plasma and 2.41 (2.03-5.94) mumol l(-1) in brain microdialysates (nine patients, 11 catheters), without significant plasma-brain correlation. After three doses, median Cmax in microdialysates increased to 5.22 (4.24-7.14) mumol l(-1) (eight patients, 10 catheters). Microdialysate VGB concentrations were higher close to focal lesions than in distant sites. Microdialysate GABA concentrations increased modestly in some of the patients after VGB administration., CONCLUSIONS: Vigabatrin, given enterally to severe TBI patients, crosses the blood-brain barrier into the brain extracellular fluid, where it accumulates with multiple dosing. Pharmacokinetics suggest delayed uptake from the blood.

4959. Shanti, R. M., et al. (2014). "Application of maxillomandibular fixation for management of traumatic macroglossia: A case report." Craniomaxillofacial Trauma and Reconstruction **8**(4): 352-355.

We present a case of a 14-year-old adolescent boy who has oral cavity after gunshot wound to the tongue presenting with hemorrhage from the tongue requiring coil embolization of the right lingual artery. The patient subsequently developed macroglossia, which was managed with maxillomandibular fixation for a period of 3 weeks with complete resolution of glossal edema.

4960. Shapiro, B. I. (1949). "[Diagnostic errors in cerebral hemorrhages caused by cranial gunshot injuries]." Oshibki diagnostiki mozgovykh krovoizliyanii pri ognestrelnykh travmakh cherepa. **18**(1): 70.

4961. Shapiro, L. (1973). "Unusual foreign body." Oral surgery, oral medicine, and oral pathology **36**(2): 288-289.

4962. Shapiro, M. J. (1981). "Use of trapezius myocutaneous flaps in the reconstruction of head and neck defects." Archives of otolaryngology (Chicago, Ill. : 1960) **107**(6): 333-336.

The trapezius myocutaneous flap of skin and muscle has, as its major blood supply, the superficial branch of the transverse cervical vessels, which is used as a pedicle. The flap may include the scapular spine as a viable bone graft for mandibular defects. Anatomic and surgical experiences have verified the feasibility of using this flap. The intended vascular pedicle arises separately from the subclavian artery in 25% of these cases. Surgical results using the flap have been excellent. Above the level of the mandible, the flap may lack adequate length. It has been used with success to repair the tongue, floor of the mouth, pharyngeal wall, and skin surface. It is particularly impressive as a method of repairing mandibular defects.

4963. Sharif, S., et al. (2000). "Transnasal penetrating brain injury with a ball-pen." British journal of neurosurgery **14**(2): 159-160.

We report a case of a 44-year-old man with 1 day's history of epistaxis. He was an in-patient in a psychiatric ward with a history of depression. He had CSF rhinorrhoea, was confused and had no focal neurological deficits. A full length pencil was removed from his left nostril in the emergency department. CT of the brain revealed a tract, but also suggested another foreign body in the inter-hemispheric space. He had a para-sagittal craniotomy and a 14 cm ball-point pen was found lying between the two cerebral hemispheres. This was removed and the patient made an uneventful recovery. This is the first report of an attempted suicide by transnasal insertion of a ballpoint pen intracranially.

4964. Sharma, A., et al. (2019). "Airway management in prone position following penetrating iron rod injury in back: An anaesthetic challenge." Indian Journal of Anaesthesia **63**(12): 1039-1040.

4965. Sharma, A., et al. (2016). "Intoxication of engineered nanoparticles in cold environment exacerbates ischemia and brain pathology following trauma." Journal of cerebral blood flow and metabolism **36**: 266.

Military personnel often engaged in peace keeping or combat operation have to work in very cold environment across the Globe. When these soldiers are inflicted with brain or spinal cord injury, their pathological outcome may be more severe in cold environment as compared to room temperature. In addition, these soldiers also are exposed to a variety of nanoparticles (NPs) emanating from the environment or following missile or gunpowder explosions. Thus, a combination of NPs and cold environment may alter the course of brain pathology and affect therapeutic potentials of drugs. In present investigation we examined the influence of cold environment with or without NPs intoxication on the pathophysiology of blood-brain barrier (BBB), brain edema and cellular injuries in a well-controlled brain trauma model. Male Wistar rats were (age 10-12 weeks) exposed to cold chamber maintained at 4°C for 2 h daily for 8 weeks. Traumatic brain injury similar to piercing object in the brain was produced by a focal incision of the right parietal cerebral cortex (3 mm deep and 5 mm long) after opening a burr hole into the skull in both cold reared and rats placed at controlled room temperature (21°C). In separate group of rats Ag, or Cu NPs (50-60 nm; 50 mg/kg, i.p.) was administered daily for 1 week and exposed either cold environment or kept at room temperature for 8 weeks. These NPs intoxicated animals were also traumatized in identical manner. In these groups of rats, regional cerebral blood flow (rCBF) was measured using microspheres technique. Also, the BBB, brain edema formation and neuronal injuries were examined. To study the drug effects on neuroprotection identical group of rats were treated with cerebrolysin, a multimodal drug either alone or tagged with TiO2 nanowires after 2 and 4 h of brain injury. The animals were allowed to survive 24 or 48 h after trauma. Our observations show that identical trauma to the brain resulted in aggravation of regional ischemia, breakdown of the BBB, edema formation and cell injuries in animals exposed to cold environment as compared to the group placed at room temperature. In addition, NPs intoxicated group showed additional deterioration of cerebrla circulation and brain pathology in combination with cold exposure as compared to animals placed normal

room temperature. These pathological effects were progressive in nature. Treatment with cerebrolysin (2.5 or 5 ml/kg, i.v.) significantly reduced trauma-induced pathology and enhanced cerebral circulation in normal animals kept at room temperature if given after 4 h of insult. On the other hand higher doses of cerebrolysin (7.5 ml or 10 ml/kg) is needed to induce neuroprotection in rats that were exposed to cold environment before injury. In case of NPs exposure in cold environment TiO2 nanowired delivery of cerebrolysin is needed to achieve comparable neuroprotection. These observations are the first to show that cold environment with NPs exposure exacerbates brain pathology after trauma and in such situations, nanodelivery of neuroprotective drugs e.g., cerebrolysin is needed for effective therapy.

4966. Sharma, A., et al. (2017). "Emergent skull-base mesh cranioplasty for large defects using titanium implants in severe head trauma: A case report of difficult cranionasal separation." Journal of Neurological Surgery Part B: Skull Base **78**.

Introduction: Large defects of the anterior/central skull base are a niche pathology that infrequently occurs in the setting of traumatic head injuries, more specifically high impact motor vehicle accidents and self-inflicted gun shout wounds to the head. Case Description: This 37-year-old otherwise healthy male presented to our level-1-trauma-center in 2012 after a self-inflicted gunshot wound to the face and head. He had an entrance wound in the submental region, with extensive comminuted facial fractures (involving the mandible, mid face, and anterior skull base). Initial CT scan demonstrated a severely comminuted mandible, palatal defect with associated comminuted midface fractures, and anterior skull base defect involving frontal sinus, cribriform plate and orbital roof. CT scan of the head showed an 11 cm subdural hematoma with midline shift and uncal herniation, for which he underwent emergent craniotomy and evacuation of subdural hematoma. His ICP drain was removed, but he developed massive CSF rhinorrhea as a result of his cranial base defect. On day 10, he underwent an open-approach anterior skull base reconstruction using titanium mesh cranioplasty. He tolerated the procedure well, but recovery was complicated by development of cerebritis and brain abscess in the frontal lobe. He improved with drainage of the abscess and antibiotic treatment without initial improvement in cognitive function. Repeat CT after 1 month revealed persistent pneumocephalus in communication with the air space of the nasal and oral cavities. Exam under anesthesia demonstrated a 2.5-cm irregular palatal defect leading from the oral cavity to the nasal cavity, a tract leading to the left frontal sinus where exposed mesh titanium plate was visible. A stage 2 reconstruction was performed with composite free graft of cartilage/bone/mucosa. One month after, a flexible nasal endoscopy demonstrated a viable graft in place and a CT scan demonstrated resolution of pneumocephalus. After enduring cranionasal separation was achieved, the otorhinolaryngology team then repaired the extensively comminuted facial fractures based on CT-guided design of reconstruction plates for his midface fractures. In collaboration with oromaxillofacial surgery, nonviable portions of mucosa and underlying dentition, maxilla, and palate were removed. The resulting palatal defect was occluded with a temporary acrylic obturator. A dental prosthesis was fashioned to obdurate the palatal defect and bridge the maxilla. At the time of writing, the patient had experienced sufficient cognitive improvement for minimal assistance living at home. Discussion: Cranioplasty is required in cranial trauma patients with large basal defects, for physiologic restoration of neurovascular structures, cosmesis and prevention of CSF leak. Several materials can be used to reconstruct cranial defects, and choice should be guided by consideration of biocompatibility, MR- and CT-compatibility, malleability and ease of surgical manipulation, optimal structure, weight, and stress-bearing capability, and finally cost. In the setting of acute trauma, however, the choice of material is narrowed by time-sensitive conditions that necessitate efficient decision-making, surgical planning, and operative action. Titanium-mesh is ideal and allows for easy surgical manipulation and contouring to the cranial defect, increasing accuracy of graft reconstruction and reducing surgical morbidity and mortality.

4967. Sharma, B. R. and M. Sharma (2005). "Severe post thermal burn cicatricial ectropion with corneal ulceration: an illustrative case." JNMA; journal of the Nepal Medical Association **44**(159): 102-105.

Management of postburn cicatricial ectroption of the upper lid is always a challenge for the oculoplastic surgeon, as they are often associated with exposure keratitis and ulceration. Traditionally, split thickness grafts have been described for upper lid reconstruction and tarsorrhaphies have been discouraged. We present a case of corneal ulceration associated with postburn cicatricial ectropion presenting 10 years following the initial trauma. The patient underwent full thickness skin grafting and tarsorrhaphy to release the ectropion with resolution of corneal ulceration. We believe that full thickness skin grafts and tarsorrhaphy are effective in correcting upper lid cicatricial ectropion, without functional compromise.

4968. Sharma, G., et al. (2021). "A Rare Case of Transorbital Penetrating Intracranial Injury by a Screw." Indian Journal of Neurotrauma **18**(1): 91-92.

4969. Sharma, H. S., et al. (2013). "Nanoparticles exacerbate brain pathology and sensory motor disturbances following concussive brain injury." Cell Transplantation **22**(5): 915-916.

Concussive brain injury (CBI) as a result of roadside blast or missile explosion is quite common in military personnel engaged in combat operations across the World. CBI is often associated with mild to moderate brain dysfunction and alterations in cognitive and sensory motor functions. However, these CBI symptoms could be further altered by acute or chronic exposure to various nanoparticles present in the environment or due to gunpowder explosion. In the present investigation effects of SiO2 and carbon nanoparticles (CNPs) on CBI induced pathophysiology was examined in a rat model. The CBI was produced in Equithesin anesthetized (3 ml/kg IP) rats by inflicting a blunt head injury on right parietal skull bone using a 114.6 g of cylindrical iron rod tapering towards one end (2 mm2) not pointed enough to pierce the skull from a height of 20 cm. This weight and distance will result in an impact injury of 0.224 N on the right parietal skull surface without breaking it. In a separate group of rats SiO2 (50-60 nm) or CNPs (45-50 nm) were administered daily in a suspension of Tween 80 at a dose of 50 mg/ kg (IP) for 7 days. In these nanoparticle-treated animals, CBI was inflicted on the 8th day. CBI in normal animals resulted in a marked increase in blood-brain barrier (BBB) disruption and brain edema formation that was most marked in the contralateral left half as compared to the injured ipsilateral side. Interestingly SiO2 treatment resulted in the most marked aggravation of BBB leakage and brain edema compared to CNPs intoxication. However, in nanoparticle-treated injured rats, the left hemisphere was also more adversely affected than the right injured hemisphere. These pathological changes increased over time. Thus, pronounced changes were seen after 8 h CBI and increased further at 24 h after CBI. CBI in normal animals did not result in any marked changes in cognitive and sensory motor disturbances up to 5 h. However, behavioral dysfunctions were prominent after 8 and 24 h CBI in a progressive manner. On the other hand nanoparticle-treated rats showed profound behavioral changes at 5 h after CBI that worsen further with the advancement of time. Taken together, our observations show that nanoparticle intoxication exacerbates CBI-induced brain pathology and behavioral disturbances. These pathophysiological changes following CBI largely depend on the nature of nanoparticles intoxication and duration of trauma.

4970. Sharma, M., et al. (2021). "Delayed Cerebral abscess following a retained shrapnel." Medical Journal Armed Forces India.

Retained foreign bodies following penetrating brain injuries continue to pose therapeutic dilemmas. Previously used aggressive approach involving extensive wound debridement and removal of foreign bodies caused additional neurological deficit with higher mortality. Less aggressive approach used more recently involving decompressive craniectomy has lead to higher incidence of retained foreign bodies with potential of infective sequelae. We describe one such case where, in presence of a retained foreign body, an intracranial abscess formed after a gap of 17 yrs. The case has peculiar radiological and morphological findings.

4971. Sharma, M., et al. (2021). "Craniocerebral missile injuries in a combat zone: spectrum of injuries and lessons learnt." Medical Journal Armed Forces India **77**(4): 382-389.

Background: High-velocity missile injuries are commonly encountered in war or war-like situations. Aggressive resuscitation, early evacuation to neurosurgical center, and application of neurosurgical principles remain tenets of success. Methods: The spectrum of injuries and clinical profile of 14 such cases with craniocerebral missile injuries managed at our center in the northern sector were included. Site of injury, GCS at presentation, associated injuries, surgical intervention, duration of hospitalization, and recovery of the patient were analyzed. Results: Five patients had sustained gunshot wounds, and nine patients had sustained shrapnel injuries. Thirteen patients were deeply comatose, and one patient was conscious. The entry wound was in frontal lobe in eight patients, and in four patients, it was in the faciocranial area. Ten patients had Glasgow Coma Scale (GCS) less than 8 at presentation. Surgical intervention was required in 13 patients, including 11 decompressive craniectomies and anterior skull base repair in four patients with faciocranial entry wound. One patient expired during initial resuscitation, and one patient died in the postoperative period. Location of injury was the single most important determinant of outcome. Conclusion: An early decompressive

craniectomy provides a reasonable chance of recovery. Aggressive debridement involving track explorations, lobectomies, or removal of retained shrapnels is not beneficial. Injuries to the skull base and violation of sinus spaces predispose these patients to cerebrospinal fluid leaks and infective sequelae. All these patients require aggressive postoperative intensive care and rehabilitation.

4972. Sharma, P. G. and D. A. Rajderkar (2018). "Forensic Radiology to the Rescue: Prenatal imaging used to solve a case of a newborn with suspected non-accidental trauma." Journal of Forensic Radiology and Imaging **12**: 72-75.

The allegation of child abuse, or non-accidental trauma, is very serious and can have a devastating impact on children and their families. However, the lack of recognition of injuries resulting from abusive incidents can be equally detrimental. When a child presents to the emergency facility with a suspicious injury it is of the utmost importance that a well-documented medical history be obtained. We present a case of a 3-day old infant sent to the pediatric ER after the pediatrician noted bruising over the right shoulder and clavicle. A subsequent skeletal survey performed demonstrated a mildly depressed skull fracture and an overriding displaced right clavicular fracture raising a concern of non-accidental trauma (NAT). Upon further review of the patient's history, it was noted that the mother was involved in a high- speed motor vehicle collision on the day of delivery. Review of the mother's body trauma computed tomography (CT) scan revealed that the injuries were, in fact, sustained in utero and obviating the need for further NAT work up and investigation. This case demonstrates forensic use of radiologic images to establish a diagnosis of an accidental trauma.

4973. Sharma, S., et al. (2018). "Clinical characteristics and visual outcome, prognostic factor, visual acuity and globe survival in posterior segment intraocular foreign body at Tilganga Institute of Ophthalmology." Nepalese journal of ophthalmology : a biannual peer-reviewed academic journal of the Nepal Ophthalmic Society : NEPJOPH **10**(19): 66-72.

PURPOSE: To evaluate clinical characteristics, visual outcomes and globe survival after intraocular foreign body removal from posterior segment via pars plana approach., METHODS: A hospital based retrospective study. All the patients of penetrating eye injury with intraocular foreign body in posterior segment as detected by computed tomography were enrolled from 2012 to 2014., RESULTS: Thirty patients of 30 eyes were included. The mean age was 27.7 years. (2-52). Twenty-four (80%) were male. Out of 30 eyes 19 (63.3%) eyes had injury at Zone 1 and 11 (36.7%) eyes had injury at Zone 2. The mean time spent between primary repair following surgery and intra ocular foreign body removal, was 15.47 days. Retinal detachment and endophthalmitis prior to intraocular foreign body removal was present in 9/30 of eyes. We looked for correlation between post operative Phthisis bulbi with zone of injury and pre operative endophthalmitis and preoperative retinal detachment. However, p value for the above correlation was more than 0.552 and 0.815 respectively, which was statistically not significant., CONCLUSIONS: The eyes with posterior segment intraocular foreign bodies showing clinical features of preoperative endophthalmitis, retinal detachment and the zone of injury also did not have any direct significance with globe survival. Copyright © NEPjOPH.

4974. Sharp, N. and K. Tieves (2015). "Pediatric Head Trauma." Journal of Pediatric Intensive Care **4**(1): 47-54.

Traumatic brain injury (TBI) refers to a spectrum of brain injury that can result in significant morbidity and mortality in pediatric patients. Pediatric head trauma is distinct from adult TBI. The purpose of this review article is to discuss pediatric TBI and current treatment modalities available.

4975. Sharun, K., et al. (2020). "Diagnosis and surgical management of an intraocular foreign body secondary to ballistic wound in a Rhesus macaque (Macaca mulatta)." Iranian Journal of Veterinary Research **21**(3): 234-237.

Background: Intraocular foreign bodies (IOFBs) such as air gun pellet is a rare finding in wild animals like Rhesus macaque (Macaca mulatta). The purpose of the present scientific report is to describe the surgical retrieval of IOFB secondary to ballistic wound in a wild Rhesus macaque. Case description: A juvenile female wild Rhesus macaque was brought with the history of swollen and inflamed right eye for the past several days. Findings/treatment and outcome: Clinical examination revealed presence of partially healed wound over the dorsal eyelid. Radiographic examination revealed the presence of a metallic foreign body inside the right orbit. Inflamed and persistently closed eyelid prevented the further localization of the metallic foreign body. Lateral canthotomy was performed under general anesthesia. Following the failure to recover the metallic foreign body from the ocular adnexa, right eye vitrectomy was performed to retrieve the IOFB. The metallic foreign body was recovered from the posterior chamber of the right eye. Due to the poor

prognosis of the already damaged eye, enucleation of the eye was performed which was followed by tarsorrhaphy. Further examination of the foreign body identified it as a 4.5 mm (.177 Calibre) air gun pellet. Post-operatively animal was treated with antibiotics and anti-inflammatory drugs. The animal recovered uneventfully. Conclusion: Intraocular foreign bodies secondary to gunshot wound should always be considered as a surgical emergency. Enucleation should be performed in cases having poor prognosis to avoid further complications especially in wild animals like Rhesus macaque.

4976. Shashidhar, M. P. and H. K. Thombre (2015). "Prosthetic rehabilitation of a serving soldier with custom made ocular prosthesis." Medical Journal Armed Forces India **71**: S248-S250.

Eyes are the prominent organs of the facial structure and first feature to be noticed during interactions. Loss of an eye can be because of various reasons like congenital defects, traumatic injury, road traffic accidents, gun shot wounds, or malignant tumors.¹ Gun shot wounds or blast injuries are the most common causes for the loss of eyes in armed forces personnel. The disfigurement associated with the loss of an eye can cause significant physical, psychological and emotional problems.² Prosthetic rehabilitation of such patients with ocular prosthesis will improve patient's quality of life and increase their confidence.

4977. Shaw, H. E., Jr. and M. B. Landers, 3rd (1975). "Vitreous hemorrhage after intracranial hemorrhage." American journal of ophthalmology **80**(2): 207-213.

Eight patients, aged 2 months to 55 years, developed vitreous hemorrhages as a result of subarachnoid or subdural bleeding. Subhyaloid hemorrhages were associated with, or preceded, hemorrhage into the vitreous cavity in four cases. Most vitreous hemorrhages cleared spontaneously, several months later, without major visual sequelae. In one patient, intravitreal blood persisted after 28 months. Vitreous hemorrhage can be a serious complication in patients surviving subarachnoid or subdural hemorrhages and, though uncommon, probably occurs with greater frequency than previously acknowledged. While vitrectomy may be a reasonable therapeutic approach in selected cases, in most instances vitreous hemorrhage following intracranial hemorrhage should be treated conservatively.

4978. Shaw, K.-P., et al. (2011). "A method for studying knife tool marks on bone." Journal of forensic sciences **56**(4): 967-971.

The characteristics of knife tool marks retained on hard tissues can be used to outline the shape and angle of a knife. The purpose of this study was to describe such marks on bone tissues that had been chopped with knives. A chopping stage with a gravity accelerator and a fixed bone platform was designed to reconstruct the chopping action. A digital microscope was also used to measure the knife angle (theta) and retained V-shape tool mark angle (psi) in a pig skull. The kappa value (elasticity coefficient; theta/psi) was derived and recorded after the knife angle (theta) and the accompanied velocity were compared with the proportional impulsive force of the knife and psi on the bone. The constant impulsive force revealed a correlation between the V-shape tool mark angle (psi) and the elasticity coefficient (kappa). These results describe the tool marks--crucial in the medicolegal investigation--of a knife on hard tissues.

4979. Shcherbakova, E. I., et al. (1984). "[Radionuclide cisternography in the late period of penetrating cranio-cerebral wounds]." Radionuklidnaia tsisternografiia v otdalennom periode pronikaiushchikh cherepno-mozgovykh ranenii. **29**(4): 27-32.

An analysis of the radiological signs is presented proceeding from the results of examination of the visualization of the CSF tract in 123 patients in whom radionuclide cisternography with 99mTc-DTPA was performed 1,3,6 and 24 h after administration of a radiopharmaceutical. The radiological appearance of pathology of the CSF system in a long-term period after penetrating craniocerebral wound was developed.

4980. Shcherbuk, I. A., et al. (2014). "[Methodological aspects of surgical approach in victims with severe multiple craniofacial trauma in consideration of severity of traumatic injury]." Vestnik khirurgii imeni I. I. Grekova **173**(3): 49-54.

It is important to improve the medical care system and treatment of victims, introduce new methods of treatment and attract the multidisciplinary specialists in the cases of multitrauma. An integrated approach is required for the identification of different character and severity of multiple craniofacial injuries and the development of rational surgical strategy on this base. Different scales such as AIS, CRIS, ISS, PTS, TRISS, TRISSCAN, CRAMS et.al, were created abroad. Another approach to medical strategy was developed in the department of military surgery of Kirov Military Academy in the late nineties. It was based on investigating of possibilities of surgical strategy optimization by application of objective evaluation of the severity of injuries (military surgery--SP, SG, SS). Given treatment strategy of victims with multiple craniofacial trauma resulted in double reduction of quantity of suppurative and septic complications (from 10.5% to 4.1%). It gave the possibility to reduce the lethality from 6.4% to 4.0%. At the same time a hospital stay was shortened and the strategy allowed obtaining satisfactory functional results of treatment and avoiding reinterventions for removal of posttraumatic facial deformations.

4981. Shea, Y. F., et al. (2011). "An unexpected finding in a lucky elderly man." Hong Kong medical journal = Xianggang yi xue za zhi **17**(5): 423-424.

4982. Shear, D. A., et al. (2011). "Acute neuroprotective effects of glial growth factor 2 in a model of penetrating ballistic-like brain injury." Journal of neurotrauma **28**(6): A120.

Glial growth factor 2 (GGF2; ACORDA Therapeutics) is a member of the neuregulin family of growth factors that is best known for its ability to promote the survival and proliferation of oligodendrocytes and stimulate remylenation in preclinical models of multiple sclerosis. More recently, the GGF2 molecule was demonstrated to have a range of other effects in neural protection and repair including providing trophic support and exerting potent anti-inflammatory and antioxidant effects in the brain. In addition, neuregulins have been shown to play a role in synaptic plasticity, which is important for memory. Thus GGF2 shows promise as a potential neuroprotective therapy for the treatment of traumatic brain injury (TBI). The current study was designed to test the potential neuroprotective effects of GGF2 in our model of penetrating ballistic-like brain injury (PBBI). GGF2 (100 or 500 µg/kg) or vehicle was administered via i.v. infusion at 30 min post-PBBI and given once/day until the experimental endpoint. Animals were sacrificed at 24h, 72h, and 7 days post-injury (n=6/grp/time) and the tissue was processed for histopathological analysis. GGF2 (either dose) treatment did not exhibit any significant neuroprotective effects on lesion size, apoptosis (Bax/BCL2), neutrophil infiltration (MPO), or axonal injury (silver) following PBBI. However, GGF2 dose-dependently reduced the extent of GFAP reactivity in the cortex of PBBI rats at 72h post-PBBI. Critically, no toxic side-effects were observed during acute administration of GGF2, even after multiple treatment days. This observation, combined with our current observations of a GGF2-mediated reduction in GFAP reactivity, provide support for a dose-response study that would combine modified dosing regimens with extended treatment duration.

4983. Shear, D. A., et al. (2013). "Operation brain trauma therapy consortium: Dose-response evaluation of cyclosporine a in the wrair penetrating ballistic-like brain injury (PBBI) model." Journal of neurotrauma **30**(15): A170-A171.

Introduction Cyclosporine A (CsA) has shown beneficial effects on several secondary injury mechanisms in traumatic brain injury (TBI), including inhibition of both calcium induced mitochondrial permeability transition pore opening and calcineurin. This study assessed the therapeutic efficacy of CsA on neurobehavioral and neuropathological outcome metrics in the WRAIR PBBI model. Methods Unilateral frontal PBBIwas produced in the right hemisphere of isoflurane anesthetized rats (10% injury severity level). CsA (SandImmune; UPMC Pharmacy; 10mg/2ml/kg or 20mg/4ml/kg) or vehicle (Cremophor EL 4ml/ kg) were delivered as 10m bolus IV infusions at 15m and 24h post-injury. Blood samples (0.7mL whole blood) were collected at 4h, 24h, and the terminal endpoints to measure serum levels of the neuronal biomarker UCHL-1 and the glial biomarker GFAP. Motor function was evaluated on the rotarod (7 and 10 days post) at fixed-speed increments of 10, 15, and 20 rpm. Cognitive performance was evaluated on the Morris water maze (MWM) days 13-17 (4 trials/day). Histopathological analysis included lesion volume and total hemispheric tissue loss. Groups consisted of: (1) Sham (n =10); (2) PBBI + vehicle (PBBI; n = 13), (3) PBBI + 10 mg/kg CsA (n = 15) and (4) PBBI + 20mg/kg CsA (n = 18). Results Motor testing revealed significant deficits in all injury groups with mean rotarod latencies reduced by 53 ± 9% (PBBI), 41 ± 9% (CsA-10mg/kg), and 34 ± 8% (CsA-20mg/kg) vs. sham ($p < .05$). No significant therapeutic effects were detected on the rotarod task. MWM results revealed significant deficits in all injury groupswith the average latency to find the hidden platform (across all testing days) increased by 55 ± 14% (PBBI), 53 ±

12% (CsA-10mg/kg), and 59 ± 14% (CsA-20mg/kg) vs. sham ($p < .05$). No significant therapeutic effects were detected on MWM parameters, mean lesion volume (PBBI = 40-5mm3; CSA-10mg/kg = 41 -6mm3; CsA-20mg/kg = 39- 11mm3), % tissue loss measured in injured vs. non-injured hemispheres (PBBI = 22 ± 1%; CsA-10mg/kg = 23 ± 2%; CsA-1mg/kg = 18 ± 1%) or serum biomarker levels of UCHL-1 or GFAP. Critically, mortality rates were significantly increased in animals treated with the high dose of CSA (29%mortality) as well as rats treated with the corresponding (4ml/kg) volume of vehicle (39%). Conclusions Overall, the current study failed to demonstrate a therapeutic benefit of CsA in the PBBI using this dosing strategy. While CsA did not worsen performance metrics, tissue loss or biomarker response caused by PBBI, there was an increase in mortality and gross adverse effects (ranging from dehydration to “blackened” tails) observed that was at least partly caused by the vehicle (Cremophor EL). It is worth noting that toxicity was maximal in the PBBI model across the OBTT consortium, which may reflect the severity of PBBI or other unique differences between penetrating and non-penetrating head injury.

4984. Shear, D. A., et al. (2016). "Nicotinamide Treatment in Traumatic Brain Injury: Operation Brain Trauma Therapy." Journal of neurotrauma **33**(6): 523-537.

Nicotinamide (vitamin B3) was the first drug selected for cross-model testing by the Operation Brain Trauma Therapy (OBTT) consortium based on a compelling record of positive results in pre-clinical models of traumatic brain injury (TBI). Adult male Sprague-Dawley rats were exposed to either moderate fluid percussion injury (FPI), controlled cortical impact injury (CCI), or penetrating ballistic-like brain injury (PBBI). Nicotinamide (50 or 500 mg/kg) was delivered intravenously at 15 min and 24 h after injury with subsequent behavioral, biomarker, and histopathological outcome assessments. There was an intermediate effect on balance beam performance with the high (500 mg/kg) dose in the CCI model, but no significant therapeutic benefit was detected on any other motor task across the OBTT TBI models. There was an intermediate benefit on working memory with the high dose in the FPI model. A negative effect of the low (50 mg/kg) dose, however, was observed on cognitive outcome in the CCI model, and no cognitive improvement was observed in the PBBI model. Lesion volume analysis showed no treatment effects after either FPI or PBBI, but the high dose of nicotinamide resulted in significant tissue sparing in the CCI model. Biomarker assessments included measurements of glial fibrillary acidic protein (GFAP) and ubiquitin carboxyl-terminal hydrolase-1 (UCH-L1) in blood at 4 or 24 h after injury. Negative effects (both doses) were detected on biomarker levels of GFAP after FPI and on biomarker levels of UCH-L1 after PBBI. The high dose of nicotinamide, however, reduced GFAP levels after both PBBI and CCI. Overall, our results showed a surprising lack of benefit from the low dose nicotinamide. In contrast, and partly in keeping with the literature, some benefit was achieved with the high dose. The marginal benefits achieved with nicotinamide, however, which appeared sporadically across the TBI models, has reduced enthusiasm for further investigation by the OBTT Consortium.

4985. Shear, D. A., et al. (2010). "Longitudinal characterization of motor and cognitive deficits in a model of penetrating ballistic-like brain injury." Journal of neurotrauma **27**(10): 1911-1923.

Traumatic brain injury (TBI) produces a wide range of motor and cognitive changes. While some neurological symptoms may respond to therapeutic intervention during the initial recovery period, others may persist for many years after the initial insult, and often have a devastating impact on quality of life for the TBI victim. The aim of the current study was to develop neurobehavioral testing parameters designed to provide a longitudinal assessment of neurofunctional deficits in a rodent model of penetrating ballistic-like brain injury (PBBI). We report here a series of experiments in which unilateral frontal PBBI was induced in rats, and motor/cognitive abilities were assessed using a battery of tests ranging from 30 min to 10 weeks post-injury. The results showed that PBBI produced consistent and significant (1) neurological deficits (neuroscore examination: 30 min to 10 weeks post-PBBI), (2) sensorimotor dysfunction in the contralateral forelimb (forelimb asymmetry task: 7 and 21 days), (3) motor dysfunction (balance beam task: 3-7 days; and fixed-speed rotarod task: 3-28 days), and (4) spatial learning deficits in the Morris water maze (MWM) task out to 10 weeks post-injury. Overall, the results of this study demonstrate that PBBI produces enduring motor and cognitive deficits, and identifies the optimal task and testing parameters for facilitating longitudinal screening of promising therapeutic interventions in this brain injury model.

4986. Shear, D. A., et al. (2011). "Severity profile of penetrating ballistic-like brain injury on neurofunctional outcome, blood-brain barrier permeability, and brain edema formation." Journal of neurotrauma **28**(10): 2185-2195.

This study evaluated the injury severity profile of unilateral, frontal penetrating ballistic-like brain injury (PBBI) on neurofunctional outcome, blood-brain barrier (BBB) permeability, and brain edema formation. The degree of injury severity was determined by the delivery of a water-pressure pulse designed to produce a temporary cavity by rapid (<40 ms) expansion of the probe's elastic balloon calibrated to equal 5%, 10%, 12.5%, or 15% of total rat brain volume (control groups consisted of sham surgery or insertion of the probe only). Neurofunctional assessments revealed motor and cognitive deficits related to the degree of injury severity, with the most clear-cut profile of PBBI injury severity depicted by the Morris water maze (MWM) results. A biphasic pattern of BBB leakage was detected in the injured hemisphere at all injury severity levels at 4 h post-injury, and again at 48-72 h post-injury, which remained evident out to 7 days post-PBBI in the 10% and 12.5% PBBI groups. Likewise, significant brain edema was detected in the injured hemisphere by 4 h post-injury and remained elevated out to 7 days post-injury in the 10% and 12.5% PBBI groups. However, following 5% PBBI, significant levels of edema were only detected from 24 h to 48h post-injury. These results identify an injury severity profile of BBB permeability, brain edema, and neurofunctional impairment that provides sensitive and clinically relevant outcome metrics for studying potential therapeutics.

4987. Shear, D. A., et al. (2012). "Operation brain trauma therapy consortium: Dose-response evaluation of nicotinamide in the wrair model of penetrating ballistic-like brain injury." Journal of neurotrauma **29**(10): A72-A73.

Introduction Operation Brain Trauma Therapy (OBTT) is a multi-center consortium evaluating promising therapies across traumatic brain injury (TBI) models.The WRAIR penetrating ballistic-like brain injury (PBBI) model has been well-characterized and produces reliable and reproducible neurobehavioral and neuropathological profiles. This study assessed the therapeutic efficacy of nicotinamide in the PBBI model. Methods Unilateral frontal PBBI was produced in the right hemisphere of isoflurane anesthetized rats (10% injury severity level).Rats were randomized into 4 groups: PBBI + vehicle (PBBI; n = 14), PBBI + 50 mg/kg nicotinamide (NIC-50 mg/kg; n = 15), PBBI + 500 mg/kg nicotinamide (NIC-500mg/kg; n = 16) and sham (n = 9).Nicotinamide was delivered intravenously (IV) at 15m and 24h after injury. Blood samples (0.7mL whole blood) were obtained via the IV catheter at 4h, 24h, and at sacrifice from each rat to measure serum levels of the neuronal biomarker UCHL-1 and the glial biomarker GFAP.Motor function was evaluated on the rotarod (7 and 10 days post) at fixedspeed increments of 10, 15, and 20 rpm.Cognitive performance (acquisition and probe trial) was evaluated on the Morris water maze (MWM) days 13-17 (4 trials/day).Histopathological analysis included lesion volume and total hemispheric tissue loss; both expressed as a % of the contralateral hemisphere. Results Motor testing revealed significant deficits in all injury groups with mean rotarod latencies reduced by 60 -8% (PBBI), 60 - 8% (NIC-50mg/kg), and 48 - 9% (NIC-500mg/kg) vs. sham ($p < .05$).PBBI rats treated with the high dose (500 mg/kg) of nicotinamide showed modest, albeit not significant, improvement on the rotarod task ($p > .05$).MWM results revealed significant deficits in all injury groups with the average latency to find the hidden platform (across all testing days) increased by 121 - 13% (PBBI), 115 - 12% (NIC-50mg/kg), and 132 - 13% (NIC-500mg/kg) vs. sham ($p < .05$).No significant therapeutic effect was detected in nicotinamide- treated rats on MWM parameters.Nicotinamide did not affect PBBI-induced lesion volume measured at 22 days post-injury (% contralateral hemisphere): PBBI = 15 - 2%, NIC-50mg/kg = 15 - 2% and NIC-500 mg/kg = 13 - 1%.Likewise, nicotinamide treatments failed to reduce PBBI-induced hemispheric volume loss: PBBI = 25 - 3%, NIC-50mg/kg = 24 - 4% and NIC-500 mg/kg = 24 - 1%.The high dose nicotinamide (500 mg/kg) significantly reduced post-injury (24h) increases in GFAP serum biomarker levels ($p < 0.05$), but not UCHL-1 levels. Conclusions The acute (24h) beneficial effects of nicotinamide observed on PBBI biomarker (GFAP) data are supportive of research demonstrating neuroprotective efficacy on acute histopathology in other TBI animal models. However, in the absence of any corresponding neuroprotective profiles on the neurobehavioral and neuropathological outcome metrics, nicotinamide is not likely to be selected as a lead candidate for advanced OBTT studies in the PBBI model.

4988. Shear, D. A., et al. (2013). "Operation brain trauma therapy consortium: Dose-response evaluation of erythropoietin in the wrair penetrating ballistic-like brain injury (PBBI) model." Journal of neurotrauma **30**(15): A171.

Introduction Erythropoietin (EPO) is a pleiotropic cytokine that has demonstrated potent anti-apoptotic effects in animal models of stroke and TBI. This study assessed the therapeutic efficacy of EPO on neurobehavioral and neuropathological outcome metrics in the WRAIR PBBI model. Methods Unilateral frontal PBBI was produced in the right hemisphere of isoflurane anesthetized rats (10% injury severity level). EPO (PROCRIT, 10,000IU/mL vial; UPMC Pharmacy) was dosed at 5000 IU/kg (0.50mL/kg) or 10,000 IU/kg (1.0mL/kg) and was administered as a single bolus injection at 15m post-injury via indwelling jugular vein catheters. Blood samples (0.7mL whole blood) were collected at

4h, 24h, and the terminal endpoints to measure serum levels of the neuronal biomarker UCHL-1 and the glial biomarker GFAP. Motor function was evaluated on the rotarod (7 and 10 days post) at fixed-speed increments of 10, 15, and 20 rpm. Cognitive performance was evaluated on the Morris water maze (MWM) days 13-17 (4 trials/day). Histopathological analysis included lesion volume and total hemispheric tissue loss. Groups consisted of: (1) Sham (n = 10); (2) PBBI + vehicle (PBBI; n = 14), (3) PBBI + 5,000 IU/kg EPO (EPO-0.50mL/kg; n = 15) and (4) PBBI + 10,000 IU/kg EPO (EPO-1.0mL/kg; n = 16). Results Motor testing revealed significant deficits in all injury groups with mean rotarod latencies reduced by 51 ± 7% (PBBI), 38 ± 7% (EPO-0.50mL/ kg), and 46 ± 8% (EPO-1.0mL/kg) vs. sham ($p < .05$). Although PBBI rats treated with the low dose of EPO showed a positive (45% ± 13%) trend towards improved performance at 10 days post-injury on the rotarod task, this effect was not significant ($p = .217$ vs. PBBI). MWM results revealed significant deficits in all injury groups with the average latency to find the hidden platform (across all testing days) increased by 147 ± 13% (PBBI), 124 ± 15% (EPO-0.50mL/kg), and 115 ± 11% (EPO-1.0mL/kg) vs. sham ($p < .05$). No significant therapeutic effects were detected on any MWM parameters. Critically, the low dose of EPO resulted in significant increases in mean lesion volume (PBBI = 32-4mm3; ∼EPO-0.50mL/kg = 67- 14mm3; EPO-1.0mL/kg = 42- 7 mm3; $*p < .05$ vs. PBBI) but not in % tissue loss measured in injured vs. non-injured hemispheres (PBBI = 24 ± 1%; EPO-0.50mL/kg = 32 ± 4%; EPO-1.0mL/kg = 25 ± 2%). No therapeutic effects were detected on serum biomarker levels of UCHL-1 or GFAP. Conclusions Overall, while the observations of some positive trends of EPO on motor and cognitive outcome are encouraging, the results of the current study indicate that a single post-injury infusion of EPO is not sufficient to confer significant therapeutic benefit in the PBBI model. However, results demonstrating worsened neuropathology in EPOtreated rats are cause for concern, particularly with regards to clinical treatment for severe penetrating TBI where acute intracranial hemorrhage may present complications.

4989. Shear, D. A., et al. (2009). "Neuroprotective profile of dextromethorphan in an experimental model of penetrating ballistic-like brain injury." Pharmacology, biochemistry, and behavior **94**(1): 56-62.

Dextromethorphan (DM) has been well-characterized as a neuroprotective agent in experimental models of CNS injury. The goal of this study was to determine the neuroprotective profile of DM in a military-relevant model of penetrating ballistic-like brain injury (PBBI). In an acute (3 day) dose-response study, anesthetized male Sprague-Dawley rats were exposed to a unilateral frontal PBBI with DM (0.156-10 mg/kg) or vehicle delivered as an i.v. bolus from 30 min to 48 h post-injury. In a follow-up (7 day) experiment, the 10-mg/kg bolus injections of DM were administered in conjunction with a 6-h infusion (5 mg/kg/h). DM bolus injections alone produced a dose-dependent improvement in motor recovery on a balance beam task at 3 days post-injury. However, more rapid recovery (24 h) was observed on this task when the bolus injections were combined with the 6-h infusion. Moreover, the DM bolus/infusion treatment regimen resulted in a significant (76%) improvement in cognitive performance in a novel object recognition (NOR) task at 7 days post-injury. Although post-injury administration of DM (all doses) failed to reduce core lesion size, the maximum dose of DM (10 mg/kg) was effective in reducing silver-stained axonal fiber degeneration in the cortical regions adjacent to the injury.

4990. Shehu, B. B. and I. Hassan (2006). "Delayed presentation of penetrating craniocerebral injury caused by a nail." Brain injury **20**(13-14): 1455-1458.

A 38-year-old woman presented after 2 weeks with penetrating craniocerebral injury from a six inch nail. She had aphasia and right hemiplegia. Brain CT scan showed no significant cerebral injury. The nail track was infected. Craniectomy and extraction of the nail along with broad spectrum antibiotics was effective. She had no residual neurologic deficit.

4991. Shehu, B. B., et al. (2010). "Fetal head injury from intentional penetrating abdominal trauma in pregnancy." Annals of tropical paediatrics **30**(1): 69-72.

A male fetus was extruded from the uterus following multiple lower abdominal stab wounds to the mother. He was brought to the emergency room at 8 hours of age. He had sustained a compound skull fracture with brain contusion. There was no neurological deficit. Debridement and primary wound closure were undertaken. His mother had multiple lacerations to the uterus and a laceration of the fundus of the bladder. Following resuscitation, she had repair of the uterus and bladder and made an uneventful recovery. At 3 years of age, the boy is developing normally.

4992. Sheikh, N. A., et al. (2022). "Fatal transorbital-intracranial penetrating injury- A case report." Journal of forensic and legal medicine **85**: 102288.

Transorbital injuries are rare and may lead to fatal craniocerebral damage. Ocular penetrating injuries account for 24% of all penetrating head injuries in adults, while this percentage goes up to 45% in children. Any penetrating injury through the eyes may enter the intracranial cavity and might prove fatal to the victim owing to cerebral tissue damage and complex management. The dead bodies of three victims were found by the side of the river with multiple injuries to their eyes. Further examination revealed that they had sustained multiple transorbital-intracranial injuries. In such cases, identifying injury patterns is vital so that cause and manner of death can be determined precisely. A thorough postmortem examination can help identify the alleged weapon involved in the act and may clear the doubts concerned with the manner of death.

4993. Shelsta, H. N., et al. (2010). "Wooden intraorbital foreign body injuries: clinical characteristics and outcomes of 23 patients." Ophthalmic plastic and reconstructive surgery **26**(4): 238-244.

PURPOSE: To describe the clinical characteristics, interventions, and visual outcomes of orbital injuries associated with wooden foreign bodies., METHODS: A retrospective case review of orbital injuries managed at Wills Eye Institute and Massachusetts Eye and Ear Infirmary was conducted between 1992 and 2006., RESULTS: The clinical course and management for a total of 23 intraorbital wooden foreign body injuries were reviewed. The distribution of wood included pencil (39%), tree branch/plant matter (35%), and other treated wood (26%). About half of the subjects (52%) presented with preoperative vision between 20/20 and 20/40. Almost all [corrected] of the subjects with preoperative vision between 20/20 to 20/40 retained vision in that range postoperatively (92%). [corrected] Time from injury to presentation was highly variable, ranging from 24 hours to 17 months (mean, 62 days; median, 3 days). Forty-three percent of subjects presented within 24 hours of injury. The site of foreign body found within the orbit was superior (26%; n = 6), medial 30% (n = 7), inferior (26%, n = 6), posterior (9%; n = 2), and lateral (4%; n = 1). Preliminary radiographic interpretation for foreign body was definite in 61% (n = 14), possible in 22% (n = 5), and absent in 13% (n = 3)., CONCLUSIONS: Young men are at particularly high risk for wood intraorbital foreign body. There was a relatively equal distribution of wood type. The time from injury to presentation was variable, ranging from <1 day to over a year. Almost half of the subjects presented within 24 hours of injury. In patients with a known site of penetration, almost half occurred in the conjunctiva, notably without presence of eyelid laceration, emphasizing the need to check the conjunctiva and fornices closely. Preliminary radiographic readings often miss or are inconclusive in detecting the foreign body. The shape, location, serial examinations, and particularly the use of quantitative CT are extremely helpful in distinguishing retained wood foreign body from other low-density signals of air or fat.

4994. Shemie, S. D., et al. (2003). "Advancing toward a modern death: the path from severe brain injury to neurological determination of death." CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne **168**(8): 993-995.

4995. Shemie, S. D., et al. (2006). "Severe brain injury to neurological determination of death: Canadian forum recommendations." CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne **174**(6): S1-13.

4996. Shen, W., et al. (2020). "EO1001: A First-in-Class Irreversible Pan-ErbB Inhibitor with Excellent Brain Penetration." Journal of Thoracic Oncology **15**(2): S26.

Background: ErbB receptor tyrosine kinases EGFR (ErbB1), HER2 (ErbB2, neu), HER3 (ErbB3), and HER4 (ErbB4) are part of a complex network activating signaling pathways involved in cell growth and survival. Mutations causing errant ErbB activation are an oncodriver in many cancers including NSCLC. Inhibitors targeting ErbB mutations have transformed outcomes for patients; however, resistance to treatment develops rapidly. The various ErbB receptors have overlapping roles in oncogenesis and crosstalk between ErbB family members is associated with acquired resistance and metastases. For example, amplification of HER2 is a well-established mechanism of acquired resistance to EGFR-TKIs.

The development of next-generation agents targeting multiple ErbB receptors has shown promise but has been limited by toxicity and poor brain penetration. Up to 80% of NSCLC patients will experience a brain lesion associated with their disease; treatment-resistant phenotypes metastasizing to the brain have become an important driver of morbidity and mortality and patients have limited therapeutic options. New agents are needed to address this important and growing unmet medical need. EO1001 is a first-in-class, oral, brain-penetrating, irreversible pan-ErbB inhibitor targeting ErbB1, ErbB2, and ErbB4 that is positioned for near-term entry into clinical development. Methods: In vitro testing: EO1001 exhibits excellent and balanced equipotent activity against all three important ErbB receptors including EGFR, HER2, and HER4 with low nM activity (0.4 to 7.4 nM), with high specificity vs. off-target receptors. In vivo studies: Following oral administration, EO1001 treatment resulted in a statistically significant improvement in outcomes compared to positive and negative controls in erbB-positive mouse orthotopopic models including N87 (Her2+), H1975 (EGFR/T790M), GBM12 (EGFR+), GBM39 (EGVRvIII+). EO1001 rapidly enters the CNS at high concentrations relative to plasma and inhibits signaling downstream of mutant ErbB receptors in tumor tissue. Treatment with EO1001 was generally well tolerated with no gastrointestinal side effects observed at efficacious doses in mouse xenograft models. PK and Toxicity Results: Preclinical pharmacokinetic and toxicology studies have been completed. EO-1001 exhibits a half-life of 16-20 hours in rodent models. Toxicities typical of the ErbB inhibitor class, including gastrointestinal effects, weight loss, and decreased activity, were observed at higher dose groups in both rodent and non-rodent species. Extrapolation to human dosing suggests an attractive therapeutic window in comparison to other agents in the class. Conclusion and Next Steps: EO1001 has the potential to be a best-in-class CNS-penetrating pan-ErbB inhibitor amenable for use as a single agent and in combination regimens. First-in-man clinical testing with EO1001 is planned. Continued characterization of EO1001 activity against specific ErbB mutations will be undertaken in parallel.

4997. Shenoy, S. N. and A. Raja (2003). "Unusual self-inflicted penetrating craniocerebral injury by a nail." Neurology India **51**(3): 411-413.

Penetrating injuries of the brain caused by a nail are rare. An interesting case of a patient with schizophrenia who attempted suicide by a self-inflicted penetrating intracranial injury using a nail is reported here. The literature related to this unusual case is reviewed.

4998. Sheridan, R. L., et al. (1999). "Solid organ procurement from burned children." The Journal of trauma **47**(6): 1060-1062.

BACKGROUND: Burns have constituted a traditional contraindication to solid organ procurement because of concerns that such organs may be damaged by burn shock associated splanchnic ischemia and contaminated by burn wound manipulation associated bacteremia., METHODS: Over a 5-year period, we attempted solid organ procurement from five burned children who had suffered concurrent anoxic brain injury., RESULTS: These four boys and one girl had an average age of 8.1 years (range, 2.5-12 years) and burn size of 29% (range, 4-70%). All were injured in house fires and four of five (80%) required prehospital external cardiac compressions. Brain death was declared an average of 35 hours (range, 2.75-77 hours) after injury. Solid organs procured and successfully transplanted from this group were 4 livers, 10 kidneys, and 2 hearts. Two of the livers and one heart were placed into pediatric recipients. Procured tissues included three sets of cardiac valves, and two corneas. All solid organs transplanted were functional at 6 months, although longer follow-up is not available., CONCLUSION: Early identification and diagnosis of brain death during resuscitation of burn patients with anoxic brain injury, combined with careful resuscitation and support of the brain dead potential organ donor, can result in the recovery of suitable solid organs and tissues for transplantation.

4999. Sherman, H. F., et al. (2001). "Should Level I trauma centers be rated NC-17?" The Journal of trauma **50**(5): 784-791.

BACKGROUND: Previous studies have reached contradictory conclusions regarding where injured children are best treated. Our hypothesis was that no differences in survival outcome exist among trauma centers caring for pediatric patients., METHODS: For 16,108 injured children, we created a dependant variable, As-Ps (actual survival--predicted survival), which represents variation from TRISS-predicted outcome for each individual. We then used that variable to compare trauma centers' survival results overall and results for liver, spleen, and head injuries, statistically adjusting for age and injury severity., RESULTS: When adjusted for age and injury severity, centers with added qualifications in pediatrics and Level I centers had improved survival performance overall and in the subcategory of head injured

children. No differences existed in other organ-specific injury categories., CONCLUSION: The improved unexpected outcome results at Level I centers and centers with Added Qualifications in Pediatrics suggest that a team of qualified professionals working in an institution willing to commit the required resources can sufficiently offer injured children the survival advantage expected of a trauma center.

5000. Sherman, S. and M. R. Levine (1987). "Gunshot wounds of the orbit." Advances in ophthalmic plastic and reconstructive surgery **7**: 181-192.

Five cases of ocular firearm injuries are presented. A physical analysis of the gunshot wound characteristics, with representative examples, is highlighted. The important early and late complications are completely discussed. Appropriate management sequence, including complete evaluation, diagnostic testing, and surgical intervention, is outlined and discussed.

5001. Sherman, W. D., et al. (1980). "Gunshot wounds to the brain--a civilian experience." The Western journal of medicine **132**(2): 99-105.

A study involving 79 patients who were considered for surgical treatment for craniocerebral gunshot injuries between 1972 and 1978 was carried out to develop criteria for radiographic assessment and surgical operation, as well as to improve operative techniques and preoperative planning. The study focused on differences between military and civilian injuries, as well as criteria for gross prediction of outcome. Of note in the overall perspective of the series were (1) the predominance of low-velocity missiles, (2) the high rate of self-inflicted injuries (34 percent), (3) the overall mortality of 23 percent with the rate for persons older than 60 being approximately 70 percent, (4) the correlation between preoperative patient assessment and mortality, (5) complications predominated by cerebrospinal fluid fistulas (10 percent), (6) the value of computerized axial tomographic (CAT) scanning in patient assessment and operative strategy and (7) the ultimate employability rate in survivors (78 percent). An historical review of the development of management principles based on operative experience in the military sector as well as other recent civilian literature also deserves consideration.

5002. Shetty, M., et al. (2008). "Fatal craniocerebral injury from wild boar attack." Wilderness & environmental medicine **19**(3): 222-223.

5003. Shetty, V., et al. (2001). "Clinician variability in characterizing mandible fractures." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **59**(3): 254-252.

PURPOSE: This study evaluated variability in the clinical parameters commonly used to characterize mandible fractures., PATIENTS AND METHODS: Inter-rater reliability of 18 oral and maxillofacial surgeons was assessed using radiographs of 22 cases of mandible fractures. Raters were asked to evaluate each case based on several parameters including number, location, and displacement of the individual fractures and severity of the composite injury. To evaluate intra-rater reliability, selected cases were reviewed at a second session by a subgroup of these surgeons. Tests of concordance used to quantify measurement reliability included the interclass correlation coefficient and multiple-rater kappa statistics., RESULTS: Inter-rater agreement on the number of constituent fractures ranged from excellent for simpler fractures to poor for complex gunshot injuries. Even within raters, the range of interclass correlation for complex injuries was only 0.33 to 0.42 between the 2 assessments. Clinicians appeared to be better at delineating coronoid, condyle, ramus, and angle fractures; symphyseal and canine region fractures had lower inter- and intrarater agreement. Tests of concordance showed moderate to excellent reliability when fracture displacements were expressed in millimeters, but only fair reliability when displacements were expressed as categories. Even when the clinicians concurred on displacement measurements, a large overlap was observed in their categorization of these displacements. Despite the differences in the assessment of individual parameters, the high intrarater reliability coefficient (0.78) indicated that the individual clinicians had a high internal consistency in their assignment of summary severity scores. Multiple regression analysis revealed the number of constituent fractures, the type of fracture, and amount of fracture displacement (millimeters) to be significant predictors of clinician ratings of injury severity., CONCLUSIONS: The clinician variability underscores the difficulties involved in trauma description and scoring. The study identifies some sources of

clinician variability and emphasizes the need to standardize the characterization of mandible fractures by using explicit guidelines.

5004. Shevach, I., et al. (1992). "Orbital porencephalic cyst following penetrating orbitocranial trauma." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **8**(5): 297-299.

In a 10-year-old boy an orbitocranial penetrating wound produced by an umbrella tip caused an orbital roof bone fragment to penetrate up to the anterior part of the third ventricle behind the left foramen of Monro. Hemorrhages and encephalomalacia developed along the trajectory of the fragment and subsequently a porencephalic cyst was formed at this site. Six months after the trauma, increased pressure developed in the left ventricular system due to obstructive hydrocephalus and consequently the porencephalic cyst herniated into the orbit through the orbital roof fracture, producing intermittent diplopia, left exophthalmos, and palpebral swelling. A ventriculo-peritoneal shunt led to shrinkage of the orbital cyst content and resolution of the symptoms.

5005. Shewell, P. C. and J. D. Nancarrow (1991). "Dogs that bite." BMJ (Clinical research ed.) **303**(6816): 1512-1513.

OBJECTIVE: To study the circumstances of dog bites and identify risk factors., DESIGN: Postal questionnaire survey and case note review of victims of dog bites referred between 1982 and 1989., SETTING: One referral based regional plastic surgery unit., PATIENTS: 146 consecutive patients referred for primary treatment of dog bites, for whom current addresses were available for 133, 107 (81%) of whom returned the questionnaire., RESULTS: The male to female ratio was 74:72; 79 (54%) patients were aged below 15 years. The commonest dogs producing bites were Staffordshire bull terriers (15 cases), Jack Russell terriers (13), medium sized mongrels (10), and Alsatians (nine). 82 of 96 (85%) dogs were male. 29 of 47 (62%) adults were bitten at home and 45 of 60 (75%) children at a friend's, neighbour's, or relative's house. 91 of 107 (85%) bites occurred in the dog's home. Bites occurred during playing with 13 (12%), petting 14 (13%), or waking 16 (15%) dogs. 45 (42%) bites were judged as unprovoked. 32 bites were identified as severe and 11 attacks as sustained., CONCLUSIONS: Most victims are bitten by male dogs which they either own or have had frequent contact with, and the bite occurs in the dog's home.

5006. Shewmon, D. A. (1997). "Recovery from "brain death": a neurologist's apologia." The Linacre quarterly **64**(1): 30-96.

5007. Shi, J., et al. (2017). "Management of screwdriver-induced penetrating brain injury: a case report." BMC surgery **17**(1): 3.

BACKGROUND: Penetrating brain injury (PBI) can be caused by several objects ranging from knives to chopsticks. However, an assault with long and electric screwdriver is a peculiar accident and is relatively rare. Because of its rarity, the treatments of such injury are complex and nonstandardized., CASE PRESENTATION: We presented a case of a 54-year-old female who was stabbed with a screwdriver in her head and accompanied by loss of consciousness for 1 h. Computer tomography (CT) demonstrated that the screwdriver passed through the right zygomatic bone to posterior cranial fossa. Early foreign body removal and hematoma evacuation were performed and the patient had a good postoperative recovery., CONCLUSIONS: In this study, we discussed the clinical presentation and successful management of such a unique injury caused by a screwdriver. Our goal is to demonstrate certain general management principles which can improve patient outcomes.

5008. Shi, L., et al. (2019). "Diagnosis and treatment of a penetrating brain injury caused by a welding electrode: A case report." Medicine **98**(10): e14528.

RATIONALE: Penetrating brain injury caused by a welding electrode is a rare occurrence. This type of injury requires careful preoperative assessment and timely treatment measures to avoid secondary damage., PATIENT CONCERNS: A 55-year-old male patient fell from a height of approximately 5 m during when a welding electrode in his left hand was inadvertently inserted into his brain. The patient had a GCS score of 15 and complaints of dizziness and headache. CT showed an object of metallic density penetrating the skull and entering the brain parenchyma in the frontotemporal region., DIAGNOSIS: According to the clinical findings and preoperative imaging examination, the

diagnosis was open craniocerebral injury with intracranial foreign body and left orbital wall fracture., INTERVENTION: After definite diagnosis and sufficient preoperative preparation, active surgical treatment was carried out to remove intracranial foreign body. Anti-infection and other symptomatic treatment were given after operation. The signs of infection and changes of vital signs were closely observed., OUTCOMES: After treatment, no obvious adverse reactions were found and the patient was discharged. No complications such as infection occurred during the follow-up period of 6 months., LESSONS: In treating patient with a welding electrode penetrating the brain, assessments need to be made preoperatively, the welding electrode needs to be removed in a timely manner, complete hemostasis needs to be achieved during surgery with total repair of the damaged area, and anti-inflammatory treatment needs to be administered postoperatively to achieve good results.

5009. Shi, W., et al. (2008). "Clinical features of immune rejection after corneoscleral transplantation." American journal of ophthalmology **146**(5): 707-713.

PURPOSE: To summarize the clinical features of immune rejection after corneoscleral transplantation., DESIGN: A retrospective, noncomparative, observational case series., METHODS: Patients who received corneoscleral transplantation because of whole corneal ulcer or corneal perforation at Shandong Eye Institute from July 1, 2003 through July 31, 2005 were included. Fourteen patients (14 eyes) with immune rejection but not recurrence or other complications were reviewed, including ocular vision, rejection onset time, symptoms, and characteristics., RESULTS: The average rejection time in the 14 eyes was 35 days. The rejection arose rapidly, and the mean best-corrected visual acuity decreased to counting fingers or hand movements. Circular limbal congestion and edema developed with circuitous and dilatational vessels. Whole graft edema and Descemet membrane folds were present, but no epithelial rejection line, endothelial rejection line, or keratic precipitate were observed. The average intraocular pressure (IOP) dropped from 13.6 mm Hg to 7.4 mm Hg. Seven eyes had shallow anterior chambers (AC). Retinal and choroidal edema was observed in five eyes., CONCLUSIONS: The clinical features of immune rejection after corneoscleral transplantation include rapid onset of rejection, vision decrease, circular limbal congestion and edema with circuitous and dilatational vessels, whole graft edema and shallow AC, low IOP, and no rejection line or keratic precipitate.

5010. Shibuya, T., et al. (1993). "[A case of penetrating head injury caused by nail-gun]." No shinkei geka. Neurological surgery **21**(4): 373-377.

A rare case of penetrating head injury caused by a nail-gun was described. A 24-year-old male was admitted to our hospital due to head injury. He had handled a nail-gun at a construction site. On admission the patient was fully conscious with no neurological defects. A small wound was observed at the left front-temporal region. Skull films showed a large nail embedded in the skull cavity. A computed tomographic (CT) scan, changing level of window, demonstrated intracerebral hematoma, fragment of skull bone and nail. Cerebral angiography (CAG) showed extravasation at the left frontal region. Emergency operation was performed and his recovery was uneventful. Twenty-two craniocerebral injuries caused by nail-guns have been reported in world medical literature but this was the first report in Japan. The characteristics of craniocerebral nail-gun injuries were less damage and better prognosis compared with gunshot injuries. However intracranial infection and vascular injury were possible lethal complications. In this case, preoperative examination, such as CT scan and CAG was valuable and the early operation for the sake of safety was very effective.

5011. Shields, L. B. E., et al. (2003). "Nonterrorist suicidal deaths involving explosives." The American journal of forensic medicine and pathology **24**(2): 107-113.

Suicidal deaths involving explosives unconnected to terrorism are rare. The investigation of deaths from explosive devices requires a multidisciplinary collaborative effort, as demonstrated in this study. Reported are 2 cases of nonterrorist suicidal explosive-related deaths with massive craniocerebral destruction. The first case involves a 20-year-old man who was discovered in the basement apartment of his father's home seconds after an explosion. At the scene investigators recovered illegal improvised power-technique explosive devices, specifically M-100s, together with the victim's handwritten suicide note. The victim exhibited extensive craniofacial injuries, which medicolegal officials attributed to the decedent's intentionally placing one of these devices in his mouth. The second case involves a 46-year-old man who was found by his wife at his home. In the victim's facial wound, investigators recovered portions of a detonator blasting cap attached to electrical lead wires extending to his right hand. A suicide note was discovered at the

scene. The appropriate collection of physical evidence at the scene of the explosion and a detailed examination of the victim's history is as important as documentation of injury patterns and recovery of trace evidence at autopsy. A basic understanding of the variety of explosive devices is also necessary. This investigatory approach greatly enhances the medicolegal death investigator's ability to reconstruct the fatal event as a means of separating accidental and homicidal explosive-related deaths from this uncommon form of suicide.

5012. Shields, L. B. E., et al. (2008). "Russian roulette and risk-taking behavior: a medical examiner study." The American journal of forensic medicine and pathology **29**(1): 32-39.

Fatal Russian roulette refers to death following an act of extreme bravado in which the individual spins the cylinder of a revolver loaded with at least one cartridge, aims the muzzle at the head, and pulls the trigger. The majority of victims are men younger than 30 years who, in the presence of others, are under the influence of ethanol or other drugs. This is a 10-year (1993-2002) retrospective review of self-inflicted gunshot wounds of the head, among which we culled and paid special attention to cases of Russian roulette, at the Medical Examiners' Offices in Kentucky. Of the 24 incidents of Russian roulette, the majority of victims were white (79.2%), and all were men between 14 and 47 years with a mean age of 24.8 years. Compared with other cephalic firearm suicides, the subjects engaging in Russian roulette were significantly more likely to have elevated blood levels (> or = 0.1%) of ethanol along with various drugs detected in urine. Although the presumed intent of the risky act is to survive, Russian roulette is deemed to be suicide, which is based on a comprehensive understanding of the inherently deliberate, volitional actions of the decedent.

5013. Shih, T.-Y. and Y.-L. Kuo (2002). "Development of intracranial complications following transoral stab wounds in children. Report of two cases." Pediatric neurosurgery **37**(1): 35-37.

Sharp penetrating trauma to the skull and brain is uncommon in children. The related pediatric literature consists mainly of cases involving penetrating stab wounds to the face or scalp resulting from assaults or accidents. Herein, we present two cases of perioral intracranial penetration. The first case was a 2-year-old boy who presented with septic complications and developed a brain abscess. The second case was a 2-year-old girl who presented with a subarachnoid hemorrhage and developed a traumatic pericallosal artery aneurysm. After craniotomy and clipping, both patients made a satisfactory recovery. A high index of suspicion, liberal use of neuroimaging and early operative intervention are important points in the successful management of such cases. Copyright 2002 S. Karger AG, Basel

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5014. Shimamura, A. P. and L. R. Squire (1987). "A neuropsychological study of fact memory and source amnesia." Journal of experimental psychology. Learning, memory, and cognition **13**(3): 464-473.

We investigated the ability of amnesic patients to learn new facts (e.g., Angel Falls is located in Venezuela) and also to remember where and when the facts were learned (i.e., source memory). To assess the susceptibility of fact and source memory to retrograde amnesia, patients prescribed electroconvulsive therapy were presented facts prior to the first treatment and were tested after their second treatment. All amnesic patients exhibited marked fact memory impairment. In addition, some amnesic patients exhibited source amnesia (i.e., they recalled a few facts but then could not remember where or when those facts had been learned). Source amnesia was unrelated to the severity of the memory deficit itself, because patients who exhibited source amnesia recalled as many facts as the patients who did not. These results show that the deficit in amnesia includes an impairment in acquiring and retaining new facts. Source amnesia can also occur, but it is dissociable from impaired recall and recognition and appears to reflect difficulty in remembering the specific context in which information is acquired. The findings are discussed in terms of their significance for how memory is organized.

5015. Shimazu, S. and C. H. Shatney (1983). "Outcomes of trauma patients with no vital signs on hospital admission." The Journal of trauma **23**(3): 213-216.

In 5 years, 267 patients with cardiopulmonary arrest after trauma were treated at our institution. The long-term survival rate was 2.6%. Only 1.5% of the 267 patients were functional individuals. Overall, neither the mechanism of injury nor routine emergency thoracotomy influenced the salvage rate. Our results in the management of trauma victims without vital signs indicate that: 1) among blunt trauma patients, those with isolated head injury have the highest survival rate; 2) patients with blunt multisystem injuries involving the chest, abdomen, or truncal orthopedic

structures are unsalvageable; 3) cardiopulmonary arrest with penetrating head or neck wounds is a lethal combination; and 4) with the exception of patients sustaining penetrating chest or heart injuries, emergency thoracotomy does not enhance the survival rate of trauma patients who were formerly declared 'dead on arrival.'

5016. Shimia, M. and S. Sayyahmelli (2009). "Traumatic displacement of the globe into brain." Rawal Medical Journal **34**(2): 234-235.

We report a case where globe was dislocated into the brain following orbital wall fracture. Traumatic dislocation of the eye into the brain is rare and urgent management and surgical repair is indicated. To our knowledge, this is the first case of traumatic displacement of the globe into the brain with satisfactory removal of the globe and orbital wall repair. (Rawal Med J 2009;34: 234-235).

5017. Shimura, T., et al. (1997). "[Clinicopathological studies of craniocerebral gunshot injuries]." No shinkei geka. Neurological surgery **25**(7): 607-612.

UNLABELLED: Gunshot wounds are rare in Japan because of few regulatory laws against the possession of guns. Nevertheless such wounds are increasing in prevalence these days. Reports on the microscopic findings concerning these intracerebral lesions are fewer than those on the macroscopic findings in the scalp, the skull and the intracranial cavity. In this study we evaluated computed tomographical and histopathological findings in craniocerebral gunshot injuries., CASES: Nine patients with gunshot wounds to the head were presented. All were male and the age ranged from 17 to 66 years. Four were suicides and four were attempted murders and the last one was of unknown etiology. Morphological examination was performed on 5 autopsy cases. The distance of the bullet from the cranial cavity was as follows: long distance, 4 cases; close contiguity, 5 cases. The calibers of the weapons were as follows: 38 mm in 6 cases, 45 mm in 1 case and unknown in 2 cases., RESULTS: CT scans were examined in six cases, which revealed a missile track, hemorrhagic contusion, traumatic subarachnoid hemorrhage and marked tension pneumocephalus. In some cases, CT scan also revealed bony and metallic fragments, some deep within the cranial cavity. In the histopathological study, we found marked swollen brain (brain weight over 1500 mg) and hemorrhagic contusion in the vicinity of the missile track and interhemispheric fissure, and widespread traumatic subarachnoid hemorrhage and intraventricular hematoma. We would like to emphasize especially the remote contusion seen in the distant part of the missile track as well as massive exsudation and hemorrhage around the nerve fiber bundles. Remote contusion was observed in the inferior surface of the fronto-temporal lobes, and bilateral hemorrhagic contusion was seen in the vicinity of the superior longitudinal fissure on CT scans and autopsy findings. In one case, the bullet rotated within the intracranial cavity. In conclusion, nine cases of craniocerebral gunshot injuries were examined, while we also reviewed the medical literature concerning the shearing injury produced by gunshot brain wounds. The head injuries were further delineated by the correlation between autopsy and computerized tomography findings.

5018. Shin, T. H., et al. (2012). "Transorbital penetrating intracranial injury by a chopstick." Journal of Korean Neurosurgical Society **52**(4): 414-416.

A 38-year-old man fell from a chair with a chopstick in his hand. The chopstick penetrated his left eye. He noticed pain, swelling, and numbness around his left eye. On physical examination, a linear wound was noted at the medial aspect of the left eyelid. Noncontrast computed tomography (CT) study showed a linear hypodense structure extending from the medial aspect of the left orbit to the occipital bone, suggesting a foreign body. This foreign body was hyperdense relative to normal parenchyma. From a CT scan with 3-dimensional reconstruction, the foreign body was found to be passing through the optic canal into the cranium. The clear plastic chopstick was withdrawn without difficulty. The patient was discharged home 3 weeks after his surgery. A treatment plan for a transorbital penetrating injury should be determined by a multidisciplinary team, with input from neurosurgeons and ophthalmologists.

5019. Shinder, R., et al. (2011). "Occult orbital organic foreign body." Ophthalmic plastic and reconstructive surgery **27**(6): 463-464.

5020. Shiraishi, S., et al. (2008). "[A case of intralenticular foreign iron body without any symptoms for 20 years]." Nippon Ganka Gakkai zasshi **112**(10): 882-886.

BACKGROUND: After penetrating injury an intralenticular foreign body is usually associated with complications such as traumatic cataracts, uveitis, and glaucoma. Under rare conditions, however, a foreign body may remain in the eye without any complications for many years. There have been few reports of persisting intralenticular foreign bodies in Japan, and no report of an intralenticular body of iron which was retained for more than 6 months. We report a case of intralenticular foreign iron body that stayed without any symptoms for 20 years., CASE REPORT: A 65-year-old male with an episode of ocular pain in his right eye 20 years ago presented with blurred vision in the right eye. Slit lamp examination revealed cataract and a intralenticular foreign body in the right eye. Despite the presence of a black foreign body in the middle of the nucleus, damage to the anterior capsule was minimal. He was successfully treated by surgical removal of the foreign body, phacoemulsification, and intraocular lens implantation. In vitro analysis demonstrated that the foreign body was oxidized Fe., CONCLUSION: A foreign body may remain dormant in the crystalline lens for many years depending on the conditions. We reported a patient with an intralenticular foreign iron body without symptoms for 20 years, who was successfully treated with lens surgery.

5021. Shirley, S., et al. (1994). "Narrowing the organ donation gap: hospital development methods that maximize hospital donation potential." The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation **13**(5): 817-823.

The purpose of this article is to identify and describe this organ procurement organization's hospital development methods that have markedly increased the quantity and quality of organ donor referrals. Procedures used include the establishment of organ donor programs (hospital donor programs) within each donor hospital. The goal for these hospital donor programs is to monitor and maximize organ procurement within each institution. Routine quality assurance or death audits along with referral data from the organ procurement organization's database provide both the organ procurement organization and the hospital donor program with the necessary information to evaluate organ procurement strengths and weaknesses. This data is used in concert with ongoing development activities, which include, but are not limited to, physician and staff education and frequent marketing visits. Early referral to the organ procurement organization of all nonsurvivable head injuries for evaluation as potential organ donors, and a timely request for donation by the organ procurement organization coordinator are emphasized. The results of these efforts have been gratifying. In 1989, 138 referrals and 41 organ donations occurred. In 1990, 174 referrals and 66 organ donations occurred. In 1991, 213 referrals and 71 organ donations occurred. In 1992, 228 referrals and 70 organ donations occurred. In the first 6 months of 1993, 146 referrals and 40 organ donations occurred, for a prorated figure of 292 referrals and 80 organ donations annually. In conclusion, these results appear to validate the benefits of this approach and its significant contribution to narrowing the donation supply and demand gap.

5022. Shlugman, D., et al. (2001). "Abnormal pupillary activity in a brainstem-dead patient." British journal of anaesthesia **86**(5): 717-720.

The pupils in brainstem-dead patients are classically fixed and dilated. We present a case of a brainstem-dead patient whose pupils displayed persistent asynchronous pupillary constriction and dilatation independent of external physical stimuli. Central causes for the phenomenon were excluded leaving an unexplained peripheral cause as the most likely explanation. Early recognition of this phenomenon prevents delay in the diagnosis of brainstem death, lessening to some extent the distress for the family, and facilitating earlier organ donation and allowing the better use of resources.

5023. Shoemaker, W. C., et al. (2006). "Noninvasive hemodynamic monitoring for combat casualties." Military medicine **171**(9): 813-820.

The aims of this study were to develop and to test a noninvasive hemodynamic monitoring system that could be applied to combat casualties to supplement conventional vital signs, to use an advanced information system to predict outcomes, and to evaluate the relative effectiveness of various therapies with instant feedback information during acute emergency conditions. In a university-run inner city public hospital, we evaluated 1,000 consecutively monitored trauma patients in the initial resuscitation period, beginning shortly after admission to the emergency department. In addition to conventional vital signs, we used noninvasive monitoring devices (cardiac index by bioimpedance with blood pressure and heart rate to measure cardiac function, arterial hemoglobin oxygen saturation by pulse oximetry to reflect changes

in pulmonary function, and tissue oxygenation by transcutaneous oxygen tension indexed to fractional inspired oxygen concentration and carbon dioxide tension to evaluate tissue perfusion). The cardiac index, mean arterial pressure, pulse oximetry (arterial hemoglobin oxygen saturation), and transcutaneous oxygen tension/fractional inspired oxygen concentration were significantly higher in survivors, whereas the heart rate and carbon dioxide tension were higher in nonsurvivors. The calculated survival probability was a useful outcome predictor that also served as a measure of severity of illness. The rate of misclassification of survival probability was 13.5% in the series as a whole but only 6% for patients without severe head injuries and brain death. Application of noninvasive hemodynamic monitoring to acute emergency trauma patients in the emergency department is feasible, safe, and inexpensive and provides accurate hemodynamic patterns in continuous, on-line, real-time, graphical displays of the status of cardiac, pulmonary, and tissue perfusion functions. Combined with an information system, this approach provided an early outcome predictor and evaluated, with an objective individualized method, the relative efficacy of alternative therapies for specific patients.

5024. Shore, J. W., et al. (1992). "Repair of telecanthus by anterior fixation of cantilevered miniplates." Ophthalmology **99**(7): 1133-1138.

BACKGROUND: The accepted surgical method for telecanthus repair is transnasal wiring. This procedure requires a stable posterior lacrimal crest on the affected side and surgical manipulation of the wires as they exit the contralateral side. A method for repairing telecanthus that obviates these prerequisites is presented. Indications for use of this technique and comparison to transnasal wiring is discussed., METHODS: A Y-shaped titanium rigid orbital plating system ("miniplate") was used to surgically correct traumatic telecanthus in five patients, two in the acute setting and three in late reconstruction. The miniplate was cantilevered from the lateral aspect of the nose and directed posteriorly into the orbit. This provided a stable fixation point for the medial canthal tendon., RESULTS: Marked resolution of the telecanthus was noted in four patients. No post-operative complications have been encountered to date., CONCLUSIONS: Miniplate fixation was used successfully to repair unilateral traumatic telecanthus. Miniplate fixation of the medial canthal tendon should be considered in unilateral cases of traumatic telecanthus and in cases where poor bony support for transnasal wires is evident.

5025. Shoung, H. M., et al. (1985). "The early prognosis of craniocerebral gunshot wounds in civilian practice as an aid to the choice of treatment. A series of 56 cases studied by the computerized tomography." Acta neurochirurgica **74**(1-2): 27-30.

The authors report a series of 56 cases of craniocerebral lesions secondary to missile injuries studied by means of CT scan. CT scans demonstrate the track of the missile, destruction of deep cerebral parenchyma, dissection of the white matter (intracerebral air) and reactive oedema. The prognostic incidence of CT is discussed. The CT scan helps to choose the best therapeutic management with respect to each particular case.

5026. Shrewsbury, D. W., et al. (1982). "Repair of complicated mandibular defects." Archives of otolaryngology (Chicago, Ill. : 1960) **108**(3): 162-166.

In most instances, the injured mandible can be successfully repaired with arch bars and intermaxillary fixation. However, it is important to identify certain potential problem situations early and apply special techniques for their treatment. Potential management problems, such as the non-compliant patient, the edentulous patient, gunshot wounds, radiated mandibles, tumors, and osteomyelitis, are reviewed. The use of special techniques, eg, the dynamic compression plate, the Morris biphase apparatus, the cobalt-chromium alloy (Vitallium) basket, a suction-irrigation apparatus, and the mandibular reconstruction plate, are described to show how they may be effectively applied to these special situations. With early recognition of these management problems and proper application of these more sophisticated techniques, the quality of care for patients, with mandibular injuries can be enhanced.

5027. Shriver, E. M., et al. (2011). "Trochlear calcification mimicking an orbital foreign body." Ophthalmic plastic and reconstructive surgery **27**(6): e143-144.

A 39-year-old man presented with diplopia 1 day following left orbit trauma. CT scan and ultrasound showed a left trochlear hyperintensity that was interpreted by both the radiologist and echographer as a metallic foreign body.

Surgical exploration failed to identify a foreign body. The patient presumably had preexisting trochlear calcification with a post-traumatic nonconcomitant small-angle vertical deviation and diplopia. Calcification should be considered in the differential diagnosis of trochlear hyperintensity noted on imaging studies.

5028. Shriwas, S. R. and A. Z. Kinzha (1993). "Orbital injuries in children: play-related." Indian journal of ophthalmology **41**(3): 129-130.

5029. Shub, E. and A. McCague (2016). "Muriatic acid ingestion complicated by penetrating head injury: A case report and literature review." Journal of Emergencies, Trauma and Shock **9**(2): 86-88.

5030. Shuja, F., et al. (2008). "Role of hypothermia in hemorrhagic shock." Journal of Organ Dysfunction **4**(3): 151-160.

Hemorrhagic shock that leads to cardiovascular collapse does not respond well to conventional methods of cardiopulmonary resuscitation. Even when the source of bleeding can be controlled and the circulation restored, cerebral ischemia lasting for >5 min invariably results in severe brain damage. Often the underlying injuries are reparable but the patient dies of irreversible shock. In this setting, strategies to maintain cerebral and cardiac viability long enough to gain control of hemorrhage and restore intravascular volume could be life-saving. This requires an entirely new approach to the problem, with emphasis on rapid total body preservation, repair of injuries during metabolic arrest, and controlled resuscitation, so-called emergency preservation and resuscitation. Currently, hypothermia is the most effective method for preserving cellular viability during prolonged periods of ischemia. Herein, the authors describe the rationale behind the development of this strategy, its impact on various cellular mechanisms, clinical uses, and the optimal methods for its application.

5031. Shuker, S. (1985). "Spontaneous regeneration of the mandible in a child. A sequel to partial avulsion as a result of a war injury." Journal of maxillofacial surgery **13**(2): 70-73.

A 7-year-old child sustained a severe avulsion injury to the left mandible leaving a 6 cm. gap. A Kirschner wire alone was used for immobilization and stabilization. Radiographs of the mandible 2 1/2 years later showed complete osteogenesis and solid bone formation over the Kirschner wire. The young age of the patient was definitely important in influencing this favourable result. The author's experience in older war injuries patients, using the same procedure, has shown no such bone formation. The source of osteogenesis is believed to be from mesenchymal cells of the soft tissue remaining in the gap. The theories pertaining to the source and mode of osteogenesis in this case are discussed.

5032. Shuker, S. T. (2008). "Management of transcranial orbital penetrating shrapnel/bullet war injuries." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **66**(9): 1927-1931.

5033. Shuker, S. T. (2010). "Base-of-skull/infratemporal fossa shell fragment retrieval." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **68**(11): 2668-2674.

PURPOSE: Shell fragments and bullets are frequently observed to have settled in the skull base and infratemporal fossa (ITF) with the impact resulting in a new surgically complicated trauma. This compact region is one of the most difficult and dangerous locations for lodged objects. When called upon to retrieve these objects, the surgeon faces a complicated challenge. The complexity of the task depends on many factors, such as size, deformation, and surface hooks, as well as identification of the precise anatomic location., MATERIALS AND METHODS: New surgical approaches and successful methods of treatment are presented. The practicability of correctly determining the location of the foreign body is also described. These methods are based on safe and successful practices used in the retrieval of 212 shell fragments from the ITF., RESULTS: In this study, 79% of the ITF fragments and bullets were retrieved by the transoral ITF method. The remaining 21% were removed via the facial path of missile entrance and a transantral approach., CONCLUSION: This article describes feasible, sensible, time-saving practices resulting in lower surgical morbidity in one of the most challenging regions from which to extract lodged missiles. Osseous landmarks are used for

proper localization of trajectories in the ITF by use of posteroanterior and true lateral skull radiographs, which assist in locating metal fragments. The intraoral approach, which is successfully used as a short pathway with minimal tissue damage, may encourage surgeons not to leave fragments unattended.

5034. Shuker, S. T. (2012). "The immediate lifesaving management of maxillofacial, life-threatening haemorrhages due to IED and/or shrapnel injuries: "when hazard is in hesitation, not in the action"." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **40**(6): 534-540.

Maxillofacial/neck vascular injuries caused by improvised explosive devices IEDs or ballistics injuries are life threatening when they cause severe haemorrhage resulting in airway compromise. One should always keep in mind that the best technique used is that which saves the patient's life and not the most expensive and/or technologically advanced. Medical professionals on the scene should have the necessary experience to handle the emergency situations of airway compromise and haemorrhage control. In this instance there is only, "one to a few minutes" to clear airway obstruction and arrest haemorrhage to prevent death. The patients in this study had life-threatening shrapnel injuries of the carotid and/or jugular vessels, and facial primary blast affect implosion of facial middle third air-containing cavities injuries. In a massive casualties arenas, where time=lifesaving, we should need to replace "non-battlefield" civilian techniques with "time driven", combat management for IEDs injuries. In these cases, the immediate and effective compression tamponade using digital, Foley catheter tamponade, packs and/or vessels ligation for severe facial/neck haemorrhage were used successfully.

5035. Shuker, S. T. (2012). "Management of penetrating medial and retro-bulbar orbital shrapnel/bullet injuries." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **40**(8): e261-267.

The presence of shrapnel or a bullet lying in the medial orbital and retrobulbar area is rare. A review of the literature revealed only a few reports. Recently eye/orbital penetrating trauma has increased dramatically, mainly due to IEDs or conventional weaponry in civilian and military casualties. Our experience in the management of these types of injuries prompted this report. Practical techniques for correctly determining the location of retained projectiles in the orbit are described. Surgical techniques for treatment are presented, based on safe and successful practices used in the missile retrievals. Six shrapnel and three bullet injuries, mostly in the medial orbital region, were removed without increasing morbidity and with limited orbital tissue injury.

5036. Shuker, S. T. (2013). "Effect of biomechanism mine explosion on children: craniofacial injuries and management." The Journal of craniofacial surgery **24**(4): 1132-1136.

The significant bodily violence and harm to children from blast injuries continue to be substantially caused by unexploded ordnance and improved explosive devices. Children have many unique anatomic and pathophysiologic attributes that potentially affect their susceptibility to injury. Consequently, this provides a characteristic profile to mine blast effects and projectile injuries. As a result, children's injuries inflicted on craniofacial tissues, airway compromise, hemorrhage, and brain injuries vary significantly from those inflicted on adults. In children more than adults, it is relevant that the simplest, immediate repair of maxillofacial injury is preferable to a major complex surgical approach that is significantly delayed because of availability.Twenty-one cases of mine blast/shrapnel pediatric maxillofacial injuries were selected to represent categorical varieties of a significant but unknown number of casualties treated successfully. The high number of mortality and morbidity caused by mine blast/projectile necessitates a reappraisal of pediatric craniofacial management training. "Losing a single child's life" is especially unacceptable if that loss was found to be due to the medical preparedness being inadequate or the lack of pediatric knowledge.

5037. Shuker, S. T. (2013). "Emergency treatment strategy and the biodynamic effects of massive, "chopped off", mandibular tissue and a prolapsed tongue." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **41**(3): e59-63.

Current weaponry possesses unobserved new, biodynamic wounding effects. For many victims, high velocity, large shell fragments have resulted in massive lower jaw "chopped off" hard and soft tissues injuries accompanied by tongue prolapse. The management challenges begin with lifesaving which is possibly complicated by airway compromise, severe hemorrhage, massive lower jaw loss, and a prolapsed tongue. Consequently, the goal shall be "No patient should die from massive facial tissue injuries alone". That is, if feasible, sensible, lifesaving techniques are applied at the appropriate time. Following general condition stabilization, the surgical management steps of massive lower jaw tissue loss should begin with immediate lost tissue reconstruction. Seventeen cases were selected from an unquantified number patients who had massive mandibular tissue losses in which the tongue, surprisingly, remained intact. In these cases, definitive, early scaffolding stabilization was accomplished by joining the remaining two lower jaw intact segments. The successful procedure consists of using a 2 mm horseshoe shaped Kirschner wire bridging the gap of the mandibular arch which effectively is used as a "scaffold" for rebuilding the soft tissue. Proper, initial, surgical management resulted in protecting lacerated tissue, diminishing subsequent morbidity and disfigurement, preventing a prolapsed tongue and preserving the intact tissues physiological functions. As the spectrum of injuries continues to evolve the clinical characterization of the severity of facial wounds need an expanded classification, appropriate to massive facial injuries. It is suggested it has the following descriptors: blast, penetration, perforation, avulsions and "chopping off" (BPPAC).

5038. Shuker, S. T. (2013). "Interrami intraoral fixation technique for severe mandibular rifle fragmented bullet injury management." The Journal of craniofacial surgery **24**(4): 1168-1174.

Interrami intraoral Kirschner wire fixation technique is presented for the reduction, stabilization, and immobilization of a pulverized and avulsed lower jaw caused by rifle fragmented bullet injuries. This indirect mandibular war injury fixation technique was tolerated by the patients and tissue more than any indirect external fixation. In addition, it is easier than open reduction using large bone plates for disrupted ballistics mandibular injury defects. An interrami intraoral fixation is appropriate for severely disrupted mandibular hard and soft tissues, and has been adapted in cases of mass casualties and limited resources. Benefits of use include limited hospital beds and fewer follow-up visits. Rifle fragmented bullet injuries need more attention for several reasons: not only because of the higher mortality and devastating nature of the injuries, but also because these injuries are responsible for an unreported type of bullet biomechanism wounding in the craniofacial region. In turn, this necessitates specialized victim management. The survival rates depend on immediate proper execution of airway, breathing, and circulation, which become more complicated as it relates to airway compromise and oropharyngeal hemorrhage resuscitation. Survival is predicated on the implementation of feasible, sensible, life-saving techniques that are applied at the appropriate time.

5039. Shuker, S. T. and R. Sadda (2010). "Craniomaxillofacial falling bullet injuries and management." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **68**(7): 1593-1601.

PURPOSE: The purpose of this study was to bring attention to craniocerebral maxillofacial perforating/penetrating injuries due to AK-47 Kalashnikov falling bullets (FBs); these dangerous injuries to both civilians and soldiers are rare. A review of the literature shows no reports on AK-47 FBs leading to double craniocerebral perforation and settling into the maxillofacial region. The number of victims, the AK-47's availability, the associated morbidity and mortality rates, and the rarity of cases prompted this article., MATERIALS AND METHODS: The treatment of injuries to the craniocerebral facial clinical profile due to FBs is challenging, and an understanding of the neurosurgical and maxillofacial management of these low-velocity FB injuries is required., RESULTS: We treated 11 cases due to AK-47 rifle FBs and 1 due to anti-aircraft Dashka 12.7-mm FBs. Craniocerebral facial injuries were treated and lodged bullets removed from different challenging locations in the base of the skull, without increasing morbidity and with avoidance of unnecessary surgical trauma to the affected area by the bullets., CONCLUSION: The required identification of such injuries can be difficult, and the removal of the lodged bullet to prevent secondary complications and reduce the chance of secondary infection can be graver than in other parts of the body. AK-47 FBs are a major public health concern internationally and require serious attention in terms of protection and management for civilians and soldiers in uniform.

5040. Shukla, A., et al. (2017). "Vasopressin Bolus Protocol Compared to Desmopressin (DDAVP) for Managing Acute, Postoperative Central Diabetes Insipidus and Hypovolemic Shock." Case Reports in Endocrinology **2017**.

Introduction. Management of postoperative central diabetes insipidus (DI) can be challenging from changes in volume status and serum sodium levels. We report a case successfully using a dilute vasopressin bolus protocol in managing hypovolemic shock in acute, postoperative, central DI. Case Report. Patient presented after bifrontal decompressive craniotomy for severe traumatic brain injury. He developed increased urine output resulting in hypovolemia and hypernatremia. He was resuscitated with intravenous fluids including a dilute vasopressin bolus protocol. This protocol consisted of 1 unit of vasopressin in 1 liter of 0.45% normal saline. This protocol was given in boluses based on the formula: urine output minus one hundred. Initial serum sodium was 148 mmol/L, and one-hour urine output was 1 liter. After 48 hours, he transitioned to 1-desamino-8-D-arginine vasopressin (DDAVP). Pre-DDAVP serum sodium was 149 mmol/L and one-hour urine output 320 cc. Comparing the bolus protocol to the DDAVP protocol, the average sodium was 143.8 ± 3.2 and 149.6 ± 3.2 mmol/L (p=0.0001), average urine output was 433.2 ± 354.4 and 422.3 ± 276.0 cc/hr (p=0.90), and average specific gravity was 1.019 ± 0.009 and 1.016 ± 0.01 (p=0.42), respectively. Conclusion. A protocol using dilute vasopressin bolus can be an alternative for managing acute, central DI postoperatively, particularly in setting of hypovolemic shock resulting in a consistent control of serum sodium.

5041. Shulman, A. and A. M. Strashun (2009). "Fluid dynamics vascular theory of brain and inner-ear function in traumatic brain injury: a translational hypothesis for diagnosis and treatment." The international tinnitus journal **15**(2): 119-129.

It is hypothesized that in all traumatic brain injury (TBI) patients with a clinical history of closed or penetrating head injury, the initial head trauma is associated with a vibratory sensation and noise exposure, with resultant alteration in vascular supply to the structures and contents of the fluid compartments of brain and ear (i.e., the fluid dynamics vascular theory of brain-inner-ear function [FDVTBE]). The primary etiology-head trauma-results in an initial fluctuation, interference, or interaction in the normal fluid dynamics between brain and labyrinth of the inner ear, with a resultant clinical diversity of complaints varying in time of onset and severity. Normal function of the brain and ear is a reflection of a normal state of homeostasis between the fluid compartments in the brain of cerebrospinal fluid and perilymph-endolymph in the labyrinth of the ear. The normal homeostasis in the structures and contents between the two fluid compartment systems--intracerebral and intralabyrinthine--is controlled by mechanisms involved in the maintenance of normal pressures, water and electrolyte content, and neurotransmitter activities. The initial pathophysiology (a reflection of an alteration in the vascular supply to the brain-ear) is hypothesized to be an initial acute inflammatory response, persistence of which results in ischemia and an irreversible alteration in the involved neural substrates of brain-ear. Clinically, a chronic multisymptom complex becomes manifest. The multisymptom complex, individual for each TBI patient regardless of the diagnostic TBI category (i.e., mild, moderate, or severe), initially reflects processes of inflammation and ischemia which, in brain, result in brain volume loss identified as neurodegeneration and hydrocephalus ex vacuo or an alteration in cerebrospinal fluid production (i.e., pseudotumor cerebri) and, in ear, secondary endolymphatic hydrops with associated cochleovestibular complaints of hearing loss, tinnitus, vertigo, ear blockage, and hyperacusis. The FDVTBE integrates and translates a neurovascular hypothesis for Alzheimer's disease to TBI. This study presents an FDVTBE hypothesis of TBI to explain the clinical association of head trauma (TBI) and central nervous system neurodegeneration with multisensory complaints, highlighted by and focusing on cochleovestibular complaints. A clinical case report, previously published for demonstration of the cerebrovascular medical significance of a particular type of tinnitus, and evidence-based basic science and clinical medicine are cited to provide objective evidence in support and demonstration of the FDVTBE.

5042. Shul'tsev, G. P. (1981). "[Clinical manifestations of long-term sequelae of war contusions, wounds, and diseases]." K klinike otdalennykh posledstvii voennykh kontuzii, ranenii i zabolevanii. **59**(9): 59-62.

5043. Shurbaji, A., et al. (2006). "Metallic foreign body in the cavernous sinus causing delayed formation of brain abscess after missile injury." The Journal of trauma **60**(5): 1135-1137.

5044. Shvyrkov, M. B., et al. (1999). "Non-free osteoplasty of the mandible in maxillofacial gunshot wounds: mandibular reconstruction by compression-osteodistraction." The British journal of oral & maxillofacial surgery **37**(4): 261-267.

We have treated 33 young men with medium to large (3-8 cm) bony and soft tissue defects of the lower third of the face caused by gunshot wounds. After debridement, collapsing the proximal segments for primary approximation of soft and hard tissues and a closed osteotomy of a small fragment of mandible, we used an original compression-distraction device, designed in 1982 and tested during 1983 (analogous devices were absent at that time) to reposition the mandible and cause callus to form (during distraction) between the fragment and to use the remaining stumps of bone to fill in the defect. The soft tissues were repaired at the same time. Twenty-eight of the patients presented within a few hours of injury, and the remaining five had old injuries. The only complications were in the group with old injuries where four patients developed abscesses that required drainage, but these did not interfere with the process of osteogenesis. All 33 patients had good functional and aesthetic results within 3-4.5 months. The method allows a bloodless minimally traumatic procedure which can be carried out in one stage. The results compare very favourably with the classic methods of the treatment of mandibular gunshot injuries.

5045. Shwyrkow, M. B. and A. K. Shamsudinov (1989). "Methods of simultaneous treatment of the mandible defects and the adjacent soft tissues." Acta chirurgiae plasticae **31**(4): 226-235.

Original methods of removing combined defects of the mandibular body and the adjacent soft tissues are described: osteoplasty by local tissues and nonfree osteoplasty. A compression-distraction apparatus of the authors' own construction is used. During the re-arrangement of the bone fragments and the osteotomized portions of the mandible, simultaneous repair of the defect of the bony tissue and the soft tissues takes place without using free bone transplants and soft-tissue flaps. Duration of treatment varies between 2 1/2 and 5 months depending on the size of the defect. A total of 12 persons with traumatic defects of the lower jaw from 2 to 8 cm in length and of the adjacent soft tissues were treated by these methods. Good functional and cosmetic results were obtained.

5046. Siccardi, D., et al. (1991). "Penetrating craniocerebral missile injuries in civilians: a retrospective analysis of 314 cases." Surgical neurology **35**(6): 455-460.

Analysis of 314 cases of penetrating craniocerebral missile injuries in civilians revealed a high rate of early mortality, with 228 victims having died at the scene and a further 38 dead within 3 hours. Surgery was performed in 44 patients who had a preoperative Glasgow Coma Score of at least 4. Out of the 26 survivors, all operated upon, 19 had an adequate recovery (score of 0-3 on the expanded Glasgow Outcome Scale). Vigorous resuscitation and early surgery often resulted in useful survivals and occasionally in spectacular recoveries. However, the high mortality rate on the scene or soon after the injury restricted the possibility of effective management to a minority of cases.

5047. Sichez, J. P., et al. (1982). "[Computed tomography of the head in gunshot wounds. Thirty-three cases (author's transl)]." Le pronostic des plaies craniocerebrales par balle en pratique civile. Serie de trente-trois cas etudies par la tomodensitometrie. **58**(12): 715-717.

The authors report a series of 33 cases of craniocerebral lesions secondary to projectiles injuries studied by means of CT scan. Ct scans demonstrate the path of the missile, destructions of deep cerebral parenchyma, dissections of with matter (intra-cerebral bubble) and reactive oedema. Prognostic incidence of CT is discussed. CT scan helps to choose the best therapeutic approach as regards each particular case.

5048. Siddiqi, S. (2021). "Connectome-targeted neuromodulation across symptoms and disorders." Brain stimulation **14**(6): 1712.

Abstract There is incidental variance in the precise location of different clinical TMS/DBS sites and brain lesions. Each site can be mapped to an underlying circuit using data from a large fMRI connectome database (n=1000), enabling us to retrospectively compare the effects of stimulating different circuits. This session will cover three approaches to connectome-based circuit targeting, each of which was replicated in independent datasets with rigorous permutation-based statistics: 1. Symptom-specific targeting: In two datasets of prefrontal TMS for MDD (n=111), dysphoric symptoms (e.g. sadness, anhedonia) responded best to stimulation of one circuit, while anxious/somatic symptoms responded best to stimulation of a different circuit. These circuits were reproducible across datasets ($p<0.01$) and predicted symptom-

specific improvement in independent cohorts (p<0.0002). 2. Transdiagnostic modulation of depression severity: We analyzed five lesion datasets (n=465), four TMS datasets (n=151), and five DBS datasets (n=101). Diagnoses included stroke (n=269), penetrating brain injury (n=196), MDD (n=195), Parkinson's disease (n=32), and epilepsy (n=25). Similar "depression circuits" were derived from TMS sites that relieve depression, DBS sites that modulate depression, and lesions that cause depression (p<0.005). This "depression circuit" was similar between MDD versus non-MDD patients (p<0.001). 3. Expanding to other disorders: We re-analyzed prior studies of lesions that protect against PTSD or addiction. Penetrating lesions protective against PTSD (n=189) were connected to a common circuit (split-half replication p<0.05). Stroke lesions protective against nicotine use disorder (n=103) were connected to the same circuit as penetrating lesions that reduce alcoholism risk (n=186, p<0.05). We demonstrate that (1) neuromodulation can target different circuits for different symptoms of MDD, (2) antidepressant circuit targets are transdiagnostic, (3) a common circuit can be modulated by TMS, DBS, and brain lesions, and (4) brain lesions can reveal targets for other disorders. These findings provide a robust framework for circuit-based targeting of neuromodulation. Keywords: Connectome, Causal, TMS, DBS

5049. Siddiqi, S. (2022). "Connectome-Targeted Neuromodulation Across Disorders." Biological Psychiatry **91**(9): S58-S59.

Background: There is incidental variance in the precise location of different clinical TMS/DBS sites and brain lesions. Each site can be mapped to an underlying circuit using data from a large fMRI connectome database (n=1000), enabling us to retrospectively compare the effects of stimulating different circuits. Using this approach, we have previously shown that TMS and DBS targets for depression can be identified based on the location of lesions that cause depression. This suggests that lesion connectivity may reveal neuromodulation targets for other disorders. Methods: We analyzed three datasets to identify connectivity of lesions that modify risk of PTSD, addiction, and OCD. 1. Penetrating brain lesions (n=189) in Vietnam Veterans, some of whom developed PTSD (defined by SCID-IV), and all of whom completed an MMPI. 2. Stroke lesions (n=103), some of which led to remission of nicotine use disorder. 3. Published case reports of lesion-induced OCD (n=25). 4. TMS sites associated with change in inhibitory control (n=52). Results: Penetrating lesions protective against PTSD (n=189) were connected to a common circuit (split-half replication p<0.05). Stroke lesions protective against nicotine use disorder (n=103) were connected to the same circuit as penetrating lesions that reduce alcoholism risk (n=186, p<0.05). Published OCD lesions (n=25) were connected to the same circuit as penetrating lesions associated with psychasthenia (n=186, p<0.01) and TMS sites that modify inhibitory control (n=52, p<0.001). Conclusions: Brain lesions may be used to identify new neuromodulation targets for PTSD, addiction, OCD, and potentially other disorders. Funding Source: NIMH K23, NARSAD Young Investigator Grant Keywords: TMS, DBS, Lesion, BOLD fMRI

5050. Siddiqi, S. H., et al. (2020). "A convergent circuit for depression across brain lesions and brain stimulation." Journal of Neuropsychiatry and Clinical Neurosciences **32**(3): e22.

Background: Lesion locations and neurostimulation sites can reveal causal links between neuroanatomy and behavior. Objective: To determine whether lesions, transcranial magnetic stimulation (TMS), and deep brain stimulation (DBS) converge on a common "depression circuit."Methods: We analyzed five lesion datasets (N5465), four TMS datasets (N5151), and five DBS datasets (N5101), each with incidental variance in the precise lesion or stimulation location. Diagnoses included stroke (N5269), penetrating injury (N5196), major depression (N5195), Parkinson disease (N532), and epilepsy (N525). Each lesion or stimulation site's whole-brain connectivity was estimated using a normative resting-state functional connectivity database (N51000). Connections correlated with depression score (lesion datasets) or change in depression score (stimulation datasets) were identified. Cross-circuit similarity was assessed via permutation testing on mean spatial crosscorrelation. Results: Similar depression circuits were identified across all datasets (p<0.001). Circuits derived from brain lesions, TMS sites, and DBS sites all matched one another (p<0.001), as did circuits derived from patients with or without major depression (p<0.001). The combined circuit was correlated with dorsal attention network and anticorrelated with some parts of the subgenual cingulate. Antidepressant efficacy of individual TMS or DBS sites could be predicted using a depression circuit derived from the other 13 datasets (p<0.0001). This prediction outperformed our existing model based on subgenual connectivity (p<0.05). Conclusion: Lesion locations that cause depression, TMS sites that relieve depression, and DBS sites that modulate depression all converge on a common brain circuit. This transdiagnostic and cross-modal depression circuit may serve as a valuable therapeutic target for improved antidepressant treatment.

5051. Siddiqui, N., et al. (2022). "Proteoglycan alterations after traumatic brain injury." Journal of cerebral blood flow and metabolism **42**(1): 10.

Background: Nearly seventy million people are affected by Traumatic Brain Injury (TBI) annually worldwide resulting in immense societal burden. The glial scar, composed of many activated cell types and extensive extracellular matrix (ECM) alterations, is central to its pathophysiology. While significant attention has been paid to the cellular and general extracellular constituents of this scar, less is known about its glycobiology. Aim:We sought to determine the spatiotemporal dynamics of glycosaminoglycans (GAGs) and proteoglycans at the injury site after TBI. Further, we sought to determine if brain-penetrating GAGs known to be released in diseases associated with systemic inflammation like TBI contribute to ECM changes at the injury site. Method: We performed controlled cortical impact (CCI) or craniotomy-alone (CA) in mice then measured GAGs in brain and plasma at 1 and 7d via mass spectrometry (HPLC MS/MS). We compared transcriptomic profiles of CCI site to contralateral tissue. We confirmed increased expression of proteoglycans identified by transcriptomics via immunohistochemistry. Results/Conclusions: We observed elevations in GAGs at the injury site compared to contralateral tissue after CCI and CA. We did not observe increases in circulating GAGs after CCI when compared to CA. Transcriptomics at the CCI site revealed isolated increases in the proteoglycans glypican3 and decorin. Increased expression of these proteoglycans was verified via immunohistochemistry. Our results suggest that both CCI and CA significantly impact local GAG levels. GAG alterations after TBI may be specifically driven by upregulation of glypican3 and decorin. The precise biologic consequences of these upregulated proteoglycans warrants further investigation.

5052. Siddiqui, S.-U.-D., et al. (2020). "Efficacy of open reduction and internal fixation in achieving bony union of comminuted mandibular fractures caused by civilian gunshot injuries." The surgeon : journal of the Royal Colleges of Surgeons of Edinburgh and Ireland **18**(4): 214-218.

INTRODUCTION: Comminuted fractures of the mandible caused by gunshot injuries were traditionally treated with closed reduction using maxillo-mandibular fixation (MMF). 2,3 Open reduction and internal fixation (ORIF) has become a valuable treatment modality in the management of comminuted mandibular fractures due to low rate of complications and predictable healing 4, 5., OBJECTIVE: To compare the efficacy of ORIF compared with MMF in achieving bony union of comminuted mandibular fractures in gunshot injury patients., METHOD: ology: Randomized controlled trial conducted at the department of Oral & Maxillofacial Surgery, Abbasi Shaheed Hospital for a period of 3 years; total of 40 patients divided equally into two groups. Group A were treated with ORIF and group B were treated with MMF. Callus formation radiographically was confirmed by 8th week post operatively. Data was collected using proforma, entered on a statistical software SPSS version 20. Frequency percentages were computed for age and gender. Chi square and Fisher's exact tests were applied. P value <= 0.05 considered significant., RESULT: A total of 40 patients of gunshot injuries were included in this study. 37 (92.5%) were males and 3 (7.5%) were Females with mean age of 36.35 +/- 12.9 years SD. 19 (47.5%) patients showed callus formation, whereas, 21 (52.5%) did not. Out of 19 patients, 14 (70%) belonged to group A, and 5 (25%) from group B. The final healing considered by 8th week was in 16 (80%) of ORIF group A, and 8 (40%) group B (MMF) after calculating the clinical and radiographic evidences., CONCLUSION: Comparative clinical trials have proven that ORIF is superior to MMF in the management of comminuted mandibular fractures. Early primary repair and internal fixation provides predictable and cost effective results.

5053. Sidlo, J. and H. Sidlova (2018). "Accidental fatal craniocerebral injury caused by broken chain of sawing tool." Forensic science international **289**: e15-e17.

The case of an accidental fatal penetrating craniocerebral injury to a 26-year-old man at work when cutting wood is reported. There was used an angle grinder with an accessory for cutting similar to a chainsaw. The injury was caused by a fragment of the broken chain. The chain fragment broke through the facial part of the head to the left and penetrated the brain in the region of the left parietal bone of the cranial vault. The immediate cause of death was a failure of the central nervous system (brain death). The toxicological analysis of biological materials was negative. The death occurred as a result of a triple violation of safety precautions. The presented case is extremely rare in terms of

fatal injuries caused by power tools for sawing having been published in the forensic literature.

5054. Sidlo, J. and H. Sidlova (2018). "Long-term self-inflicted craniocerebral penetrating injury with a fatal outcome." Forensic science international **293**: e1-e4.

A case of long-term continual self-inflicted penetrating craniocerebral injury to a 59-year-old man with a fatal outcome is reported. The man suffered from paranoid psychosis and alcohol dependence. Over five months, he continually scalped the skin and subcutaneous tissue of his head with a knife until he perforated the skull and dura mater and injured his brain. He eventually sought medical advice, but died after 10 days of hospitalization despite complex conservative treatment. The immediate cause of death was a combination of central nervous system failure and heart failure. The original case presented is sporadic in the forensic literature due to atypical long-term continual self-harm to the head and brain using a sharp object that resulted in perforation of the skull and a fatal outcome. This case also highlights the importance of autopsy to determine the mechanism of injury and cause of death.

5055. Siedler, D. G., et al. (2014). "Diffuse axonal injury in brain trauma: Insights from alterations in neurofilaments." Frontiers in Cellular Neuroscience **8**(DEC).

Traumatic brain injury (TBI) from penetrating or closed forces to the cranium can result in a range of forms of neural damage, which culminate in mortality or impart mild to significant neurological disability. In this regard, diffuse axonal injury (DAI) is a major neuronal pathophenotype of TBI and is associated with a complex set of cytoskeletal changes. The neurofilament triplet proteins are key structural cytoskeletal elements, which may also be important contributors to the tensile strength of axons. This has significant implications with respect to how axons may respond to TBI. It is not known, however, whether neurofilament compaction and the cytoskeletal changes that evolve following axonal injury represent a component of a protective mechanism following damage, or whether they serve to augment degeneration and progression to secondary axotomy. Here we review the structure and role of neurofilament proteins in normal neuronal function. We also discuss the processes that characterize DAI and the resultant alterations in neurofilaments, highlighting potential clues to a possible protective or degenerative influence of specific neurofilament alterations within injured neurons. The potential utility of neurofilament assays as biomarkers for axonal injury is also discussed. Insights into the complex alterations in neurofilaments will contribute to future efforts in developing therapeutic strategies to prevent, ameliorate or reverse neuronal degeneration in the central nervous system (CNS) following traumatic injury.

5056. Siegel, E. B., et al. (1983). "Fatal intracranial extension of an orbital umbrella stab injury." Annals of ophthalmology **15**(1): 99-102.

We examined a patient with an orbital stab injury with fatal intracranial extension in whom the initial emergency examination did not reveal the extent of damage. Ophthalmologic consultation showed an afferent pupillary defect (Marcus-Gunn pupil), which prompted radiologic studies. Orbital tomograms and computerized tomography demonstrated an optic canal fracture and penetration to the contralateral right ventricle. Diabetes insipidus and thermal irregularity developed, and death occurred seven days later.

5057. Sights, W. P. and R. J. Bye (1970). "The fate of retained intracerebral shotgun pellets. An experimental study." Journal of neurosurgery **33**(6): 646-653.

5058. Sikka, S., et al. (2016). "Identification of traumatic brain injury in spinal cord injury across the continuum of care." Archives of physical medicine and rehabilitation **97**(10): e111.

Research Objectives: To explore how TBI is screened among SCI patients across the continuum of care. Design: Retrospective chart review. Setting: Emergency department, trauma, inpatient rehabilitation. Participants: 325 patients with SCI admitted to inpatient rehabilitation facility (IRF) between March 1, 2011 and December 31, 2014 were screened. 49 eligible subjects had a traumatic SCI and received care in the adjoining acute care (AC) hospital.

Interventions: Not applicable. Main Outcome Measure(s): Demographic characteristics and variables that capture diagnosis of TBI/SCI included documentation from ambulance, emergency department, AC, and IRF which included ICD-9 codes, altered mental status, loss of consciousness (LOC), Glasgow Coma Score (GCS), Post Traumatic Amnesia (PTA), neuroimaging, and cognitive assessments. Results: Participants were male (81%), white (55%), privately insured (49%), and aged 39.3 ± 18.0 years with 51% paraplegic and 49% tetraplegic. Mechanisms of injury were gunshot wound (31%), fall (29%), and motor vehicle accident (20%). TBI occurred in 65% of SCI individuals, and documentation of identification of TBI varied in AC H&P (29%), AC discharge note (24%), IRF H&P (29%), AC ICD-9 (37%), and IRF ICD-9 (30%). LOC was recorded in the ER note (22%), EMS report (14%), AC H&P (31%), and IRF H&P (33%). TBI was identified in AC CT imaging (20%). PTA was identified in the AC psychology note (20%). Cognitive assessments were performed on 16% of subjects. Conclusions: Documentation showed variability between AC and IRF and among disciplines. Imaging and GCS were more consistently documented than LOC and PTA. As a result, there is a need to standardize screening processes between AC and IRF to identify those that need specialized intervention. Processes identified to improve care among TBI/SCI individuals include standardizing screening and documentation so the TBI/ SCI treatment protocol can be activated across the continuum.

5059. Sil, K. and S. Chatterjee (2016). "Perforating brain injuries in children-protocol of management from civilian practice." Child's Nervous System **32**(5): 938.

Introduction: Perforating injuries to the brain are caused by a number of blunt and sharp objects in civilian life. This is a report of 15 children with perforating brain injuries which presented to our Centre from 2007 and 2014. Methods: The average age was 5.7 year and 9 were male and 6 female. The etiological agent ranged from spookes of bicycle wheels to idli makers to sharp end of umbrellas. After emergency resuscitation, and a detailed history from witnesses, the radiological investigation useful in all cases was MR scan of brain. Important findings include: entry and exit sites; intracranial fragments; missile track and its relationship to both blood vessels and air-containing skull-base structures; intracranial air; transventricular injury; basal ganglia and brain stem injury; missile track crossing the midline; multi-lobar injury; basal cisterns effacement; brain parenchymal herniation and associated mass effect. In 6 of the cases, the missile tract was suspected to be crossing vascular territory and hence angiography was resorted to. In 3 cases, pseudoaneurysm or arteriovenous fistulae were detected. Although intracranial pressure monitoring was used by us when indicated, in only 1 of the 15 cases did we feel it necessary to measure this parameter. Although debridement is recommended in al cases, we did not intervene in 4 cases where the tract penetrated to deep levels in eloquent areasand where the children arrived very late. In one case the child came with a delayed abscess which required drainage. Results: Bad prognosis in our small series occurred in bilateral hemisphere injuries, in children presenting with low Glassgow Coma scores or with respiratory distress. Conlusions: We would like to propose a algorithm for management of these uncommon injuries in the pediatric age group.

5060. Silva, A., et al. (2021). "Load-bearing ORIF of mandibular fracture caused by firearms projectiles: Case series." International journal of oral and maxillofacial surgery **51**: e12.

Purpose: The main challenge in mandibular fractures caused by firearms is restore the anatomy in the fracture areas, due to the severe destruction of the bone and tooth borne structures. To reestablish these areas, load sharing devices usually lacks support, leading to non-union and infections. Strong systems, with load-bearing pattern are the gold-standard for the treatment of complex mandibular fractures. Methods: A series of patients with mandibular fracture caused by firearms injuries was treated with load-bearing devices and followed to observe the complications and outcomes. Results: A total of 22 patients were enrolled by this study, 19 male and 3 females. All the patients were treated with transcutaneous approach and rigid fixation with a 2.4 mm titanium plate, a total load-bearing device. The complication rate was considered low, with infection of the surgical site (13%) and material fatigue (9%) the most prevalent. Conclusion: Open reduction and internal fixation of mandibular fractures with load-bearing devices is a reliable procedure. The use of these materials in cases of caused by firearms projectiles is fundamental to promote the correct for bone support in long term.

5061. Silva, J. A., et al. (1993). "Misidentification delusions, facial misrecognition, and right brain injury." Canadian journal of psychiatry. Revue canadienne de psychiatrie **38**(4): 239-241.

Individuals suffering from misidentification syndromes may present with right hemispheric pathology and deficits in facial recognition. In addition, misidentification delusions have been associated with aggressive behaviour. The possible linkage between misidentification phenomena, facial recognition, and aggression is discussed, illustrated by the case of a patient suffering from an organic delusional disorder.

5062. Silva, S. F. R., et al. (2014). "Profile of organ donors in Ceara, northeastern Brazil, from 1998 to 2012." Transplantation proceedings **46**(6): 1692-1694.

The use of cadaver donors for transplantation is often the only alternative in the treatment of patients with organ failure. The purpose of this study was to draw a comprehensive profile of solid organ donors in Ceara, northeastern Brazil, from 1998 to 2012. The study was retrospective and based on secondary data regarding sex, age, blood typing, and cause of brain death obtained from the solid organ donor database of the Ceara Transplantation Center covering the period November 1998 to December 2012. During the study period, 976 donors (69% male) were used. Donors were distributed in 4 age groups as follows: 12.9% <18 years, 50.9% 18-40 years, 28.5% 41-60 years, and 7.7% >60 years. The average age was 35 +/- 16 years. On the average, female donors were older than male donors (38.4 +/- 17 y vs 33.5 +/- 16 y; P < .0001). Men were predominant in the age groups 18-40 y (75.3%; P < .0001) and 41-60 y (59.4%; P < .0001). The main causes of brain death were traumatic brain injury (TBI) (56.7%) and stroke (33.1%). The former was more common in men (P < .0001), the latter in women (P < .0001). TBI was caused by traffic accidents (51.4%), of which 50.7% were motorcycle accidents, and urban violence (22.6%), of which 71.2% were associated with firearms. The number of donations increased in the study period (11.2 donors per million population in 1998-2002 to 68.1 in 2008-2012). In Ceara, solid organ donation is on the rise. The predominant donor profile was young men aged 18-40 years with brain death due to TBI caused by traffic accidents and urban violence.

5063. Silvestro, C., et al. (2001). "Delayed effects of a migrated foreign body (sewing needle) in the cervical spine: a case report." Spine **26**(5): 578-579.

STUDY DESIGN: A case report is presented., OBJECTIVE: This report documents one case of intraspinal migration of a metal foreign body., SUMMARY OF BACKGROUND DATA: The migration and penetration of foreign bodies into the spine have been described, but there are only three reports of a needle as the causative object., METHODS: This case report included a chart review, an examination of the patient, and a literature search., RESULTS: The patient successfully underwent surgery, in which the foreign body (a sewing needle) was removed., CONCLUSION: It is important to be aware of the possible delayed penetration of a foreign body into the spine even in patients with few or no symptoms.

5064. Sima, A., et al. (2017). "Predicting long-term global outcome after TBI: Development of a practical prognostic tool." Archives of physical medicine and rehabilitation **98**(10): e94.

Research Objectives: To develop a prognostic tool for informative predictions on long-term functional outcomes after moderate to severe TBI.DesignMultiple Cross-Sectional Analyses at 1, 2, and 5 years post-injury. Setting: Inpatient rehabilitation facilities in multicenter TBI-Model Systems (TBIMS), with follow-up conducted primarily by telephone. Participants: Individuals with non-penetrating TBI and injury date 1997-2017 enrolled in the TBIMS. Interventions: Not applicable. Predictive models were built by a flexible classification tree methodology.Main Outcome Measure(s)Glasgow Outcome Scale. Results: There were 10,125, 8,821, and 6,165 participants in the final analyses for the 1, 2, and 5-year follow-up periods, respectively. PTA duration dominated the branching hierarchy in all model years, with similar cutoffs in each of the follow-up periods. Lower order variables used as prognostication variables included age at injury, premorbid education, occupational category, and productivity, with age at injury being the most proximal predictor when more than one emerged. Generally, patients who spent fewer days in PTA, were younger at injury, employed or productive, and had achieved higher levels of education had better outcomes. Prior TBI, problem alcohol use, illicit drug use, initial motor GCS, focal hemorrhage on CT, cranial surgery, and acute hospital LOS were non-contributory. Predictability in independent test datasets ranged from C-statistic of 0.685 (year-5) to 0.729 (year-2).Conclusion/DiscussionAn easy-to-use prognostic tool for long-term functional outcomes was developed that is based on flexible statistical methodology and a large number of patients. An assessment using an independent dataset showed reasonable predictability, allowing for its use to guide expectations for patients and their families. Findings show that up

to 5 years after moderate to severe TBI, length of PTA, a correlate of injury severity, remains the most critical determinant of functional outcomes.

5065. Siman-Tov, M., et al. (2013). "Reduction in trauma mortality in Israel during the last decade (2000-2010): the impact of changes in the trauma system." Injury **44**(11): 1448-1452.

HYPOTHESIS: Following the introduction of changes to the trauma system there would be a period of time during which the impact on mortality would be minimal. A decrease in mortality rates would be noted as the TS matured and would continue over time., DESIGN: A retrospective cohort study of all severely injured patients (injury severity score >= 16) recorded in the Israeli National Trauma Registry at six level I trauma centres in Israel from 2000 to 2010. Inpatient death rates were examined overall and by sub groups., SETTING: The National Trauma Registry contains hospitalized patients, transfer patients to or from other hospitals and those who died in the emergency department. It excludes patients who were dead on arrival, discharged following treatment in the emergency department, and patients whose injuries by definition are not classified as trauma., MAIN OUTCOME MEASURES: In-hospital mortality, RESULTS: Data included 23,143 severe trauma patients available for analysis. Inpatient mortality rates decreased significantly from 16% in 2000 to 11% in 2010. The odds ratio for mortality in 2010 vs. 2000, adjusted for year, age, sex, mechanism of injury, traumatic brain injury, penetrating injury, and severity of injury (ISS >= 25), was 0.53, confirming a downward trend., CONCLUSIONS: A steady significant reduction in the inpatient mortality rate for severe trauma patients hospitalized at all level I trauma centres in Israel between 2000 and 2010 was observed. Although a single factor that explains the reduction was not identified, evidently the establishment of the trauma system brought about a significant decrease in hospital mortality. Integrated cooperation between components of the national trauma system in Israel over the years may explain the reduction.

5066. Simic, M., et al. (2007). "The characteristics of head wounds inflicted by "humane killer" (captive-bolt gun)--a 15-year study." Journal of forensic sciences **52**(5): 1182-1185.

The "humane killer" or captive-bolt gun, is the tool/weapon widely used in meat industry and private farmer households for slaughtering animal stock. Out of 17,250 autopsies performed at the Institute of Forensic Medicine in Novi Sad during the 15-year period (1991-2005), 29 cases of suicides and two homicides were committed by captive-bolt pistols. Wounds inflicted by captive-bolt guns have specific morphological features, distinctive from wounds made by other kinds of hand firearms. Selected features of the captive-bolt wounds (punched round entrance and a double pattern of smoke soiling) depend on distance and angle of instrument at the time of firing. Autopsy findings were compared with an experimental model consisting of 20 domestic pigs. Obtained results confirmed that the appearance of the entrance hole and soot deposits, along with differences in shape, location, extent, and density of soot blackening, could be useful in identification of weapon, direction of discharge, shooting distance, and angle of the muzzle to the frontal and sagittal planes of the head at the moment of fire.

5067. Simon, G., et al. (2019). "Brain death of an infant caused by a penetrating air gun injury." Legal medicine (Tokyo, Japan) **39**: 41-44.

Air guns are shooting projectiles (pellets) from the expansion of compressed air without involving any chemical reactions. Air guns are often regarded as harmless by the public, but these weapons can produce severe, sometimes lethal injuries, especially in children. A case of a penetrating head injury of an eleven-month-old infant, caused by an ordinary air gun pellet, is presented. The air gun pellet created an exceptionally severe brain injury, and brain death. The factors influencing the severity of air gun injuries - muzzle velocity, muzzle energy, skull thickness - are discussed.

5068. Simon, J. C., et al. (2012). "Penetrating ballistic-like brain injury (PBBI) induces coagulopathy with reduction of platelet-fibrin interaction: A study of thromboelastography in a rat model." Journal of neurotrauma **29**(10): A55.

Introduction Severe coagulopathy often accompanies penetrating brain injury and its incidence isreported to be significantly higher than with closedhead trauma. However the mechanisms underlying coagulopathy in brain injury are poorly understood. The aim of this study is to assess the possible mechanism of using thromboelastography (TEG) in rat PBBI model. Methods Sprague-Dawley rats were allocated to PBBI or sham control groups (n = 7/grp). Experimental

procedures were as follows: PBBI group; a burrhole was made in the frontal skull for PBBI probe insertion and inflation/deflation. Sham control group; received craniotomy only. Arterial blood samples were collected (femoral artery) with a TEG analyzer. The following variables were measured: reaction time (R), coagulation time (K), clot formation rate (a-angle), maximum amplitude (MA), shear elastic modulus (G), coagulation Index (CI), and LY30 (%lysis during 30min after MA) and compared between the PBBI and sham groups. Group differences in each parameter were evaluated and p Values < 0.05 were considered significant. Results CI, which represents the overall coagulation status, was lower in the PBBI vs sham group (Mean - SEM; 3.10 - 0.29 vs 4.34 - 0.58). MA value, which reflects the platelet-fibrin interaction, was significantly smaller in the PBBI vs sham (65.6 - 1.6 vs 73.2 - 3.4, p = 0.0319). Moreover, the G value, which also represents the strength of the fibrin clot, was smaller in the PBBI group vs controls (17590 - 4798 vs 9644 - 615, p = 0.0411). Conclusions These results suggest platelet-fibrin interaction could be reduced in PBBI. The real time“Point of Care”assessment with TEG could help to select more targeted, goal-directed therapy in PBI patients.

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5069. Simonetti, V. A., et al. (1998). "Donor cerebral tissue pulmonary emboli in a functioning transplanted lung." Clinical transplantation **12**(6): 504-507.

Cerebral tissue pulmonary embolus (CTPE) is a rare event following severe blunt or penetrating head trauma and is often complicated by coagulation disturbances and hemorrhage. Donor cerebral tissue pulmonary embolism has been reported to cause lethal, early graft dysfunction in lung transplant recipients. We report a case of donor cerebral tissue pulmonary embolism in a 41-year-old female single lung transplant recipient with excellent post-operative graft function.

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5070. Simonit, F., et al. (2020). "A burned body with a gunshot wound in the mouth and a suicide note: A complex or complicated suicide?" Journal of forensic and legal medicine **72**: 101958.

The body of a 53-year-old man was found in a burning car. The ignition key was in start position and the accelerator pedal was held down by his right foot. Autopsy revealed a gunshot entrance wound in the hard palate, a bullet track through the anterior cranial fossa and a projectile lodged in the left frontal lobe. The brain stem was free of lesions and any signs of secondary brain injury, such as brain oedema and intracranial haemorrhage, were not significant. Soot deposits and thermal injury to the mucosa were observed in the airways below the glottis and carboxyhaemoglobin (COHb) saturation was 40%. A single bullet case and a handgun were recovered next to the driver's seat. Fire investigators identified the motor as the beginning of the burning: therefore, the conclusion was that the car had caught fire due to overheating of the engine. Differential diagnosis between complex and complicated suicide was essential. The cause of death was identified as carbon monoxide intoxication, and the injuries to the brain were not felt to be immediately fatal. The case has been classified as a complicated suicide. There are no other published cases of a complicated suicide involving exposure to fire or the use of firearms. Copyright © 2020. Published by Elsevier Ltd.

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5071. Simonton, J. T. and B. P. Arthurs (1987). "Penetrating injuries to the orbit." Advances in ophthalmic plastic and reconstructive surgery **7**: 217-227.

Although penetrating orbital wounds are an uncommon entity they are often associated with vision and life-threatening complications. By careful attention to the history and physical signs of the injured patient and the use of modern computed tomography (CT) scan imaging, the physician will be better able to make an accurate analysis and prognosis of the problem at hand as well as a well-planned therapeutic approach.

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5072. Simunek, A. and L. Novak, Jr. (1988). "[Gunshot wounds of face and jaws and their consequences]." Strelna poraneni obliceje a celisti a jejich nasledky. **36**(9): 262-268.

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5073. Sinclair, M. C. and T. C. Moore (1974). "Major surgery for abdominal and thoracic trauma in childhood and adolescence." Journal of pediatric surgery **9**(2): 155-162.

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5074. Sindwani, R. (2008). "Endoscopic frontal outflow tract obliteration for pneumocephalus after frontal sinus cranialization." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **139**(5): 735-737.

5075. Singer, P., et al. (2005). "Brain death and organ damage: the modulating effects of nutrition." Transplantation **80**(10): 1363-1368.

5076. Singh, A., et al. (2018). "Chronic Discharging Sinus of Upper Lid Due to the Missed Wooden Foreign Body." Nepalese journal of ophthalmology : a biannual peer-reviewed academic journal of the Nepal Ophthalmic Society : NEPJOPH **10**(20): 176-179.

BACKGROUND: Foreign bodies of the orbit can have a diverse range of clinical presentations, which may be perplexing to the most Ophthalmologists. Wooden foreign bodies can remain quiescent for a long time, before presenting with various complications. We report a case of Post-traumatic chronic non-healing discharging sinus in the left upper lid, which on exploration revealed the presence of the missed wooden foreign body., CASE: A 48-year-old male, presented to Ophthalmic OPD with a complaint of discharge from the left upper eyelid for 18 months. The patient had a history of minor trauma to the left upper eyelid while collecting wood in the forest, 18 months back. The patient was misdiagnosed on previous examinations elsewhere. The diagnosis of retained wooden foreign body was made at our center and surgical exploration was done to remove the same., OBSERVATION: On clinical examination, there was a 2-3mm long sinus in the left upper eyelid with purulent discharge and granulation tissue. Surrounding skin showed hyperpigmentation and excoriation. CT scan orbit was inconclusive. MRI orbit revealed a peripherally enhancing extraconal/conal collection in the left orbit with a central hypo intense structure suggestive of a foreign body. Surgical exploration of the wound was done and a small wooden foreign body measuring 9mm was removed with excision of the sinus tract., CONCLUSION: A history of trauma followed by chronic discharging sinus should evoke suspicion of a retained foreign body. Prompt imaging, followed by surgical exploration should be done to prevent misdiagnosis and inappropriate management. Copyright © NEPjOPH.

5077. Singh, B., et al. (2017). "Traumatic cerrebral fungus: Experience from an institution in North East India." Journal of neurosciences in rural practice **8**(5): 37-43.

Background: Traumatic brain fungus is manifestation of neglected head injury. Although rare it is not uncommon. The patients are usually intact with good Glasgow coma (GCS) score inspite of complex injuries and exposed brain parenchyma but morbidity and mortality is very high with time if no proper and timely management is offered. There is very less study on traumatic brain fungus with no defined management protocols. So an attempt was made to explain in details the surgical strategies and other management techniques in patients with traumatic brain fungus. Aims: To study and evaluate the pattern of causation, clinical presentations, modalities of management of traumatic brain fungus and outcome after treatment. Methods: All patients with fungus cerebri, admitted to our centre from January 2012 to December 2015 were studied prospectively. All the patients were examined clinically and triaged urgently for surgery. CT head was done in all patients to look for any brain parenchymal injury. All patients were managed surgically. Outcome was assessed as per the Glassgow Outcome Score. Results: Total 10 patients were included in the study. 8 were men and 2 women. The patients' ages ranged from 3-48 years (mean 31.6 years). The interval between initial injury and protrusion ranged from 3 days to 6 days (mean 4.1 days). Mean GCS at the time of presentation was 13.2.60% of the patients (n = 6) sustained moderate head injury. (GCS-9-13). Size of the fungus ranged from 5cm×3cm to 8cm×10cm. Conclusion: Early and proper local wound treatment prevents fungus formation. Pre-emptive antibiotics, AEDs and cerebral decongestants are recommended. Loose water-tight duroplasty prevents CSF leak. But mortality and morbidity can be reduced significantly if brain fungus is managed properly by applying basic surgical principles and antibiotic protocols combined with newer surgical modalities.

5078. Singh, B. K., et al. (2015). "Paradigm Shift in Management Strategies of Craniocerebral Missile Injuries Improving Survival Rates and Functional Outcome Score." Indian Journal of Neurotrauma **12**(1): 53-61.

Introduction With development of firearms, civilian violence, ethnic clashes, militancy, terrorist attack, and military operations there is a worldwide increase in incidence of craniocerebral missile injuries. The mortality of patients

with craniocerebral missile injuries is high, and if the victim survives, functional outcome is poor. In spite of high mortality, no proper attention was given in last five decades in improving surgical techniques and resuscitation patterns of patients with craniocerebral missile injuries. Problems Considered The problems are many, but the two problems highlighted are decreased survival because of the inadequate pre-op resuscitation and poor functional outcome due to aggressive surgery. Therefore, the study was performed to evaluate the outcome of early and less aggressive surgical strategy and aggressive preoperative resuscitation in patients with penetrating injuries and also to look for factors prognosticating outcome. Methods A series of 96 patients with craniocerebral missile injuries to head were managed at a single center over a period of 3 years is presented. Aggressive resuscitation was done in all hemodynamically unstable patients and patients with coagulopathy either with blood products, hyperosmolar therapy or ionotropic support on protocols of damage control resuscitation. Blood product therapy consisted of packed red blood corpuscles, fresh frozen plasma (FFP) and platelets. Hypertonic saline was used for hyperosmolar resuscitation, and for ionotropic support dopamine, adrenalin, and vasopressin were used. Minimum debridement of the missile tract was done and maximum cortical tissue was preserved. Results Neurosurgical procedures contemplated on 78 patients. Criteria for craniotomy were—Glasgow Coma Scale (GCS) of < 8 without hypotension and reacting pupils, GCS > 8 with intracranial bone fragments/significant clot, and raised intracranial pressure. Surgical approach were frontotemporal exposure (41%, n ¼ 32/78), frontoparietal exposure (22%, n ¼ 18/78), retrosigmoid exposure (2%, n ¼ 2/78), combined middle and posterior fossa approach (2%, n ¼ 2/78), and decompressive craniectomy (43%, n ¼ 24/78). Procedures done were debridement of devitalized tissue (100%, n ¼ 78/78), extraction of bone fragment (43%, n ¼ 17/39), extraction of metallic pellet (62%, n ¼ 42/67), lax duraplasty (100%, n ¼ 78/789), debridement of missile tract (100%, n ¼ 78/78). Overall, 36 patients were operated within 8 hours and 22 patients were operated within 14 hours. Median age group were 26 years, 81% were male, surgical mortality of 18%, and overall mortality was 33%. Conclusion This study indicates the factors prognosticating outcomes and supports that less aggressive surgery and aggressive preoperative resuscitation has decreased surgical mortality rates and improved functional outcomes.

5079. Singh, D., et al. (2010). "An unusual presentation of head injury: teeth in brain." Turkish neurosurgery **20**(1): 63-65.

Penetrating injuries other than gunshot wounds or low-velocity wounds to the head are extremely rare. We report the case of a 19 year old male who sustained a penetrating craniocerebral trauma following a road traffic accident. Noncontrast CT scan revealed three foreign bodies embedded in left frontal lobe, which on surgery turned out to be human teeth. Mechanism of injury seems to share characteristics of low velocity projectiles. The survey of management pattern of these injuries showed a general agreement about CT scan, antibiotics and anticonvulsants. The prompt management resulted in an excellent outcome. We discuss the management of this unusual case reviewing the current literature on craniocerebral injuries caused by similar objects.

5080. Singh, D. and S. Morley (2008). "Safety of electroconvulsive therapy in a patient with intracranial lead." The Australian and New Zealand journal of psychiatry **42**(12): 1075-1076.

5081. Singh, P. (2003). "Missile injuries of the brain: results of less aggressive surgery." Neurology India **51**(2): 215-219.

Sixty cases of missile injuries (59 males, average age 25 years) were studied over a period of one year. Forty-three patients had suffered splinter injuries, 12 had gunshot wounds and 5 had suffered injuries from improvised explosive devices. The Glasgow coma scale was <5 in 8 patients, 5-8 in 14, 8-12 in 30 and 13-15 in 8 patients. Extensive comminution of skull bones was found in 10 patients. Thirty-five patients had penetration of the skull and the rest had orbito-cranial or facio-cranial wounds. CT scan revealed small hemorrhagic contusion with in-driven bones without mass effect in 15, contusion with mass effect in 36 cases, cortical contusions without in-driven bones (tangential injuries) in 3, distant intracranial contusions in 4, intraventricular hemorrhages in 5, multilobar injuries in 14, and unilobar injury in 40. Fifty-two patients were operated upon at our center, of which 30 were operated within 24 hrs, 10 between 24 to 48 hrs, and 12 between 48 to 72 hrs. Six patients were treated conservatively and 2 underwent only a simple closure of scalp wound. Craniectomy was done in 10 and craniotomy in 42 patients. Two patients developed wound sepsis, one had aspiration pneumonia, one had septicemia and one had deep vein thrombosis while one had post-traumatic hydrocephalus. On follow-up at 6 months, the outcome as per the Glasgow outcome scale was as follows: Good outcome in 42, moderate disability in 7, severe disability in 6 and death of 5 patients. Retained bone fragments were found in 36.3 % on follow-up CT scan but no one had brain abscess.

5082. Singh, P., et al. (2003). "Missile injuries of brain - An experience in northern sector." Medical Journal Armed Forces India **59**(4): 290-297.

During a period of one year, from Jan 99 to Dec 99, 60 cases of missile injuries were treated at our centre. 59 were males and one was a female and their average age was 25 years. 43 patients had suffered splinter injuries, 12 had gunshot wounds and 5 had suffered injuries by improvised explosive devices. Glasgow coma scale was < 5 in 8 patients, 5-8 in 14, 8-12 in 30 and 13-15 in 8 patients. Extensive comminution of skull bones was found in 10 patients. 35 patients had more or less clear penetration of the skull and the rest had orbito-cranial or facio-cranial wounds. CT scan revealed small haemorrhagic contusion with in-driven bones without mass effect in 15, contusion with mass effect in 36 cases, cortical contusions without in driven bones (tangential injuries) in 3, distant intracranial contusions in 4, intraventricular haemorrhages in 5, multilobar injuries in 14, and unilobar injury in 40. 52 patients were operated upon at our centre of which 30 were operated within 24 hours, 10 between 24 to 48 hours, 12 between 48-72 hours. Six patients were treated conservatively and 2 required only simple closure of scalp wound. Craniectomy was done in 10 and craniotomy in 42 patients. Two patients developed wound sepsis, one each developed aspiration pneumonia, septicemia, deep vein thrombosis and post-traumatic hydrocephalus. On follow up at 6 months, outcome as per Glasgow outcome scale was as follows : good outcome - 42, moderate disability in 7, severe disability in 6 and death in 5 patients. Retained bone fragments were found in 40% on follow up CT scan but none had brain abscess.

5083. Singh, T. G., et al. (2015). "Sympathetic ophthalmia in a case of penetrating ocular injury associated with brain injury: A case report." JMS - Journal of Medical Society **29**(2): 116-118.

Sympathetic ophthalmia is a rare bilateral granulomatous inflammation that follows accidental or surgical insult to the uvea of one eye. The diagnosis may be confounded by the associated traumatic brain injury. Here, we report a case of sympathetic opthalmia in a patient who sustained perforating injury of the right eye and traumatic brain injury in the left frontal area following a road traffic accident. Timely diagnosis and surgical intervention was the key to a successful outcome.

5084. Singh, V. and S. R. Channabasappa (2021). "A retrospective study of pattern of cranio-cerebral injuries due to road traffic accident in a tertiary care hospital." Indian Journal of Forensic Medicine and Toxicology **15**(2): 1771-1777.

Head injury is defined as sudden injury due to an external force that affects the functioning of brain. It may be either caused by sudden blow or impact (closed head injury) or by an object penetrating the skull (Penetrating injury). The common causes of head injury include road traffic accidents, fall from height and assault. The mortality from head injury is reported to be between 1-2% of death from all the causes. Not only it is one of the major causes of death in young adults but also may cause permanent disability in survivors. The importance of head injury as a public health problem cannot be overstated. In the studies of Road Traffic accidents provide valuable data for implementing effective emergency services to reduce the trauma related mortality and strengthening legal measures in peak hours of fatal accidents. We aimed to study, pattern of injuries especially cranio-cerebral injuries occurring in vehicular accidents. Patients case records with history of head injury and MLC records of victims of road traffic accident reported to Saveetha hospital, Chennai from 1st Jan 2019 to 31st Dec 2019 period were analysed retrospectively. Out of total 1846 Road Traffic Accidents cases reported to Emergency Medicine department, Saveetha Medical college hospital, Chennai, 10.40% cases had history of head injury. The male/female ratio was 9:1. Commonest age group affected was between 21-40 years involving 126 (65.62%n=192) cases. Fatal traumatic brain injuries were seen in 178 (92.70%, n=192) cases. Amongst 192 head injury cases, scalp injury noted in 167 (86.97%) cases, most common bone fractured was temporal bone 94(48.95%), followed by other bone parts. The commonest variety of intracranial haemorrhage was subdural haemorrhage 173 (n=192, 90.10%) followed by Subarachnoid haemorrhage and Extradural haemorrhage. In 26 (13.54%) patients of head injury, craniotomy surgery was done. The timings between 3PM to 6PM showed the highest number of cases accounting to 61.7% of the cases followed by 26.0% of cases between 6PM to 9PM. The two-wheeler accidents accounted for 69.9% of the head injury cases followed by that due to other vehicles (16.7%).

5085. Singh, V., et al. (2004). "An unusual intraorbital foreign body." Indian journal of ophthalmology **52**(1): 64-65.

A plastic foreign body penetrating the anterior base of skull through the orbit in a 10-year-old male child is reported.

5086. Sinha, P., et al. (2005). "Visualization of bullet track and bullet by radionuclide brain scintigraphy." Clinical nuclear medicine **30**(4): 249-252.

Radionuclide brain scintigraphy is a commonly performed examination for the confirmation of brain death. Although the absence of scintigraphically detectable flow of lipophilic tracers to the brain combined with the lack of uptake in the brain is considered consistent with brain death in the appropriate clinical scenario, the cause of death itself is usually not apparent on the scan. A case of bullet track and bullet visualization during a radionuclide brain death study with Tc-99m hexamethylpropyleneamine oxime (HMPAO) is described.

5087. Sinha, S., et al. (2010). "Survival after a penetrating injury traversing midbrain - case report." British journal of neurosurgery **24**(4): 477-478.

Penetrating civilian shrapnel injuries to brainstem are quite uncommon, but invariably fatal. We report a rare case of a child who survived following shrapnel injury to tectum of midbrain.

5088. Sinha, S., et al. (2021). "Association of plasma biomarkers and blood brain barrier dysfunction in traumatic brain injury using dynamic contrast-enhanced mri." Journal of neurotrauma **38**(14): A4.

Background: Blood-brain barrier (BBB) disruption is a known component of traumatic brain injury (TBI), and has been implicated in TBI-related disability. Here we analyzed the relationship of plasma biomarker levels and dynamic contrast-enhanced (DCE) MRI as a measure of TBI-related BBB dysfunction. Methods: We examined blood-based biomarkers and neuroimaging from eleven adult patients (median age 29 years, 81.8% male) admitted to the hospital following non-penetrating TBI (54.5% motor vehicle accident, 18.2% falls, 27.2% blunt trauma). Blood was collected within 72 hours of injury. 3T DCE MRI was performed 2 weeks post-injury. DCE MRI was analyzed using the Patlak 2-compartment model to calculate total voxel-wise volume across whole brain in which the volume transfer coeffecient (Ktrans) was elevated above the 95th percentile of controls. Multiple linear regression, covarying for age, sex, and Glasgow Coma Scale (GCS) was run for each biomarker to predict Ktrans based on plasma biomarker level. Results: Mean (SD) volume of voxel-wise Ktrans elevation across whole brain for the sample was 960.66mm3 (258.30mm3). Multiple plasma biomarkers demonstrated significant predictive value for Ktrans in the regression model. These included glial fibrillary acidic protein (GFAP) ($F(7,11) = 4.313$, $p = 0.0451$, $R2 = 0.711$), neurofilament light chain (NfL) ($F(7,11) = 9.22$, $p = 0.006$, $R2 = 0.840$), platelet-derived growth factor receptor beta (PDGFRb) ($F(7,11) = 29.22$, $p = 0.000185$, $R2 = 0.911$), and C-reactive protein (CRP) ($F(7,11) = 6.063$, $p = 0.0198$, $R2 = 0.776$). Conclusion: GFAP, NfL, PDGFRb, and CRP were significant predictors of voxel-wise Ktrans elevation after controlling for age, sex, and injury severity, suggesting that these TBI-related plasma biomarkers may serve as biomarkers of TBI-related BBB dysfunction. These findings add further support to BBB dysfunction as an important TBI endophenotype. Future work will examine the relationship of these imaging and blood-based biomarkers with long-term patient outcomes.

5089. Sinnott-Armstrong, W. and F. G. Miller (2013). "What makes killing wrong?" Journal of medical ethics **39**(1): 3-7.

What makes an act of killing morally wrong is not that the act causes loss of life or consciousness but rather that the act causes loss of all remaining abilities. This account implies that it is not even pro tanto morally wrong to kill patients who are universally and irreversibly disabled, because they have no abilities to lose. Applied to vital organ transplantation, this account undermines the dead donor rule and shows how current practices are compatible with morality.

5090. Sipahi, C., et al. (2007). "The prosthodontic restoration of a self-inflicted gunshot maxillofacial defect: a short-term follow-up case report." The International journal of prosthodontics **20**(1): 85-88.

A self-inflicted gunshot maxillofacial defect was restored with dental implants and various attachments. Following mandibular surgical reconstruction, a fixed full-arch implant-supported prosthesis was fabricated. The maxillary defect was restored with an obturator retained with bar-clip and ball attachments. Crowns with an

unfavorable crown-to-root ratio were used to rectify a compromised unilateral interocclusal space. Functional rehabilitation was achieved without any pathologic sequelae and maintained over a 1-year observation period. Provision of a fixed implant-retained mandibular prosthesis opposing a specific design for a maxillary obturator provided short-term and optimistic prognosis in the management of a serious traumatic injury.

5091. Siqueira, F., et al. (2012). "Rehabilitation outcome for the treatment of trauma-induced trismus: A case report." PM and R **4**(10): S221.

Case Description: Patient presented to the outpatient rehabilitation clinic approximately 4 months after a gunshot wound to the face complaining of limited jaw movement, facial pain, and poor nutrition and oral hygiene. A 5-mm jaw opening was observed, and an ultrasound-guided diagnostic block of bilateral temporalis and bilateral masseter muscles was performed. Diagnostic block provided approximately 3 weeks of pain relief and increased jaw opening as reported by patient. Patient subsequently received botulinum toxin A injections followed by intensive joint mobility exercises, manual therapy and modalities such as transcutaneous electrical stimulation and ultrasound to facilitate healing and joint mobility. Program Description: 18-year-old man with history of gunshot trauma to the right side of his face resulting in multiple facial fractures, bilateral visual loss and severe trismus. Setting: Outpatient rehabilitation clinic. Results or Clinical Course: Injection of botulinum toxin A in combination with intensive physical therapy significantly reduced the patient's pain and improved jaw range of motion by at least 50%. Consequently, patient's mood, oral hygiene and nutrition improved, contributing to a better quality of life. Discussion: Trauma-induced trismus can be successfully treated with botulinum toxin A injection in combination with intensive physical therapy. Conclusions: Trauma-induced trismus is uncommonly reported in literature, and further studies are needed to create specific rehabilitation guidelines for this patient population.

5092. Sirko, A., et al. (2018). "Successful surgical treatment of a patient with combined gunshot shrapnel injuries in the heart and brain complicated by middle cerebral artery pseudoaneurysm." Trauma case reports **18**: 17-23.

Successful step-by-step treatment of a combined gunshot shrapnel injury of the brain, damaging the left middle cerebral artery (MCA) branches, and penetrating myocardium injury is discussed. Open brain and heart surgeries were performed. A left MCA pseudoaneurysm was formed postoperatively. Endovascular exclusion of the left MCA pseudoaneurysm was performed using detachable micro coils. Finally, plastic reconstruction of the posttraumatic cranial vault defect was performed using a dynamic titanium plate. Treatment of severe combined gunshot shrapnel brain injury with formation of MCA pseudoaneurysm and a penetrating myocardium injury requires a multimodal approach involving related specialists (neurosurgeon, cardiosurgeon and interventional radiologist).

5093. Sirko, A., et al. (2019). "Successful Surgical Treatment of Severe Perforating Diametric Craniocerebral Gunshot Wound Sustained during Combat: A Case Report." Military medicine **184**(9-10): e575-e580.

Many researchers classify perforating diametric craniocerebral gunshot wounds as fatal because mortality exceeds 96% and the majority of patients with such injuries die before hospitalization. A 23-year-old Ukrainian male soldier was admitted to a regional hospital with a severe perforating craniocerebral wound in a comatose state (Glasgow Coma Scale score, 5). Following brain helical computed tomography, the patient underwent primary treatment of the cerebral wound with primary duraplasty and inflow/outflow drainage. After 18 days of treatment in the intensive care unit, he was transferred to a military hospital for further rehabilitation. This report details our unusual case of successful treatment of a perforating diametric craniocerebral gunshot wound.

5094. Sirko, A., et al. (2020). "Mortality and Functional Outcome Predictors in Combat-Related Penetrating Brain Injury Treatment in a Specialty Civilian Medical Facility." Military medicine **185**(5-6): e774-e780.

INTRODUCTION: The combined use of new types of weapons and new types of personal protective equipment has led to changes in the occurrence, nature, and severity of penetrating brain wounds. The availability of modern equipment, methods of treatment, and trained medical personnel in a civilian hospital, as well as advanced specialty medical care, has improved treatment outcomes. There have been a limited number of publications regarding analysis and predictors of treatment outcomes in patients with combat-related penetrating brain injury in contemporary armed

conflicts. The purpose of this study was to analyze the results of surgical treatment of patients with penetrating brain injury and to identify significant outcome predictors in these patients., MATERIALS AND METHODS: This was a prospective analysis of penetrating brain injury in patients who were admitted to Mechnikov Dnipropetrovsk Regional Clinical Hospital, Ukraine, from May 9, 2014, to December 31, 2017. All wounds were sustained during local armed conflict in Eastern Ukraine. The primary outcomes of interest were mortality rate at 1 month and Glasgow Outcome Scale score at 12 months after the injury., RESULTS: In total, 184 patients were identified with combat-related brain injury; of those, 121 patients with penetrating brain injury were included in our study. All patients were male soldiers with a mean age of 34.1 years (standard deviation [SD], 9.1 years). Mean admission Glasgow Coma Scale score was 10 (SD, 4), and mean admission Injury Severity Score was 27.7 (SD, 7.6). Mortality within 1 month was 20.7%, and intracranial purulent-septic complications were diagnosed in 11.6% of the patients. Overall, 65.3% of the patients had favorable outcome (good recovery or moderate disability) based on Glasgow Outcome Scale score at 12 months after the injury. The following were predictors of mortality or poor functional outcome at 1 year after the injury: low Glasgow Coma Scale score on admission, gunshot wound to the head, dural venous sinuses wound, presence of intracerebral hematomas, intraventricular and subarachnoid hemorrhage accompanied by lateral or axial dislocation, and presence of intracranial purulent-septic complications., CONCLUSIONS: Generally, combat-related penetrating brain injuries had satisfactory treatment outcomes. Treatment outcomes in this study were comparable to those previously reported by other authors in military populations and significantly better than outcomes of peacetime penetrating brain injury treatment.

5095. Sirko, A., et al. (2019). "ANTIBACTERIAL THERAPY FOR PURULENT-SEPTIC COMPLICATIONS IN PATIENTS WITH COMBAT RELATED PENETRATING CRANIOCEREBRAL GUNSHOT WOUNDS." Georgian medical news(294): 10-16.

Aim - to evaluate pathogens and their susceptibility to antibiotic therapy (ABT) in combat-related penetrating craniocerebral gunshot wound (PCGW) patients and develop recommendations for treatment of post-traumatic meningoencephalitis. We conducted a prospective analysis of examination and treatment results of 121 patients who were admitted to the Public Institution, Mechnikov Dnipropetrovsk Regional Clinical Hospital, Dnipro, Ukraine, from 25 May 2014, to 31 December 2017, and were successively enrolled in the study. Intracranial purulent-septic complications were diagnosed in 14 (11.6%) patients including eight cases of isolated meningoencephalitis, three cases of meningoencephalitis combined with ventriculitis, two cases of meningoencephalitis combined with ventriculitis and subdural empyema and one case of multiple brain abscesses. In most cases of combat-related craniocerebral wounds, infections are considered nosocomial and typically related to medical procedures and devices. In most cases, the effectiveness of first-line antibiotics was low, and it was often necessary to prescribe broad-spectrum ABT, including those related to second-line antibiotics and reserve drugs, according to the World Health Organisation classification. The use of initial de-escalation of empiric ABT with the broadest-spectrum drugs, mainly as a part of combination therapy for expected gram-positive and gram-negative aerobic and anaerobic infection pathogens, is recommended.

5096. Sirucek, P., et al. (2017). "Brain death scintigraphy." European Journal of Nuclear Medicine and Molecular Imaging **44**(2): S618.

Introduction: Retrospective analysis of statistical data of brain death scintigraphy from a period of 2003 - 2016 performed on the Department of Nuclear Medicine University Hospital Ostrava. Method: Since 2003 till the end of 2016 (13 years), we examined 220 ventilated patients in a deep coma with areflexia above C1. We performed 229 scintigraphy acquisitions to confirm brain death. Immediately after the intravenous administration of 99mTc-HMPAO there was performed dynamic scintigraphy, followed by static scintigraphy in the front, back and both side projections. Prior to administration of the radiopharmaceutical the radiochemical purity was always checked. All adult patients had during the application of the radiopharmaceutical mean arterial pressure more than 80 mmHg. Most frequent indication for this examination was to include the patient into the transplantation program; exceptionally brain death was diagnosed to stop the intensive care. Results: Majority of the patients were men (151, 69 %), less than a third were women (69, 31%). Patients had a mean age 43 years, the youngest patient was a 10-day newborn, the oldest was 68 years old. This examination was indicated in 25 children. The cause of coma and subsequent cerebral oedema was in 39 % trauma (traffic accidents, falls, suicide - jumping, gunshot wounds of the head), 61% were other causes - AV brain malformation, stroke, complications of epilepsy, complications of anticoagulation therapy, drowning, CO intoxication, brain tumours, abscesses, encephalitis, etc.). Investigations are evaluated qualitatively. Brain death was confirmed, if there was no

accumulation of radiopharmaceuticals supra- and infratentorial. Brain death was detected in 207 patients (94 %), 13 patients at first examination had partially preserved brain perfusion. In the transplant program were enrolled 183 patients (83%), multiorgan harvesting was done in 80 patients (44 %), otherwise kidneys and heart were removed. Conclusion: Brain death scintigraphy is an important diagnostic tool in the process of brain death diagnosis, not only before the removal of organs for transplantation, but also before the termination of anesthesiology and intensive care. It is most often used in patients after cranial trauma and after neurosurgical decompression.

5097. Sise, M. J., et al. (2012). "Withdrawal of care: a 10-year perspective at a Level I trauma center." The journal of trauma and acute care surgery **72**(5): 1186-1193.

BACKGROUND: Withdrawal or limitation of care (WLC) in trauma patients has not been well studied. We reviewed 10 years of deaths at our adult Level I trauma center to identify the patients undergoing WLC and to describe the process of trauma surgeon-managed WLC., METHODS: This is a retrospective review of WLC. Each patient was assigned to one of three modes of WLC: care withdrawn, limited or no resuscitation, or organ harvest. Frequency, timing, and circumstances of WLC, including family involvement, ethics committee consultation, palliative care, and hospice, were reviewed., RESULTS: From 2000 through 2009, 375 patients died with WLC (54% of all deaths; 93% at >= 24 hours). For age >= 65 years, 80% were WLC. Overall, 15% had advance directive documents. Traumatic brain or high cervical spine injury was the cause of death in 63%. Factors associated with WLC included age, comorbidities, injury mechanism and severity, and nontrauma activation status. At time of death, 316 (84%) WLC were under trauma surgeon management. In this group, mode of WLC was care withdrawn in 74%, organ harvest in 20%, and limited or no resuscitation in 6%. Rationale for WLC in non-organ harvest patients was poor neurologic prognosis in 86% and futility in 76%. When family was identified, end-of-life discussions with physicians occurred in 100%. Conflicts over WLC occurred in 6.6% and were not associated with any demographic group. Ethics committee was involved in 2.8%. For care-withdrawn patients, median time to death from first WLC order was 6.6 hours. Palliative care and hospice consults (6% and 9%) increased yearly., CONCLUSIONS: WLC occurred in over 50% of all trauma deaths and exceeded 90% at >= 24 hours. Hospice and palliative care were increasingly important adjuncts to WLC. Guidelines for WLC should be developed to ensure quality end-of-life care for trauma patients in whom further care is futile., LEVEL OF EVIDENCE: III, therapeutic study.

5098. Skarupa, D. J., et al. (2019). "Trends in civilian penetrating brain injury: A review of 26,871 patients." American journal of surgery **218**(2): 255-260.

INTRODUCTION: The aim of our study is to analyze the 5 years' trends, mortality rate, and factors that influence mortality after civilian penetrating traumatic brain injury (pTBI)., METHODS: We performed a 5-year-analysis of all trauma patients diagnosed with pTBI in the TQIP. Our outcome measures were trends of pTBI., RESULTS: A total of 26,871 had penetrating brain injury over the 5-year period. Mean age was 36.2+/-18 years. Overall 55% of the patients had severe TBI and mortality rate was 43.8%. There was an increase in the rate of pTBI from 3042/100,000 (2010) to 7578/100,000 trauma admissions (2014) ($p<0.001$). The mortality rate has increased from 35% (2010) to 48% (2011) ($p<0.001$) followed by a linear decrease in mortality to 40% (2014). Independent predictors of mortality were age, pre-hospital intubation, suicide attempt, and craniotomy/craniectomy., CONCLUSIONS: Incidence and mortality for patients who are brought to hospitals following pTBI have gradually increased over the five-year period. Self-inflicted injury and prehospital intubation were the two most significant predictors of mortality.

5099. Skinker, D. M., et al. (1996). "Chasing the casing: a 38 Special suicide." Journal of forensic sciences **41**(4): 709-712.

Multiple self-inflicted gunshot wounds of the head are uncommon. Detailed history, scene investigation, autopsy findings, consideration of ballistics, and evidentiary proceedings are necessary to determine the manner of death in these cases. This report involves a pattern of atypical, self-inflicted bullet wounds of the head of a 26-year-old male. Investigation confirmed that a single eyewitness and several earwitnesses reported a single discharge of a firearm. The eyewitness testified that the decedent singly discharged a Smith & Wesson revolver, caliber .38 Special, to the right side of his head after interposing several objects between the muzzle and his skin immediately prior to discharge. He was declared brain dead two days later. At necropsy two contiguous atypical entry wounds were present in the right preauricular temple. The inferior wound was interpreted to be a near contact wound. The gray metal slug fragmented,

creating separate tracks to the right maxillary sinus and the mid left posterior cerebrum, respectively. The larger, atypical wound of entry was associated with passage of the projectile through the right temporalis muscle and squamous temporal bone. The projectile, consisting of a slightly distorted empty metallic cartridge case containing a "live" primer, was recovered from its point of final lodgment in the right temporal lobe. The literature addressing paired entry wounds following single discharge of the firearm with interposed targets is relatively sparse. Cases reporting multiple bullet wounds involving suicide are only sporadically reported. This report summarizes the investigative findings supporting the determination of the manner of death and revealing the interesting origin of the "misplaced" casing.

5100. Skoch, J., et al. (2013). "Injury to the temporal lobe via medial transorbital entry of a toothbrush." Journal of neurological surgery reports **74**(1): 23-28.

Objectives?Intracranial penetration by foreign bodies entering via the orbit represent an unusual form of traumatic brain injury. Nevertheless, much is at stake with high risk for cranial nerve and neurovascular injury. We present a case where the bristled end of a toothbrush entered the brain as a projectile via the superior orbital fissure and discuss considerations for surgical management. Setting?A 35-year-old woman suffered a periorbital injury after her husband threw an electric toothbrush at a wall and the head of the toothbrush became a missile that projected through her superior orbital fissure and into her right temporal lobe. She complained of headache and incomplete vision loss in the affected eye. Intervention?After obtaining a cerebrovascular angiogram, we proceeded with emergent orbital decompression and anterograde extraction of the foreign body via a modified frontotemporal orbitozygomatic approach with drilling of the skull base allowing for en bloc removal of the toothbrush. Conclusions?The patient recovered well with improvement in her vision and partial third and sixth nerve palsies. This report illustrates a unique mechanism of injury with a novel intracranial foreign body. We review the neurosurgeon's need for prompt management with an approach customized to the structure of the offending object, the damaged elements, and the surrounding cranial nerves and vascular anatomy. © 2013 Georg Thieme Verlag KG Stuttgart New York.

5101. Skoch, J., et al. (2013). "Injury to the temporal lobe via medial transorbital entry of a toothbrush." Journal of Neurological Surgery, Part B: Skull Base **74**.

Background and Importance: Intracranial penetration by foreign bodies entering via the orbit represents an unusual form of traumatic brain injury. Nevertheless, much is at stake with high risk for cranial nerve and neurovascular injury. We present a case where the bristled end of a toothbrush entered the brain as a projectile via the superior orbital fissure and discuss important considerations for surgical management including modern skull base techniques. Clinical Presentation: A 35-year-old woman suffered a periorbital injury after her husband threw an electric toothbrush at a wall and the head of the toothbrush became a missile that projected through her superior orbital fissure, fracturing her greater sphenoid wing, and into her right temporal lobe. She complained of headache and incomplete vision loss in the affected eye. Intervention: After obtaining a cerebrovascular angiogram, we proceeded with emergent orbital decompression and anterograde extraction of the foreign body via a modified frontotemporal orbitozygomatic approach (two-piece supraorbital modified approach) with drilling of the skull base allowing for en bloc removal of the toothbrush. Conclusion: The patient recovered well with improvement in her vision and with stable partial third and sixth nerve palsies. This case report illustrates a unique mechanism of injury with a novel intracranial foreign body resulting in a superior orbital fissure syndrome. We review the neurosurgeon's need for prompt management with an approach customized to the structure of the offending object, the damaged elements, and the surrounding cranial nerve and vascular anatomy.

5102. Skurczynski, W. (1965). "[Air rifle gunshot wounds in the region of the neck and head]." Luftgewehrschussverletzungen im Hals- und Kopfbereich. **13**(8): 223-226.

5103. Slain, K. N., et al. (2021). "US children of minority race are less likely to be admitted to the pediatric intensive care unit after traumatic injury, a retrospective analysis of a single pediatric trauma center." Injury Epidemiology **8**(1).

Background: The public health impact of pediatric trauma makes identifying opportunities to equalize health related disparities imperative. The influence of a child's race on the likelihood of admission to the pediatric intensive care unit (PICU) is not well described. We hypothesized that traumatically injured children of minority race would have

higher rates of PICU admission, compared to White children. Methods: This was a retrospective review of a single institution's trauma registry including children ≤18 years of age presenting to the emergency department (ED) whose injury necessitated pediatric trauma team activation at a Level 1 Pediatric Trauma Center from July 1, 2011 through June 30, 2016. Demographics, injury characteristics and hospital utilization data were collected. Race was categorized as White or racial minority, which included patients identifying as Black, Hispanic ethnicity, Native American or "other." The primary outcome measure was admission to the PICU. Chi square or Mann Whitney rank sum tests were used, as appropriate, to compare differences in demographics and injury characteristics between those children who were and were not admitted to the PICU setting. Variables associated with PICU admission in univariate analyses were included in a multivariate analysis. Data are presented as median values and interquartile ranges, or numbers and percentages. Results: The median age of the 654 included subjects was 8 [IQR 4–13] years; 55.2% were a racial minority. Nine (1.4%) children died in the ED and 576 (88.1%) were admitted to the hospital. Of the children requiring hospitalization, 195 (33.9%) were admitted to the PICU. Children admitted to the PICU were less likely to be from a racial minority group (26.1% vs 42.5%, $p < 0.001$). After adjusting for age and injury characteristics in a multivariable analysis, racial minority children had a lower odds of PICU admission compared to White children (OR 0.492 [95% C.I. 0.298–0.813, $p = 0.006$]). Conclusions: In this retrospective analysis of traumatically injured children, minority race was associated with lower odds of PICU admission, suggesting that health care disparities based on race persist in pediatric trauma-related care.

5104. Slaus, M., et al. (2007). "Identification and analysis of human remains recovered from wells from the 1991 War in Croatia." Forensic science international **171**(1): 37-43.

From 1996 to the present, the remains of 61 individuals killed during the 1991 War in Croatia were recovered from both dried out and functioning wells. Positive identification was established in 60.7% or 37/61 cases. Remains recovered from the same geographical region but from non-well settings were identified in 77.4% or 1256/1623 cases. The purpose of this paper is to report on the taphonomic, demographic and trauma characteristics of remains recovered from wells and identify factors responsible for the discrepancy in the identification ratios. The age and sex distributions in the well and non-well series were similar, as were the frequencies of recovered personal documents, jewelry and other artifacts. The taphonomic features of the remains were, however, significantly different. Preservation of remains was considerably better in non-well settings (1400/1623 or 86.3% compared to 40/61 or 65.5% in wells). Congruently, commingling of remains was more frequent in wells (26/61 or 42.6% compared to 77/1623 or 4.7% in non-well settings). In bodies recovered from non-well settings the preservation, state and commingling of the remains were strongly correlated with positive identification. None of these features were correlated with the identification of bodies from wells. Instead, identification of remains from wells was significantly affected by the presence or absence of water in the well. As both series have similar frequencies, and identical rankings of identification factors, the reason for the discrepancy in the identification ratios lies in the fact that by themselves, these factors were rarely sufficient for positive identification. In both series the majority of identifications (51.4% in the well, and 58.1% in the non-well series) were established through a combination of biological and non-biological features. The significantly lower identification ratio in the well series resulted from the difficult recovery conditions in wells with significant amounts of water, and the negative effect that water had on the preservation of clothing, personal artifacts and some dental features. Significant differences were also noted in the types and locations of perimortem traumas. There is a significantly higher frequency of entrance gunshot wounds to the back of the head, suggestive of execution style murders, in the well series.

5105. Slewa-Younan, S., et al. (2008). "Do men and women differ in their course following traumatic brain injury? A preliminary prospective investigation of early outcome." Brain injury **22**(2): 183-191.

PRIMARY OBJECTIVE: To examine the effect of a patient's sex on measures of outcome in a matched sample of patients admitted for acute traumatic brain injury (TBI)., RESEARCH DESIGN: A prospective multi-centred group comparison study based in metropolitan Sydney, Australia., METHODS AND PROCEDURES: Data was collected on 25 women admitted for treatment following non-penetrating TBI. Forty-five men were then matched with regards to age and injury severity. All subjects met the study criteria of having a moderate-to-severe TBI and aged 50 years old or younger. Exclusion criteria included history of previous head injury, psychiatric disturbance and significant alcohol and/or substance abuse. Data included injury details and physiological and psychometric measures of outcome., MAIN OUTCOMES AND RESULTS: Women demonstrated better outcomes as indicated by their Glasgow Outcome Scale scores (adjusted for initial injury severity and age at injury odds ratio [OR] 4.2, 95% CI 1.4-12.7) and having shorter Length of Stay (adjusted OR 9.03, 95% CI 3.13-26.08)., CONCLUSIONS: Understanding the presence of sex differences in outcome

following TBI is an emerging area of research. This study indicated that, after matching for initial injury severity and age at injury, women with severe TBI demonstrate a better early outcome than men.

5106. Sloan, M. A., et al. (1991). "Fatal brainstem stroke following internal jugular vein catheterization." Neurology **41**(7): 1092-1095.

Neurologic complications of central venous catheterization are uncommon, and there are no reports of cerebrovascular events. We report a case of massive postoperative vertebrobasilar territory stroke following internal jugular vein cannulation due to inadvertent vertebral artery injury. Autopsy revealed thrombosis at the site of puncture wound in the right vertebral artery, with emboli present in the distal basilar artery.

5107. Slovis, J., et al. (2017). "Long-term outcomes following pediatric traumatic brain injury presentations to the emergency department." Annals of emergency medicine **70**(4): S88.

Study Objectives: To determine prognostic factors of long-term outcome in in pediatric patients who presented to the emergency department with traumatic brain injury (TBI). Methods: A prospective database study was conducted using the Children's Health-Children's Medical Center Dallas (CMCD) Brain and Nerve Injury Center Repository and Database (BNIRD). Patients, ages 0-17 years, were queried from 2001 to 2012. Outcomes and clinical study variables were abstracted from a separate prospective database for patients prior to the formation of the BNIRD in 2005, using a similar protocol. Since the Glasgow Outcome Scale Extended Pediatric (GOSEP) was not available prior to 2005, the Glasgow Outcome Scale (GOS) was used for data collected from 2001-2004. Subjects were admitted to the CMCD Pediatric Intensive Care Unit if TBI was secondary to blunt force trauma from accidental mechanism. Children were excluded if their brain injury was penetrating or abusive, or if they were not expected to survive. Statistical analysis was done using chi-square, Fisher's Exact Test, and logistic regressions in SPSS and the R statistical computing software. Results: 307 patients were included in the study, with an average age of 6.7 years. Of the 307 patients, 67% had severe TBI (GCS 3-8), 15% had moderate TBI (GCS 9-12), and 18% had mild TBI (GCS 13-15). The GOS available in 258 patients and the GOSEP available in 137 patients were assessed at discharge and again on average 16 months after injury. For the GOS group, 47% had improved from poor outcome (GOS 1-3) to good outcome (GOS 4-5) on reassessment, and for the GOSEP group, 24% had improved from poor outcome (GOSEP 5-8) to good outcome (GOSEP 1-4) on reassessment. Of the 8 patients who were discharged in a vegetative state, 7 regained consciousness, with 2 ultimately having good outcome. All patients with a fall mechanism had a good outcome, while those with a motor vehicle collision (MVC) were associated with worse outcomes (RR=0.31 for GOS and RR=0.33 for GOSEP). Favorable predictors included higher GCS in the emergency department (p=0.01) and equal bilateral reactive pupils on arrival (p=0.04). Factors predictive of poor outcomes included intracranial pressure monitor placement (p<0.01), seizures (p=0.01), neurosurgical intervention (p=0.02), asymmetric reactive pupils on arrival (p=0.04), and CPR on scene (p=0.02) or in the ED (p=0.06). Conclusions: Despite poor neurologic status in the emergency department and at hospital discharge, many children who suffered a TBI improved in the long term. As a mechanism of injury, falls were associated with a favorable prognosis, whereas MVC's portended worse outcomes. Poor outcomes were more likely in patients requiring CPR, patients with asymmetric or fixed dilated pupils on arrival, or those requiring intracranial pressure monitor placement.

5108. Smadar, L., et al. (2020). "Demographic, clinical features, and outcomes of pediatric non-penetrating ocular foreign bodies." Graefe's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle Ophthalmologie **258**(7): 1469-1474.

PURPOSE: Data regarding ocular foreign body (FB) in the pediatric population is sparse. The purpose of this study is to describe the demographic features and the outcomes of pediatric non-penetrating ocular FB., METHODS: The charts of all children with non-penetrating ocular FB who presented at a tertiary medical center between 2011 and 2018 were retrospectively reviewed. Data analyzed included demographics, ocular FB site, the need for general anesthesia, or sedation for FB removal and clinical outcomes., RESULTS: Three hundred and fifty-two children (58.8% boys) with a mean age of 7.7 +/- 3.7 years were included. Two hundred and fifty-one (71.3%) children presented on the same day of injury. Patients with developmental delay presented more often with restlessness than patients without developmental delay (p < 0.0001). One hundred and forty-six (41.5%) of FBs were found on the conjunctiva, 128 (36.4%) under the eyelid, and 62 (17.6%) on the cornea. In 19 (4.5%) cases, general anesthesia or sedation was required for FB removal. A multivariate analysis identified young age (OR 0.976, 95% CI 0.961-0.992, p = 0.003), corneal FB (OR 50.84, 95% CI 10.08-

256.37, p < 0.0001), and developmental delay (OR 18.56, 95% CI 1.22-283.45, p = 0.036), as significant predictors for the need of general anesthesia or sedation. Among patients with corneal FB, in two (3.2%) cases, the corneal FB was complicated by infectious keratitis, resulting in mild corneal scar., CONCLUSION: The rate of general anesthesia for non-penetrating ocular FB removal in children is low. Children presenting with non-penetrating ocular FB have good prognosis without long-term complications.

5109. Small, I. A. (1983). "Reconstructive prosthetic surgery of massive craniofacial injury." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **41**(9): 609-612.

A case has been presented of reconstruction for a patient with massive injuries of the face and jaw. Reconstructive surgery, including bone grafting, skin grafting, and placement of the mandibular staple bone plate, and prosthetic rebuilding of eyes and dentures have made him a reasonably functioning and cosmetically acceptable individual.

5110. Smallfield, A., et al. (2010). "Neck injury at a rural emergency department: perils, pitfalls and management considerations." Canadian journal of rural medicine : the official journal of the Society of Rural Physicians of Canada = Journal canadien de la medecine rurale : le journal officiel de la Societe de medecine rurale du Canada **15**(3): 120-122.

5111. Smathers, R. L. and H. O. Riddervold (1981). "Traumatic intraocular air-fluid level." Journal of the Canadian Association of Radiologists **32**(3): 180.

A patient with direct trauma to the orbit was found to have an ocular air-fluid level, apparently the first such case to be reported.

5112. Smialek, J. E., et al. (1980). "Ethanol in intracerebral clot. Report of two homicidal cases with prolonged survival after injury." The American journal of forensic medicine and pathology **1**(2): 149-150.

Two homicidal cases are reported with prolonged survival after injury. In one case there was a 33-hour survival and the other had a 9-hour survival before death. In both cases there was severe injury to the brain: in one by blunt force and in the other by penetrating injury by firearm. Blood and urine alcohol levels in these cases were low or negative. The blood clot is another potential resource for information in an unnatural death investigation where intoxication is suspected or indicated by the behavior of the victim.

5113. Smilowska, K., et al. (2015). "Penetrating brain injury: a case report." Anaesthesiology intensive therapy **47**(3): 214-218.

BACKGROUND: Gunshot wounds as a result of attempted suicide, criminality or warfare comprise a significant group among penetrating injuries of the brain. A prognosis in such cases is based mainly on an initial score on the Glasgow Coma Scale (GCS). According to the literature, the mortality rate among patients with initial GCS ranging from 3 to 5 points is very high, up to 98.5%. Although there are also many other prognostic factors for high mortality, such as damage to the ventricular system or the involvement of two or more lobes, GCS score seems to be the most important determinant. The treatment in an ICU which is focused on decreasing the risk of secondary brain damage can significantly improve the prognosis and final outcome., CASE REPORT: The authors present the case of a 27-year-old man who suffered a gunshot wound to the right temporal region, self-inflicted from an air-gun. On admission to the intensive care unit he received a score of 3 points on the GCS. There were also other negative prognostic factors - the pellet penetrated two lobes and damaged the third ventricle. Despite the serious prognosis, the appropriate multiprofile treatment and rehabilitation resulted in unexpectedly good recovery. Two years after the trauma the patient was conscious, maintained logical verbal contact, and was able to walk using a walking-aid., CONCLUSION: Rapid transport to a major trauma center is essential for patients with penetrating brain injury. Among all interventions it seems essential to provide the prevention of posttraumatic nervous tissue damage and associated neurological dysfunction.

5114. Smirnov, G. G., et al. (2000). "[Surgical interventions in HIV-infected and patients with AIDS]." Khirurgicheskaia pomoshch' VICh-infitsirovannym bol'nym i bol'nym SPIDom.(7): 46-50.

176 patients with HIV-infection and AIDS were examined. 77 of them underwent various surgical interventions the most frequent of which were: opening of abscess and phlegmons--14 (23%), biopsy of lymphatic nodes--10 (13.1%), appendectomy--5 (6.2%), condyloma excision--21 (27.2%), removal of uterus adnexa--2 (2.5%), pleural puncture--4 (5.9%), cholecyst- and splenectomy--5 (8.2%). Operations for stomach cancer (creation of gastroenteroanastomosis), extrauterine pregnancy, brain tumor (drainage of IV ventricle of the brain), penetrating wound of cornea were performed less often. 43 patients underwent emergency operations without preoperative preparation, 34 patients underwent elective operations. The causes of 6 deaths were secondary diseases (Kaposi's sarcoma, purulent processes, metastases, pulmonary edema). There were no complications and blood changes in postoperative period in infected patients. These patients were discharged in the same terms as non-infected patients. In patients with AIDS, especially in combination with other infections, fever persisted long after the operation. The wound healed by first intention in all the patients, but the sutures were removed on day 10-30. Immunologically, a high ratio T-suppressors/T-helpers existed. An increase in fibrinolytic activity without high tissues hemorrhage was observed.

5115. Smith, A., et al. (2016). "Neurocognitive and psychiatric changes in epilepsy secondary to an occipital gunshot wound." Journal of Neuropsychiatry and Clinical Neurosciences **28**(3): e61.

Background: Epilepsy is associated with neurocognitive and neuropsychiatric changes including increased risk for suicide. Case History: A 52-year-old, right-handed male with epilepsy and visual deficits secondary to an accidental, occipital gunshot wound (GSW) from work and a preceding history of head injuries was referred for pre- and postsurgical neuropsychological testing to assess neurocognitive and neuropsychiatric functioning. He was tested prior to epilepsy surgery in 2013 and then postsurgery in 2015. Initial testing showed largely intact language and verbal memory and impairments in attention, working memory, and verbal fluency. He was also diagnosed with major depressive disorder, severe and posttraumatic stress disorder (PTSD). His fears of having seizures in public leading to social isolation along with his suicidal ideation, substance abuse, gun collection, and marriage separation placed him at high suicidal risk. He was then referred for temporary partial care; however, treatment did not effectively target his neuropsychiatric symptoms. Despite postsurgical improvements in verbal fluency and set-shifting and resolution of substance abuse and seizure-related phobia, he continued to display symptoms of severe depression, PTSD, passive suicidal ideation, and emotional lability. Conclusions: The occipital lobe GSW, subsequent epilepsy, and visual deficits led to functional status changes. Despite improvements in executive functions, resolution of substance abuse and increased social support, clinically elevated neuropsychiatric symptoms were observed at follow-up testing. Other potential comorbid factors for mood symptoms included continued seizures and prior history of head injuries. The persistence of untreated symptoms over time illustrates the need for targeted care in complex neuropsychiatric epilepsy cases.

5116. Smith, C., et al. (2001). "Differential expression of fibroblast growth factor-2 and fibroblast growth factor receptor 1 in a scarring and nonscarring model of CNS injury in the rat." The European journal of neuroscience **13**(3): 443-456.

Injury to the adult brain results in abortive axon regeneration and the deposition of a dense fibrous glial scar. Therapeutic strategies to promote postinjury axon regeneration are likely to require antiscarring strategies. In neonatal brain wounds, scar material is not laid down and axons grow across the lesion site, either by de novo growth or regeneration. To achieve the therapeutic goal of recapitulating the nonscarring neonatal response in the injured adult, an understanding of how ontogenic differences in scarring reflect developmental diversities in the trophic response to injury is required. Fibrobast growth factor-2 (FGF-2) expression is developmentally regulated and has been implicated as a regulator of the wounding response of the adult rat central nervous system. We have investigated the expression of FGF-2 and fibroblast growth factor receptor 1 (FGFR1) after penetrating lesions to the cerebral cortex of 5 days post partum (dpp) (nonscarring) and 16 dpp and adult (scarring) rats. In situ hybridization, immunohistochemistry and Western blotting showed robust and sustained increases in FGF-2 and FGFR1 mRNA and protein in reactive astrocytes around the lesion in scarring rats, a response that was attenuated substantially in the nonscarring neonate. These results demonstrate that changes in astrocyte FGF-2 and FGFR1 expression are coincident with the establishment of a mature pattern of glial scarring after injury in the maturing central nervous system, but it is premature to infer a causal relationship without further experiments.

5117. Smith, E. (1974). "Influence of site of impact on cognitive impairment persisting long after severe closed head injury." Journal of neurology, neurosurgery, and psychiatry **37**(6): 719-726.

The cognitive abilities of right-handed men who had sustained a severe closed head injury between 10 and 20 years earlier were studied. Results showed that a right-sided impact produced greater deficits than a left-sided impact in both verbal and non-verbal skills. The results are interpreted as reflecting left hemisphere damage due to contrecoup injury. Some evidence that a left frontal impact was apt to result in defective visual-spatial functioning is presented. These observations accord with some theories on the mechanics of head injury and with observations on the predictability of sites of cerebral contusion in brain injury uncomplicated by dural penetration, intracranial infection, or cerebral infarction. The roles of the duration of post-traumatic amnesia, the level of neurological responsiveness at the time of admission to hospital, and the age at which the injury was sustained are also discussed.

5118. Smith, E. R., et al. (2019). "Incidence and Cause of Potentially Preventable Death after Civilian Public Mass Shooting in the US." Journal of the American College of Surgeons **229**(3): 244-251.

BACKGROUND: The incidence and severity of civilian public mass shooting (CPMS) events continue to rise. Understanding the wounding pattern and incidence of potentially preventable death (PPD) after CPMS is key to updating prehospital response strategy., METHODS: A retrospective study of autopsy reports after CPMS events identified via the Federal Bureau of Investigation CPMS database from December 1999 to December 31, 2017 was performed. Sites of injury, fatal injury, and incidence of PPD were determined independently by a multidisciplinary panel composed of trauma surgery, emergency medicine, critical care paramedicine, and forensic pathology., RESULTS: Nineteen events including 213 victims were reviewed. Mean number of gunshot wounds per victim was 4.1. Sixty-four percent of gunshots were to the head and torso. The most common cause of death was brain injury (52%). Only 12% (26 victims) were transported to the hospital and the PPD rate was 15% (32 victims). The most commonly injured organs in those with PPD were the lung (59%) and spinal cord (24%). Only 6% of PPD victims had a gunshot to a vascular structure in an extremity., CONCLUSIONS: The PPD rate after CPMS is high and is due mostly to non-hemorrhaging chest wounds. Prehospital care strategy should focus on immediate point of wounding care by both laypersons and medical personnel, as well as rapid extrication of victims to definitive medical care.

5119. Smith, E. R., et al. (2018). "Fatal Wounding Pattern and Causes of Potentially Preventable Death Following the Pulse Night Club Shooting Event." Prehospital emergency care : official journal of the National Association of EMS Physicians and the National Association of State EMS Directors **22**(6): 662-668.

BACKGROUND: Mortality following shooting is related to time to provision of initial and definitive care. An understanding of the wounding pattern, opportunities for rescue, and incidence of possibly preventable death is needed to achieve the goal of zero preventable deaths following trauma., METHODS: A retrospective study of autopsy reports for all victims involved in the Pulse Nightclub Shooting was performed. The site of injury, probable site of fatal injury, and presence of potentially survivable injury (defined as survival if prehospital care is provided within 10 minutes and trauma center care within 60 minutes of injury) was determined independently by each author. Wounds were considered fatal if they involved penetration of the heart, injury to any non-extremity major blood vessel, or bihemispheric, mid-brain, or brainstem injury., RESULTS: There were an average of 6.9 wounds per patient. Ninety percent had a gunshot to an extremity, 78% to the chest, 47% to the abdomen/pelvis, and 39% to the head. Sixteen patients (32%) had potentially survivable wounds, 9 (56%) of whom had torso injuries. Four patients had extremity injuries, 2 involved femoral vessels and 2 involved the axilla. No patients had documented tourniquets or wound packing prior to arrival to the hospital. One patient had an isolated C6 injury and 2 victims had unihemispheric gunshots to the head., CONCLUSIONS: A comprehensive strategy starting with civilian providers to provide care at the point of wounding along with a coordinated public safety approach to rapidly evacuate the wounded may increase survival in future events.

5120. Smith, J. E., et al. (2014). "Outcome of penetrating intracranial injuries in a military setting." Injury **45**(5): 874-878.

BACKGROUND: Penetrating intracranial injuries are common in the deployed military medical environment. Early assessment of prognosis includes initial conscious level. There has been no previous identification of different outcomes depending on mechanism of penetrating injury. The aim of this study was to define outcome from penetrating head injury in our population, and to compare outcome between gunshot wound (GSW) and blast fragment injury, in

order to detect a difference in survival., METHODS: A retrospective database review was undertaken using the UK Joint Theatre Trauma Registry (JTTR) between the dates 2003 and 2011 to identify all cases of penetrating head injury. Data collected included mechanism of injury, first recorded GCS, injury severity score (ISS), abbreviated injury scale (AIS) head score, concomitant extracranial injury, surgical intervention, hospital length of stay, and survival., RESULTS: 813 patients sustained a penetrating head injury, of whom 625 were injured by blast fragmentation and 188 were injured by GSW; overall 336 patients (41.3%) died. There was a significant difference between survival from GSW (41.5%) and blast fragment (63.8%; p<0.001). In addition, the GCS in patients injured by GSW was significantly lower than that in patients injured by blast fragment. 157 cases sustained isolated head injury (79 GSW, 78 blast). The difference in injury severity between these groups was marked; median AIS was higher in the GSW group, survival lower (42% vs. 88%; p<0.001) and distribution of GCS categories less favourable (p<0.001). 338 of 343 patients (98.5%) with a best recorded GCS>5, survived to discharge., CONCLUSION: Most patients who present following penetrating intracranial injury, who have a GCS>5, survive to discharge. There is a significant difference in survival to hospital discharge following penetrating injury caused by blast fragment compared to those caused by GSW, partly attributable to a difference in injury severity. This is the first study to specifically highlight and define this difference.

5121. Smith, M. M., et al. (2003). "Orbital penetration associated with tooth extraction." Journal of veterinary dentistry **20**(1): 8-17.

Three cats and 2 dogs were evaluated for ophthalmologic complications associated with tooth extraction procedures. Orbital penetration leading to ocular and, in one case, brain trauma was secondary to iatrogenic injury from a dental elevator. Outcomes included enucleation of the affected eye in 3 cases, and death from brain abscessation in 1 case. Early treatment or, preferably, referral to a veterinary ophthalmology specialist may prevent such outcomes. Awareness of the anatomical proximity of caudal maxillary tooth roots and the orbit, appropriate interpretation of diagnostic intraoral dental radiographs, and technical proficiency in tooth extraction techniques will minimize these complications in veterinary dental practice.

5122. Smith, M. W., et al. (2013). "Performance of experienced versus less experienced paramedics in managing challenging scenarios: a cognitive task analysis study." Annals of emergency medicine **62**(4): 367-379.

STUDY OBJECTIVE: Out-of-hospital care is becoming more complex, thus placing greater reliance on the cognitive abilities of paramedics to manage difficult situations. In adapting to the challenges in their work, paramedics develop expertise. We study the cognitive strategies used by expert paramedics to contribute to understanding how paramedics and the EMS system can adapt to new challenges., METHODS: We conducted a "staged-world" cognitive task analysis to explore paramedics' handling of cognitive challenges related to sense-making and to resource and task management. A mixed-fidelity simulation was used to present paramedics with 2 challenging scenarios: a pulmonary embolism initially presenting as a myocardial infarction and a 2-person shooting with limited resources available., RESULTS: Participants were 10 paramedics, 6 more experienced and 4 less experienced. Analysis involved comparing the performance of the 2 groups to identify strategies associated with expertise. The more experienced paramedics made more assessments, explored a wider variety of presumptive diagnoses, and identified the pulmonary embolism earlier. They switched attention between the 2 shooting victims more, used their emergency medical technician-basic level partners more, and provided more advanced level care for both patients. Their patients arrived at the emergency department more prepared for specialized emergency care., CONCLUSION: Our findings correspond to general cognitive attributes of expertise: greater cue gathering and inferential reasoning, and more functional and strategic thinking. These results suggest potential areas and methods to facilitate development of expertise, as well as ways to better support use of expertise. Future studies should expand on these findings through larger sample sizes and more complex scenarios.

5123. Smith, O. C., et al. (1987). "Cranial fracture patterns and estimate of direction from low velocity gunshot wounds." Journal of forensic sciences **32**(5): 1416-1421.

Cranial trauma produced by low velocity gunshot wounds is investigated in an autopsy series. In skeletonized remains with postmortem damage, or after surgical debridement, the primary internal or external beveling may become obscured, causing difficulty with the identification of entrance and exit wounds. The morphology of associated

secondary and tertiary fractures based upon the mechanics of their production is discussed as a means of establishing bullet entrance and exit sites.

5124. Smith, S. L. and E. D. Hall (1998). "Tirilazad widens the therapeutic window for riluzole-induced attenuation of progressive cortical degeneration in an infant rat model of the shaken baby syndrome." Journal of neurotrauma **15**(9): 707-719.

Our infant rat model of traumatic subarchnoid hemorrhage combines violent shaking and hypoxia to produce subdural hemorrhaging and progressive cortical degeneration similar to that seen in victims of the shaken baby syndrome. Anesthetized, 6-day-old male rats were subjected to one episode of shaking under hypoxic conditions. Brain histologies revealed moderate-to-severe cortical hemorrhaging at 48 h postinjury and progressive cortical degeneration, as indicated by a 15.3% and 20.2% reduction in cortical wet weight, at 7 and 14 days postinjury, respectively. The purpose of the present study was to assess the effects of two antioxidant lipid peroxidation inhibitors (tirilazad mesylate and PNU-101033E), and the glutamate release inhibitor (riluzole), upon the brain pathology seen in this model. A significant, 54.3-75.3%, reduction in cortical hemorrhaging was observed in rats that were treated with a total of three doses of tirilazad (10 mg/kg, i.p.): 10 min before or 5-30 min after injury, and again at 2 and 24 h postinjury ($p < 0.01$ vs. vehicle). However, treatment with tirilazad or the more potent, brain-penetrating pyrrolopyrimidine, PNU-101033E (10 min before plus 2, 24, 48, and 72 h after), did not attenuate the progressive cortical degeneration typically seen at 14 days postinjury. These results suggest that free radicals play an important role in the pathophysiology of secondary brain hemorrhaging due to shaking + hypoxia, but may not be critical in the mediation of the subsequent neurodegeneration. Rather, glutamate neurotoxicity may be a key factor here. This is suggested by our observation that the glutamate release inhibitor, riluzole, significantly reduced cortical degeneration when it was administered up to 1 h postinjury in the present model. Specifically, the cortical wet weights of rats treated with 8 mg/kg riluzole (i.p.) 10 min before or 1 h after shaking + hypoxia (and again at 24 h postinjury) were 95.3% and 97.4% of noninjured controls, respectively, at 14 days postinjury ($p < 0.02$ vs. vehicle). Riluzole treatment beyond 1 h (e.g., 2 or 4 h postinjury) did not reduce the neurodegeneration. Lastly, we attempted to demonstrate that the therapeutic window for riluzole-induced attenuation of cortical degeneration could be extended beyond 1 h through the use of combination therapy. In this experiment, rat pups were treated with 10 mg/kg tirilazad (i.p.) at 30 min postinjury followed by 8 mg/kg riluzole (i.p.) at 4 and 24 h postinjury. At 14 days postinjury, the cortical wet weights of these rats were 94.5% of noninjured controls, thus demonstrating significant neuroprotection ($p < 0.05$ vs. vehicle) and a widening of the therapeutic window from 1 to 4 h in length. These results suggest that early attenuation of free radical-induced lipid peroxidation may slow down the biochemical cascade of events related to glutamate-induced excitotoxicity and, in doing so, prolong the time during which a glutamate release inhibitor, such as riluzole, is effective.

5125. Smoliar, A. N., et al. (2005). "[Combined injuries of the neck, thorax, abdomen and cranium]." Khirurgiia(2): 61.

5126. Smrkolj, V., et al. (1995). "Intracranial injuries by a screwdriver." Forensic science international **76**(3): 211-216.

Two patients with unusual intracranial foreign bodies are presented. Intracranial injuries produced by a piece of screwdriver as a wounding agent have not yet been reported in the literature. In one of our two cases we had to deal with homicide and in another with accidental self-inflicted injury. Both patients died, 5 and 14 days, respectively, after successful removal of the foreign body. In both cases death was due to brain ischaemia and the resulting oedema secondary to arterial injury.

5127. Smutok, M. A., et al. (1989). "Effects of unilateral brain damage on contralateral and ipsilateral upper extremity function in hemiplegia." Physical therapy **69**(3): 195-203.

This article describes the long-term effects of unilateral penetrating hemispheric lesions on contralateral and ipsilateral upper extremity motor performance and functional outcome. Activities-of-daily-living skill and gross motor performance contralateral to the lesions were compared among 32 left-sided and 19 right-sided hemiplegic subjects using analysis of variance and chi-square techniques. Ipsilateral to the damaged hemisphere, fine motor tasks of simple visual motor reaction time, grip and pinch strength, finger tapping, and Purdue Pegboard performance were tested. Analysis of covariance compared each ipsilateral task to performance in the corresponding hand of 70 matched controls.

Results indicate similar long-term functional ADL outcome in right and left hemisphere-damaged subjects, despite more severe contralateral functional motor deficits following lesions of the left hemisphere. Right hemisphere lesions led to ipsilateral decrements in reaction time, and lesions of either hemisphere diminished grip or pinch strength, finger tapping, and pegboard performance ipsilaterally. These results demonstrate that unilateral brain damage involving the motor areas of either hemisphere has detrimental effects on ipsilateral upper extremity motor function. Findings are discussed and related to the concept that the left hemisphere is specialized or has greater neuronal representation for bilateral motor processes. Physical therapists involved in the treatment of patients with hemiplegia should be aware that motor functions of the ipsilateral, nonparetic upper extremity may also be affected adversely by unilateral brain lesions.

5128. Snider, S. B., et al. (2020). "Cortical lesions causing loss of consciousness are anticorrelated with the dorsal brainstem." Human brain mapping **41**(6): 1520-1531.

Brain lesions can provide unique insight into the neuroanatomical substrate of human consciousness. For example, brainstem lesions causing coma map to a specific region of the tegmentum. Whether specific lesion locations outside the brainstem are associated with loss of consciousness (LOC) remains unclear. Here, we investigate the topography of cortical lesions causing prolonged LOC (N = 16), transient LOC (N = 91), or no LOC (N = 64). Using standard voxel lesion symptom mapping, no focus of brain damage was associated with LOC. Next, we computed the network of brain regions functionally connected to each lesion location using a large normative connectome dataset (N = 1,000). This technique, termed lesion network mapping, can test whether lesions causing LOC map to a connected brain circuit rather than one brain region. Connectivity between cortical lesion locations and an a priori coma-specific region of brainstem tegmentum was an independent predictor of LOC (B = 1.2, p = .004). Connectivity to the dorsal brainstem was the only predictor of LOC in a whole-brain voxel-wise analysis. This relationship was driven by anticorrelation (negative correlation) between lesion locations and the dorsal brainstem. The map of regions anticorrelated to the dorsal brainstem thus defines a distributed brain circuit that, when damaged, is most likely to cause LOC. This circuit showed a slight posterior predominance and had peaks in the bilateral claustrum. Our results suggest that cortical lesions causing LOC map to a connected brain circuit, linking cortical lesions that disrupt consciousness to brainstem sites that maintain arousal.

5129. Snyder, H. S. (1998). "Significance of the initial spun hematocrit in trauma patients." The American journal of emergency medicine **16**(2): 150-153.

This study was designed to determine whether the initial spun hematocrit (HCT) value correlated with blood loss requiring operative intervention (OR). A spun HCT was performed on the first available blood sample from 524 admitted patients 12 years of age or older with traumatic injuries (86% blunt, 14% penetrating). Patients in the OR (n = 66) group had a lower mean HCT (35 v 41, P < .001) when compared with the non-OR group. The 81 patients with an HCT of < or = 35 required OR more frequently (41% v 7%, P < .001). An HCT of < or = 35 had a sensitivity of 50%, specificity of 90%, positive predictive value of 41%, and negative predictive value of 93% for identifying the OR group. The effect of hemodilution from intravenous fluid is difficult to assess in a retrospective clinical study.

5130. Snyderman, C. H., et al. (2011). "Avoiding disaster at the skull base: Case studies in 3D." Otolaryngology - Head and Neck Surgery **145**: 16.

Program Description: Disaster awaits unprepared surgeons at the skull base. Multiple routine surgeries in otolaryngology are in close proximity to the skull base. Potential risks of endoscopic sinus surgery include cerebrospinal fluid leak, loss of olfaction, penetrating brain injury, visual loss, hemorrhage from the internal carotid artery, and loss of trigeminal sensory and motor function. Potential risks of temporal bone and lateral approaches include vascular injuries of the sigmoid sinus, jugular bulb, and internal carotid artery; injury to cranial nerves 7-12; cerebrospinal fluid leak, intra- and extradural hemorrhage; and brain trauma. A thorough understanding of skull base anatomy is essential for avoiding such complications during routine surgical procedures. In this miniseminar, case studies will be used to demonstrate potential risks of standard surgical procedures relative to the skull base. Important anatomical landmarks and relationships will be presented in 3D using cadaveric dissections and intraoperative photographs. Strategies to avoid skull base complications will be discussed with an emphasis on everyday surgical procedures. Educational Objectives: 1)

Understand key anatomical relationships at the skull base. 2) Relate skull base anatomy to anterior and lateral skull base approaches. 3) Apply anatomical knowledge to avoid surgical complications.

5131. Sobani, Z. A., et al. (2011). "Cranioplasty after decompressive craniectomy: An institutional audit and analysis of factors related to complications." Surgical neurology international **2**: 123.

BACKGROUND: Although a relatively simple procedure, cranioplasties have been associated with high complication rates. Keeping this in perspective, we aimed to determine the factors associated with immediate and long-term complications of cranioplasties at our institution., METHODS: A retrospective review of patient records was carried out for patients having undergone reconstructive cranioplasties at our institution during the last 10 years (2001-2010). All case notes, records, and investigations were reviewed and the data were recorded in a predesigned questionnaire. Complications were recorded along with existing comorbids and measures taken for their prevention and management. Univariate and multivariate logistic regression analysis was performed to determine possible predictors of complications., RESULTS: A total of 96 patients with a mean age of 33 + 15 years were included in the study. Of the sample, 76% (n = 73) had no comorbids. The leading primary pathology was blunt traumatic brain injuries in 46% (n = 44), followed by cerebrovascular incidents in 24% (n = 23), penetrating traumatic brain injuries in 12% (n = 11), and tumors in 10% (n = 10) of cases, with 41% (n = 39) of patients requiring multiple craniotomies. In a mean follow-up of 386 +/- 615 days, complications were noted in 36.5% (n = 35) of the patients. Twenty six percent of patients (n = 25) had minor complications which included breakthrough seizures (15.6%, n = 15), subgaleal collections (3.1%, n = 3), and superficial wound infections (3.1%, n = 3), whereas major complications (10.4% n = 10) included hydrocephalus (3.1%, n = 3), transient neurological deficits (3.1%, n = 3), and osteomyelitis (2.1%, n = 2). Univariate and multivariate analysis revealed External Ventricular Drain (EVD) placement and parietal flaps to be associated with complications. This could be explained by the fact that the patients requiring EVD usually have relatively severe head injuries, increasing the possibility of hydrocephalus., CONCLUSION: We have found a higher risk of complications of cranioplasty in patients who had EVD placement and removal prior to their constructive surgery. We however did not find any association between risks of complications in any other studied variable. We also did not find any association between intraoperative placement of subgaleal drains and postoperative risk of subgaleal fluid collections. Overall, our results are comparable with other reported series on cranioplasties.

5132. Sobol, S. M., et al. (1982). "Management of inadvertent injury to the carotid artery during head and neck surgery." Head & neck surgery **4**(6): 475-482.

Rare, inadvertent injury to the carotid artery during head and neck surgery may result in disastrous neurologic sequelae or even death. Several cases are presented and used as the stimulus for an analytical discussion of the pathogenesis and management of cerebrovascular complications following head and neck surgery. The major pathogenetic mechanisms are identified as (1) microembolism from an ulcerated plaque; (2) intravascular thrombus with occlusion; (3) unintentional ligation, laceration, or transection; (4) ligation of a dominant external carotid; and (5) transient reduction in cerebrovascular perfusion pressure. Methods for identifying and evaluating the patient at risk for developing cerebrovascular complications are discussed and recommendations are made. The central question in the management of inadvertent arterial injury concerns whether to ligate the vessel or to restore blood flow. The controversies surrounding this issue are discussed in perspective through an analysis of current physiological concepts and of the collective clinical experiences of head and neck, vascular, and neurological surgeons handling extracranial cerebrovascular occlusive disease, penetrating injuries to the carotid artery, and tumor-related carotid catastrophes. Several factors are considered critical in determining appropriate management of any individual case; these include (1) whether recognition of the injury occurs intraoperatively or postoperatively; (2) the presence and severity of neurological deficits; (3) time from the injury to its recognition; (4) a quantitative assessment of collateral circulation; (5) a history of wound contamination or radiation therapy; (6) overall prognosis. These and other considerations are organized into a working framework through which the otolaryngologist and head and neck surgeon can better understand and manage the problem of inadvertent injury to the carotid artery.

5133. Sokobin, A. M. (1998). "Shaken baby syndrome: a comparative study: Anglo-American law and Jewish law--legal, moral, and ethical issues." University of Toledo law review. University of Toledo. College of Law **29**(3): 513-553.

5134. Sola, J. E., et al. (2008). "Pediatric penetrating cardiac injury from abuse: a case report." Pediatric surgery international **24**(4): 495-497.

While cardiac foreign bodies after trauma have been described in the literature, we report the first case of intentional injury in an infant with an intracardiac needle. We review the literature and stress the need for a high degree of vigilance in evaluating children for potential child abuse.

5135. Solarino, B., et al. (2008). "An unusual case of child head injury by coat hanger*." Journal of forensic sciences **53**(5): 1188-1190.

Traumatic brain injury is the leading cause of morbidity and mortality among children suspected of child abuse. Penetrating cranio-facial injuries are generally rare in the pediatric age group and are caused by both accidental and inflicted mechanisms. We report an unusual case of a 2-year-old female who was admitted to a pediatric emergency room with an industrial stainless steel coat hanger impaled in her skull. Pertinent clinical forensic medicine examination, coupled with home inspection and interviews by the local law enforcement, revealed a horrible episode of domestic violence.

5136. Soliman, M. M. and T. A. Macky (2008). "Pattern of ocular trauma in Egypt." Graefe's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle Ophthalmologie **246**(2): 205-212.

PURPOSE: To review the epidemiology of serious ocular trauma presenting to Kasr El Aini Hospital, Cairo University., METHODS: This is a prospective epidemiological and clinical study of ocular trauma patients admitted to Kasr El Aini hospital during a 6-month period; January-June 2000. Cases were analyzed with respect to: (1) demographics, (2) time, place and nature of trauma, (3) type of injury, (4) time to receive care, and (5) management and visual outcomes following primary repair., RESULTS: One hundred and fifty three eyes of 147 patients (six bilateral injuries) sustaining serious ocular injury requiring hospitalization were included during the study period. Eighty percent of ocular trauma occurred in men ($P < 0.001$ chi-square test) with an average age of 22 years (ranging from 2 months to 76 years). There were 123 (80.4%) open globe injuries and 30 (19.6%) closed globe injuries. Of the open globe injuries, 48 eyes (31.4% of all eyes) were ruptured globes and 75 eyes (49% of all eyes) were lacerated globes (37 intraocular foreign bodies, 35 penetrating injuries and three perforating injuries, that is 24%, 23%, and 2% respectively of all injured eyes). Of the closed globe injuries, 5.9% had hyphema (33% of all patients), 4% lamellar lacerations, and 2.5% vitreous hemorrhage with retinal detachment. Most of the injuries occurred (39.5%) and presented (36.7%) between 12:00-5:59 PM: . Eighteen patients (12%) presented after 24 hours, and nine patients (6%) 1 week after the time of trauma. Presenting visual acuity in 123 patients (123 eyes) was as follows: 98 (80%), ten (8%) and 15 (12%) patients had poor, moderate and good visual acuity respectively. Ten eyes developed posttraumatic endophthalmitis (8% of open globe injuries). On leaving the hospital, 77.1% eyes had a visual acuity of less then 1/60 (poor), 3.9% were between 1/60 and 6/60 (moderate), and 19% were 6/36 and/or better (good). Fifty-two (35%) patients were lost in follow-up: at 1 month, 60%, 7% and 33% of the rest had poor, moderate and good visual acuity respectively., CONCLUSION: The majority of ocular trauma in our population was due to assaultive injuries occurring mainly in males. Open globe injuries were more common than closed globe injuries, and globe lacerations were more common than ruptured globes. Open globe injuries, especially ruptured globes, had the worst visual outcomes. The initial visual acuity correlated well with the final visual acuity. Immediate and comprehensive medical care is mandatory for ocular trauma patients. Educating the public is essential if we wish to prevent eye injuries.

5137. Solmaz, I., et al. (2009). "Traumatic brain injury due to gunshot wounds: a single institution's experience with 442 consecutive patients." Turkish neurosurgery **19**(3): 216-223.

AIM: Traumatic brain injury (TBI) caused by a gunshot wound is a complex injury with a broad spectrum of symptoms and high rates of mortality and morbidity. This study presents an evaluation of TBI caused by gunshot wounds presenting at a single institution and discusses possible predictive factors for the outcome of surgical intervention., MATERIAL AND METHODS: The study sample consisted of 442 patients who underwent surgery for TBI over a 16-year period. All injuries were caused by gunshot wounds, such as bullets and shrapnel. All patients underwent surgical intervention., RESULTS: Almost all patients (99.3%) were male, and the mean patient age was 22.3 years. Wounds were

caused by shrapnel in 68 percent of patients. The Glasgow Coma Scale (GCS) score at admission was below 8 in 116 patients (26.2%) and above 8 in 326 patients (73.8%). In total, 47 patients (10.6%) died despite surgical management, with diffuse brain injury the most common cause of death., CONCLUSION: Low GCS scores, ventricular injuries and bihemispheric injuries are correlated with poor prognosis. Early and less invasive surgery in conjunction with short transportation time to the hospital could decrease mortality rates.

5138. Solmaz, I. A. and B. Tekerekoglu (2015). "Three-Centimeter Bullet in the Orbita of a 2.5-Year-Old Syrian Boy." The Journal of craniofacial surgery **26**(4): 1326-1327.

Aim of this report is to present a patient who has had a retrobulbar bullet in his left orbit after gunshot injury and had full recovery after surgery. A Syrian boy aged 2.5 years was referred to our emergency after a gunshot injury from left temple. First examination showed stable vital functions; the boy was conscious but had marked proptosis and edema on the left eye. Left intraorbital bullet was observed in X-ray and computed tomography. The exact localization of the bullet and the integrity of the left eye cannot be determined because of shining in computed tomography. Under general anesthesia, lateral and inferior orbitotomy was performed and 3-cm long bullet was excised, which was obliquely localized in the retrobulbar, intraconal area. Ten days later, the patient was sent to his homeland with almost full recovery and minimum sequela.

5139. Solomiichuk, V. O., et al. (2013). "Posttraumatic delayed subdural tension pneumocephalus." Surgical neurology international **4**: 37.

BACKGROUND: Pneumocephalus is a complication of head injury in 3.9-9.7% of the cases, it also appears after supratentorial craniotomy in 100% of cases. The accumulation of intracranial air can be acute (<72 hours) or delayed (>=72 hours). When intracranial air causes intracranial hypertension and has a mass-effect with neurological deterioration, it is called tension pneumocephalus., CASE DESCRIPTION: We represent a clinical case of a 75-year-old male patient with open penetrating head injury, complicated by tension pneumocephalus on the fifth day after trauma and underwent urgent surgical correction. Operation performed: Burr-hole placement in the right frontal region, evacuation of tension pneumocephalus., CONCLUSION: Tension pneumocephalus is a life-threatening neurosurgical emergency case, which needs to undergo immediate surgical or conservative treatment.

5140. Solomon, K. D., et al. (1993). "Cranial injury from unsuspected penetrating orbital trauma: a review of five cases." The Journal of trauma **34**(2): 285-289.

Penetrating orbital-cranial injury is potentially life threatening. The history of the trauma and ophthalmologic examination may be misleadingly innocent; serious injury may be overlooked. We present five cases of orbital injury in which the diagnosis of intracranial extension was not obvious at the time of initial examination. A thorough history and physical examination should be performed on all patients, even those with apparently trivial injuries. Intracranial extension should be considered in any case where the injury was caused by an instrument small enough to enter the orbit. The threshold for obtaining a coronal CT scan of the orbits should be lowered, since this is the best way to detect an orbital roof fracture.

5141. Solomon, L. B., et al. (2011). "Weight-bearing-induced displacement and migration over time of fracture fragments following split depression fractures of the lateral tibial plateau: a case series with radiostereometric analysis." The Journal of bone and joint surgery. British volume **93**(6): 817-823.

We investigated the stability of seven Schatzker type II fractures of the lateral tibial plateau treated by subchondral screws and a buttress plate followed by immediate partial weight-bearing. In order to assess the stability of the fracture, weight-bearing inducible displacements of the fracture fragments and their migration over a one-year period were measured by differentially loaded radiostereometric analysis and standard radiostereometric analysis, respectively. The mean inducible craniocaudal fracture fragment displacements measured -0.30 mm (-0.73 to 0.02) at two weeks and 0.00 mm (-0.12 to 0.15) at 52 weeks. All inducible displacements were elastic in nature under all loads at each examination during follow-up. At one year, the mean craniocaudal migration of the fracture fragments was -0.34 mm (-1.64 to 1.51). Using radiostereometric methods, this case series has shown that in the Schatzker type II fractures

investigated, internal fixation with subchondral screws and a buttress plate provided adequate stability to allow immediate post-operative partial weight-bearing, without harmful consequences.

5142. Solov'ev, A. E., et al. (2014). "[Observation of tetanus in a teenager]." Klinichna khirurhiia(7): 71-72.

5143. Soltani, S., et al. (2016). "Review of fall injuries and related factors in patients admitted to a trauma referral hospital in Tehran, Iran." International Journal of Medical Toxicology and Forensic Medicine **6**(4): 200-208.

Background: Falls are important causes of mortality and morbidity in urban areas and put a high burden on societies. We investigated patterns of fall traumas and related factors in a referral trauma hospital in Tehran, Iran. Methods: In this routine-data-based study, all documents of fall cases in Hazrate-Rasool hospital, Tehran, Iran, during October 2014-2015 were investigated. Information on demographic factors of patients, fall conditions and outcomes were collected. Data were analyzed by SPSS 11.5. The statistically significant level was considered ≤ 0.05. Results: Of the 307 cases, 70% were male. Median (interquartile range) age was 32 (22-51) years. Of cases, 91% were undergraduates. The mortality rate was 2.6%. Suicide attempts reported in 17 (5.5%) cases and only 2 (12%) of them were successful. Injured body organs in order of frequency were extremities, head and neck, thorax, vertebras, abdomen and pelvis. Outcome (in terms of injured body organs) was related to age and gender of patients alongside with height and reason of the fall. Falls at workplaces, in suicide attempts and among males happened for significantly higher distances. High distance falls and low GCS at admission were related to higher mortality. Majority of falls on a same level happened at home among old women. Conclusion: In our region, fall was a problem of people with low socioeconomic status. Our mortality rate is similar to the highest mortality rates in the world. Personal characteristics along with trauma-related factors are both important in the outcomes of fall cases. Safety equipment at high risk jobs is essential to prevent falls.

5144. Solumsmoen, S. and J. Kelsen (2018). "[Successful treatment and rehabilitation of severe, penetrating brain injury]." Ugeskrift for laeger **180**(33).

Penetrating brain injuries due to gunshots are rare in Denmark. This is a case report of the successful treatment of a 31-year-old man who was shot in the right frontal region of the head. The bullet went through his brain without damaging the large intracranial vessels. On admission he had a GCS of 9. Haematoma removal and bifrontal craniectomy was performed to obtain lowering of the intracranial pressure. One year after the incidence the patient was able return to work. This case report illustrates the importance of early prehospital and neurointensive treatment with lowering of the intracranial pressure and highly specialised rehabilitation.

5145. Solumsmoen, S., et al. (2018). "[Traumatic penetrating brain injury]." Ugeskrift for laeger **180**(51).

Penetrating brain injury is a severe form of traumatic brain injury. It is significantly less prevalent than closed head injury but carries a much worse prognosis. The experience with traumatic penetrating brain injury in Denmark is limited. The most common causes in penetrating brain injury in Denmark are: violence, accidents and suicidal behaviour. The aim of this review is to give a brief update on historical background, mechanisms of disease, recommended medical and surgical treatment, and complications. Clinical examples and a treatment algorithm are discussed.

5146. Sommers, M. S. (1994). "The effects of alcohol intoxication on the initial treatment and hospital course of patients with acute brain injury. (Gurney JG, Rivara FP, Mueller BA, Newell DW, Copass MK, Jorovich GJ. J Trauma 1992;33:709-13.)." Heart and Lung: Journal of Critical Care **23**(1): 95-98.

The purpose of this study was to determine the frequency and degree of alcohol intoxication in individuals with traumatic brain injuries. The study also investigated the association between the degree of intoxication at the time of injury and hospital management and treatment outcome. The study was conducted at a Level I Regional Trauma Center in the Pacific Northwest. During the 16 months of the study, 520 subjects met eligibility criteria, which included: age of 18 years or older; a serum alcohol concentration (SAC) sample drawn in the emergency department (ED) on admission; and an acute brain injury resulting from blunt head trauma (International Classification of Diseases [ICD-9-CM] including at least one head injury code). Subjects with penetrating head injuries or brain injury from hanging, suffocation, drowning or near drowning, burns, electrocutions, hypothermia, hyperthermia, or poisoning were excluded. In addition,

subjects admitted for less than a 1- day admission or admitted and discharged during the same weekend were not included in the study. Data on the subject's severity of injury and medical condition during prehospital care as well as during hospitalization were collected by experienced chart abstractors. SAC was measured from blood drawn in the ED; subjects were then stratified into two groups: intoxicated (SAC ≥ 100 mg/dl; n = 191) and nonintoxicated (SAC < 100 mg/dl; n = 329). When compared with nonintoxicated subjects, intoxicated subjects were more likely to require endotracheal intubation in the field or ED (relative risk [RR] 1.3; 95% confidence interval [CI] 1.1 to 1.5), more likely to require placement of an intracranial pressure bolt (RR 1.4; 95% CI 1.4 to 1.8), more likely to have respiratory distress requiring ventilatory assistance develop (RR 1.8; 95% CI 1.0 to 3.3), and more likely to have pneumonia develop (RR 1.4; 95% CI 0.9 to 2.2). One interesting finding was that intoxicated subjects had a 40% elevation in the relative likelihood of receiving invasive intracranial monitoring as compared with nonintoxicated subjects. This finding may indicate a tendency for intoxicated subjects to have more severe brain injuries than nonintoxicated subjects, or the trend may suggest that clinicians were less willing to rely solely on clinical assessments of cerebral injury in intoxicated subjects than in nonintoxicated, brain- injured subjects. In the study population, therefore, the findings suggested that head-injured, intoxicated subjects were more likely to require diagnostic-management procedures and have more adverse respiratory outcomes than those who were not intoxicated.

5147. Song, S. A., et al. (2017). "The emerging necessity of head and neck expertise in war." Otolaryngology - Head and Neck Surgery (United States) **157**(1): P57.

Objectives: (1) Analyze head and neck trauma from Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). (2) Describe the impact on mortality for the presence of head and neck surgeons in theater. Methods: This retrospective study used the Department of Defense Trauma Registry, which contains data for patients admitted to US military treatment facilities or at affiliated hospitals in theater in Iraq and Afghanistan from 2002 to 2015. The data were analyzed for differences in anatomic injury patterns, Injury Severity Score (ISS), procedures, injury diagnoses, and mortality. Multivariate logistic regression analysis was performed to determine the independent predictors of mortality. Results: Nearly 18,000 patients suffered head and neck injuries and 13,000 head and neck procedures were performed. The most common injuries included open facial wound (22%), tympanic membrane perforation (8.8%), and closed maxillary fracture (8.6%). Tracheostomy was the most common procedure performed (14%), followed by control of epistaxis (7.6%), eyelid/eyebrow laceration repair (7.5%), and neck exploration (6.6%). The dominant mechanism of injury in non-US military was penetrating (68%) compared with blunt (58%) in US military ($P < .0001$). Elevated ISS (odds ratio [OR] = 39.5, $P < .001$) and penetrating injuries (OR = 2.24, $P < .001$) resulted in higher mortality. The availability of a head and neck surgeon resulted in lower mortality (OR = 0.65, $P < .001$). Conclusions: There has been an increase in head and neck injuries during OIF/OEF when compared with prior conflicts. The availability of head and neck surgeons seem to be associated with a significant decrease in overall mortality.

5148. Sonmez, E., et al. (2012). "An iron rod stuck in the right motor cortex." Turkish neurosurgery **22**(6): 772-774.

Non-missile intracranial injuries caused by foreign bodies are quite uncommon in civilian practice. Nails, knives, screwdrivers and sewing needles are the most commonly reported agents. The authors report a unique case of an adult male patient who suffered a penetrating craniocerebral injury caused by a falling concrete reinforcing iron (rebar) from the fourth floor of a building under construction. The foreign body was safely removed by a right parietal craniectomy as a result of detailed radiological evaluation and preoperative planning. To the best of authors' knowledge, the successful surgical treatment of a penetrating brain injury caused by a rebar has not been reported previously.

5149. Sood, H., et al. (2021). "Acute Bacterial Meningitis Risk Factors in Patients with Craniocerebral Gunshot Injuries." Intensive Care Medicine Experimental **9**(SUPPL 1).

Introduction. Craniocerebral Gunshot Injuries (CGI) can predispose patients to acute bacterial meningitis (ABM) because of the possible spread of bacteria from the skin or contaminated spaces (sinuses, nasopharynx or middle ear) to CNS. Antibiotics are often given prophylactically, although the evidence to support their utility is limited. Objectives. In our study, we sought to determine the incidence of meningitis, use of prophylactic antibiotics, and risk factors for patients who developed ABM after CGI. Methods. A retrospective chart review was performed of all patients who were admitted with a diagnosis of traumatic brain injury to an urban level 1 trauma center from January 1st, 2013 to December 31st, 2019 and patients with CGI were identified. All patients with CGI were screened for ABM within six

weeks following admission, based on cerebrospinal fluid (CSF) analysis and neuroimaging. We also recorded demographic data, medical history, use of prophylactic antibiotics, incidence of skull fractures, CSF leaks, and neurosurgical procedures. Results. Of 4,574 patients presenting with traumatic brain injury, 80 patients (1.75%) had CGI. Of those, 50 patients (62.50%) survived past the first 24 h. 20 out of these 50 patients were given prophylactic antibiotics for meningitis, ranging from 3-10 days (mean = 5.6 days). Of the remaining 30 patients, 7 (23.33%) were diagnosed with ABM, based on neuroimaging in one patient, and CSF findings for the rest. Their age ranged from 17-40 years, and six of the seven patients were male. Skull fractures with CSF leak on presentation were present in 3 out of 7 (42.86%) patients, and all 3 underwent a decompressive craniectomy for refractory intracranial pressure (ICP), within the first week of admission. Moreover, 5 out of the 7 patients had an external ventriculostomy drain (EVD) or ICP monitor placement. 1 out of 7 patients (14.28%) died during the hospital stay whereas all others were discharged to rehab. Amongst the patients who received prophylactic antibiotics, none had a CSF leak and only 2 had an ICP monitor placed. Conclusion. We found that amongst 4574 TBI patients, the incidence of ABM was 23.33% in CGI patients who did not receive antibiotics. Development of ABM was associated with the presence of CSF leaks or undergoing neurosurgical procedures. Patients with a CSF leak had a statistically significant increased odds ratio (OR) of developing ABM compared to patients without a CSF leak (OR 6.50, 95% CI 1.35, 201.29). Similarly, patients undergoing neurosurgical procedures had a higher risk of developing ABM (OR 26.25, 95% CI 2.94, 234.37). Our data suggest that these may be independent risk factors for developing meningitis and that this subset of patients with CGI may need antibiotic prophylaxis. Future prospective studies, especially in CGI patients with CSF leaks and EVD/ICP monitor placements, are needed to confirm our findings.

5150. Soreide, E. and C. D. Deakin (2005). "Pre-hospital fluid therapy in the critically injured patient--a clinical update." Injury **36**(9): 1001-1010.

Venous access and fluid therapy should still be considered to be essential elements of pre-hospital advanced life support (ALS) in the critically injured patient. Initiation of fluid therapy should be based on a clinical assessment, most importantly the presence, or otherwise, of a radial pulse. The goal in penetrating injury is to avoid hypovolaemic cardiac arrest during transport, but at the same time not to delay transport, or increase systolic blood pressure. The goal in blunt injury is to secure safe perfusion of the injured brain through an adequate cerebral perfusion pressure, which generally requires a systolic blood pressure well above 100 mmHg. Patients without severe brain injury tolerate lower blood pressures (hypotensive resuscitation). Importantly, using systolic blood pressure targets to titrate therapy is not as easy as it seems. Automated (oscillometric) blood pressure measurement devices frequently give erroneously high values. The concept of hypotensive resuscitation has not been validated in the few studies done in humans. Hence, the suggested targeted systolic blood pressures should only provide a mental framework for the decision-making. The ideal pre-hospital fluid regimen may be a combination of an initial hypertonic solution given as a 10-20 minutes infusion, followed by crystalloids and, in some cases, artificial colloids. This review is intended to help the clinician to balance the pros and cons of fluid therapy in the individual patient.

5151. Sørensen, D. W., et al. (2015). "Controlled organ donation after circulatory death (cDCD) with use of regional normo termic perfusion (RNP): Case report of two patients in Norway." Acta anaesthesiologica Scandinavica **59**: 37-38.

Introduction: The numbers of patients which progress to a total loss of brain perfusion make up a relatively small fraction of all patients that die in the ICUs. To fulfill the patients wish for organ donation and meet the increased demand for organ transplantation we have established a program for cDCD with the use of RNP for in situ organ preservation. The protocol was approved by the Regional Ethical Committee, Norwegian Directorate of Health and finally the Ministry of Health and Care Services which stated that the cDCD protocol was in accordance with Norwegian Law. The study was presented at Centre for Medical Ethics, acknowledged by local ethical committee and given permission to start by board meeting at Division of Emergencies and Critical Care, Ulleval University Hospital. Objectives: To describe the steps taken to establish the protocol. To present two patient cases. (Figure presented) Results: Two males, one with penetrating brain injury, the other with intracranial hemorrhage, fulfilled the cDCD criteria. Next of kin supported organ donation and in agreement with the medical staff, life-sustaining treatment was withdrawn. Permanent cardiac arrest occurred after 13 and 10 min, respectively. RNP was applied for 54 and 106 min prior to kidney retrieval. Four kidney recipients were successfully transplanted and discharged with normalized creatinine levels. Conclusion: The implementation of cDCD has proven to be a challenge for the medical, ethical and transplant

community. However, excellent transplant results and satisfied next of kin and ICU staff have encouraged us to continue the use of cDCD.

5152. Sorensen, E. J. and C. Kruse-Larsen (1990). "[Practical use of the brain death diagnosis]." Hjernedodsdiagnosen i praktisk anvendelse. **152**(12): 805-806.

A retrospective review of a material spontaneous intracerebral haemorrhages and head injuries from a period of five years revealed that 14% of the patients with these diagnoses eventually are diagnosed as brain dead. In half of the brain dead patients cerebral angiography was carried out and, in all of the cases, this revealed circulatory arrest in the brain. The investigation demonstrates that, on the average, 8.5 hours elapse from the establishing of the diagnosis of brain death until cardiac arrest occurs. In 75 out of 105 cases, relations were asked for permission to remove organs and the reply was affirmative in 52 cases (69.3%). Two patients had already consented to organ donation.

5153. Soria, E. D., et al. (1988). "Traumatic aneurysms of cerebral vessels: a case study and review of the literature." Angiology **39**(7 Pt 1): 609-615.

Traumatic cerebral aneurysms (TCAs) are rare: few more than 100 cases are recorded in the world literature. TCAs are located predominantly in the supratentorial compartment and are classified as either "true" or "false." A true aneurysm is a dilation resulting from partial disruption of the arterial wall. A false aneurysm results from a full-thickness tear, with the scar from the brain tissue or an organized hematoma acting as the aneurysmal wall. The authors present a case of a false traumatic aneurysm of the pericallosal artery, which was discovered in a young patient fourteen months after a self-inflicted gunshot wound to his head. The aneurysm was an incidental finding on a CT scan performed for the investigation of his late posttraumatic seizures. Its presence was confirmed by angiography. The interval between the traumatic episode and the diagnosis of a TCA usually ranges from a few hours to a few weeks, for most are discovered by angiography performed in the acute or subacute stage of a head injury. The long interval between the injury and the diagnosis in our case is exceptional. A previous CT scan done four months after the injury did not reveal the aneurysm, which strongly suggests a protracted growth of the aneurysmal sac long after the trauma.

5154. Soroker, N., et al. (1989). "Practice of prophylactic anticonvulsant treatment in head injury." Brain injury **3**(2): 137-140.

The policy of patient selection for prophylactic anticonvulsant treatment has been evaluated retrospectively in 124 head-injured patients admitted consecutively for rehabilitation after primary neurosurgical treatment. Prophylaxis had been instituted in about 60% (51/83) of high risk patients and in about 30% (12/41) of the patients who did not belong to the high risk categories. The use of existing risk data as guidelines for decisions about anticonvulsant prophylaxis is discussed.

5155. Sosin, D. M., et al. (1989). "Head injury-associated deaths in the United States from 1979 to 1986." JAMA **262**(16): 2251-2255.

Review of US mortality data from 1979 to 1986 identified 315,328 deaths associated with head injury, which represented 2% of all deaths, 26% of injury deaths, and an annualized head injury-associated death rate of 16.9 per 100,000 residents. Motor vehicles (57%), firearms (14%), and falls (12%) were the most frequent causes. Death rates peaked at 15 to 24 years of age and at 75 years or older, with the younger group most affected by motor vehicles (77%) and the older group by falls (43%). Although blacks and whites had similar death rates overall, age- and cause-specific rates varied considerably. The rate of head injury-associated death for males was three times that of females. Rates for head injury-associated death plateaued after declining in the early 1980s. Physicians can play an important role in primary prevention of head injury through careful prescribing of medications, patient counseling, and advocacy of proved interventions such as motor vehicle-occupant restraints. use, we observed 9827 children riding bicycles at sites in high-, middle-, and

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5156. Sosin, M., et al. (2016). "Total Face, Eyelids, Ears, Scalp, and Skeletal Subunit Transplant Cadaver Simulation: The Culmination of Aesthetic, Craniofacial, and Microsurgery Principles." Plastic and reconstructive surgery **137**(5): 1569-1581.

BACKGROUND: The application of aesthetic, craniofacial, and microsurgical principles in the execution of face transplantation may improve outcomes. Optimal soft-tissue face transplantation can be achieved by incorporating subunit facial skeletal replacement and subsequent tissue resuspension. The purpose of this study was to establish a reconstructive solution for a full face and scalp burn and to evaluate outcome precision and consistency., METHODS: Seven mock face transplants (14 cadavers) were completed in the span of 1 year. Components of the vascularized composite allograft included the eyelids, nose, lips, facial muscles, oral mucosa, total scalp, and ears; and skeletal subunits of the zygoma, nasal bone, and genial segment. Virtual surgical planning was used for osteotomy selection, and to evaluate postoperative precision of hard- and soft-tissue elements., RESULTS: Each transplant experience decreased each subsequent transplant surgical time. Prefabricated cutting guides facilitated a faster dissection of both donor and recipient tissue, requiring minimal alteration to the allograft for proper fixation of bony segments during inset. Regardless of donor-to-recipient size discrepancy, ample soft tissue was available to achieve tension-free allograft inset. Differences between virtual transplant simulation and posttransplant measurements were minimal or insignificant, supporting replicable and precise outcomes., CONCLUSIONS: This facial transplant model was designed to optimize reconstruction of extensive soft-tissue defects of the craniofacial region representative of electrical, thermal, and chemical burns, by incorporating skeletal subunits within the allograft. The implementation of aesthetic, craniofacial, and microsurgical principles and computer-assisted technology improves surgical precision, decreases operative time, and may optimize function.

5157. Sosiukin, A. E., et al. (2008). "[Pathology of lungs by wounded in the armed conflicts in Northern Caucasus]." Voenno-meditsinskii zhurnal **329**(11): 31-96.

According to 7000 patient histories, wounded in armed conflicts in Northern Caucasus, for the last years, is marked a big part of wounds of mild (45.3%) and medium (31.5%) severity. Heavy and extremely heavy wounds marked conformably in 20.8 and 2.4 percents. An acute respiratory distress-syndrome is marked by 32 wounded with heavy and extremely heavy wounds, including 10--with penetrating wound of brainpan, 9--penetrating wound of bosom and tense hemopneumothorax, 11--penetrating wound of abdomen (with deflection of hollow and parenchymal organs), 2--penetrating wound of lower limbs (with firing breakup of long bones and deflections of great vessel), attended by blood loss and shock. Pneumonia was found during first 3 days after the wound by 47%, on 4-7 day--31%, during second week--13%, latter--9%. In 93% of cases pneumonia was marked in combination with traumatic shock. Radiological examining of radiological plays a conclusive account in diagnostics, and according to meanings--computerized tomography. Estimation of function of exterior breathing is also important.

5158. Soto, E., et al. (2021). "Reconstructive Management of Gunshot Wounds to the Frontal Sinus: An Urban Trauma Center's Perspective." Annals of plastic surgery **86**(6S Suppl 5): S550-S554.

INTRODUCTION: In the last decade, we have seen a steady increase in the incidence of frontal sinus trauma due to gunshot wounds and a decrease in motor vehicle trauma. Penetrating gunshot wounds to the frontal sinus present a unique challenge to the reconstructive surgeon because they require careful consideration of the management principles of plastic surgery. Despite previous reviews on frontal sinus trauma, there are no studies examining the management techniques of frontal sinus fractures due specifically to gunshot wounds. In this study, we aim to retrospectively evaluate the use of a variety of tissue flaps in intervention and associated outcomes., METHODS: A retrospective chart review was completed on all patients with gunshot wound(s) to the frontal sinus from January 2010 to January 2018 at a single institution. The patients were classified based on the fracture pattern (anterior vs posterior table vs both), degree of displacement, presence of nasofrontal outflow tract injury, and evidence of cerebrospinal fluid leak. Patients were then stratified according to the type of reconstruction performed (cranialization, obliteration and need for free flap) and evaluated for major and minor complications after reconstruction., RESULTS: In this study, we present outcome data from 28 cases of frontal sinus trauma due to gunshot wounds. There was a statistically significant difference (P = 0.049) in the type reconstructive strategy employed with each type of flap, with pericranial flaps primarily used in cranialization, temporal grafts were more likely to be used in obliteration, and free flaps were more likely to be used in cranialization. The overall major complication rate was 52% (P = 0.248), with the most common acute major complication was cerebrospinal fluid leak (39%) and major chronic was abscess (23.5%)., CONCLUSIONS: This

report explores the management of frontal sinus trauma and presents short-term outcomes of treatment for penetrating gunshot wounds at a tertiary referral center.

5159. Souter, M. and G. Van Norman (2010). "Ethical controversies at end of life after traumatic brain injury: defining death and organ donation." Critical care medicine **38**(9 Suppl): S502-509.

Death is more than a mere biological occurrence. It has important legal, medical, and social ramifications that make it imperative that those who are responsible for determination of death be accurate and above suspicion. The medical and legal definitions of death have evolved to include consideration of such concepts as loss of integration of the whole organism, loss of autonomy, and loss of personhood. Development of the concept of brain death coincided with advances in medical technology that facilitated artificial ventilation and organ transplantation. More recently, the process of "timed" death with subsequent organ donation (controlled donation after cardiac death transplantation) has raised controversial questions having to do with the limits of treatments that facilitate organ transplant but might hasten death, and the duration of cardiac arrest necessary for declaration of death and the commencement of organ procurement. In this review, we discuss the background and ethical ramifications of the concepts of brain death, and of controversies involved in controlled donation after cardiac death organ transplantation.

5160. Souter, M. J. and M. Kirschen (2020). "Brain death: optimizing support of the traumatic brain injury patient awaiting organ procurement." Current opinion in critical care **26**(2): 155-161.

PURPOSE OF REVIEW: Increasing numbers of deaths on the transplant waiting list is associated with an expanding supply-demand deficit in transplantable organs. There is consequent interest in reviewing both donor eligibility after death from traumatic brain injury, and subsequent management, to minimize perimortem insult to donatable organs., RECENT FINDINGS: Recipient outcomes are not worsened when transplanting organs from donors who were declared dead after traumatic brain injury. Protocolized donor management improves overall organ procurement rates and subsequent organ function. Longer periods of active management (up to 48 h) are associated with improved outcomes in renal, lung, and heart transplantation. Several empirically derived interventions have been shown to be ineffective, but there are increasing numbers of structured trials being performed, offering the possibility of improving transplant numbers and recipient outcomes., SUMMARY: New studies have questioned previous considerations of donor eligibility, demonstrating the ability to use donated organs from a wider pool of possible donors, with less exclusion for associated injury or comorbid conditions. There are identifiable benefits from improved donor resuscitation and bundled treatment approaches, provoking systematic assessments of effect and new clinical trials in previously overlooked areas of clinical intervention.

5161. Sova, M., et al. (2010). "Gunshot wounds of the head and brain." Ceska a Slovenska Neurologie a Neurochirurgie **73**(5): 547-551.

Aim: The authors report the results of treatment to patients with gunshot and captive bolt injury to the brain, all of them undergoing surgery at the Department of Neurosurgery at the Faculty Hospital, Brno in the 2005-2008 period. The article addresses the most important prognostic factors influencing choice of therapeutic procedures. It also includes a classification and pathophysiology of penetrating injuries. The authors present a basic survey of the impact ballistics of gunshot injuries. Patient group and methods: The case histories of 20 patients were subjected to operational review. All of them were male, mean age 59, range 33-80 years. Attempts at suicide accounted for 17 of the them; two arose out of negligent handling of a firearm; and one patient was a victim of violent crime. The clinical status of the patients was retrospectively evaluated by means of the Glasgow Outcome Scale [1], 6 months after the penetrating injury on the part of the survivors. The dependence of GOS on the patient's state of consciousness on admission and the extent of brain involvement according to CT scan were evaluated. Results: The patient's state of consciousness on admission and the extent of brain parenchyma damage on CT scan are the most important prognostic factors dictating approaches to the treatment of these severely injured patients. In our group, the initial Glasgow Coma Scale [2] points totalled 3 in 15 patients (75%), 9 in 1 patient (5%), 14 in 1 patient (5%) and 15 in 3 patients (15%). Initial presenting examination of the brain with computer tomography revealed 9 cases of severe, extensive, multilobar involvement of the brain parenchyma, 11 cases of focal involvement of a single lobe, often in the "eloquent" brain. Mortality in the whole group reached 65%, and 4 cases were classified as donors to the transplantation program. Conclusion: The

specialist literature indicates that the mortality rate of brain gunshot wounds varies between 60% and 90%, and our group suffered a mortality of 65%. This relatively favourable outcome is determined by the fact that 50% of the wounds were inflicted by a slaughterhouse (captive bolt) gun, which lacks the extended penetration of bullet-firing weapons. Despite the fact that serious primary injury to the brain parenchyma occurs, a favourable prognosis may result from emphasis on minimizing further secondary brain damage.

5162. Sozaonti, Z. R., et al. (2010). "[Radiation studies in patients with explosive mine wounds of the head]." Vestnik rentgenologii i radiologii(3): 47-53.

5163. Spallaccia, F., et al. (1996). "[Trauma to the anterior cranial base. Report of a case]." Traumi della base cranica anteriore. Presentazione di un caso clinico. **45**(6): 289-293.

The authors present a case of foreign body retention, following car accident, localized on superior medial corner of the right orbit. The traumatic impact, involving endo-orbital structures, owing to the peculiar direction of the foreign body, caused a fracture in the anterior cranial base and laceration of the dura madre. As the anatomical structures involved did not concern only the MaxilloFacial district, the choice of the protocol to be applied to the patient was taken in accordance with the neurosurgical equipe. An intra cranial surgical approach has allowed to remove, by retrograding the foreign body on its trajectory path, in order not to injure further the already damaged structures involved. Then the tissues have been reconstructed; in particular, the anterior cranial base was restored through the use of pericranial strip. This technique is the elective surgical treatment in lesions of such small entity, as it is able to grant a solid support to the overhanging cerebral parenchyma. Besides, this reconstruction technique provides a complete protecting isolation of the ocular globe from compressive and pulsative phenomena, due to the neurocranial adjacent structures. With this technique, after a 8 month's follow-up. The patient has obtained optimum functional and aesthetic results.

5164. Spanio, S., et al. (2002). "Intracranial dislocation of the mandibular condyle: report of two cases and review of the literature." The British journal of oral & maxillofacial surgery **40**(3): 253-255.

Fractures of the mandibular condylar process are common and account for up to 40% of all mandibular fractures. Penetration of the condylar head into the middle cranial fossa is, however, rare. We have found reports of only 43 cases since 1834. The diagnosis of intracranial condylar dislocation is difficult, there are usually no particular symptoms or neurological signs. As a result, detailed radiological studies are necessary. In the absence of clear radiographic images of the condylar structures, computed tomography (CT) is essential to locate the fragments and to investigate and monitor intracranial lesions. This paper describes the diagnostic and surgical procedures used in two cases of condylar dislocation and discusses them with reference to previous cases. The use of a titanium screw, which was positioned intracranially in the first case, has not, to our knowledge, been described previously. Copyright 2002 The British Association of Oral and Maxillofacial Surgeons.

5165. Spatenkova, V. (2018). "International prospective observational study on intracranial pressure in intensive care (the synapse-ICU study)." European Journal of Neurology **25**: 29.

Background: International prospective observational StudY on iNtrAcranial PreSsurE in intensive care (ICU), the SYNAPSE-ICU was initiated by European Society of Intensive Care Medicine Neuro-Intensive Care Section. The objectives of the study are to explore ICP monitoring variation in practice in order to prioritise uncertainties in the clinical management of critical care patients with acute brain injury and support further collaborative hypotheses based prospective studies. Material and Methods: This study will start in March 2018. It will be conducted in several ICUs in different countries. Inclusion criteria: a) Acute brain injury (ABI) admitted to ICU following: Haemorrhagic stroke, including intracerebral hematoma and subarachnoid haemorrhage, TBI (penetrating and nonpenetrating); age >18 years old; c) worst motor score <6 or requiring intubation and ventilation for neurological reasons/deterioration; d) no eye opening at enrolment. Exclusion criteria: a) acute brain injury (ABI) NOT admitted to ICU; ABI not included in the inclusion criteria; c) age < 18 years old; d) motor score of the Glasgow Coma Scale on admission to ICU = 6. Outcome measures: GOS-Extended at 6 months.

5166. Spatenkova, V., et al. (2020). "Potential brain dead organ donation in neurocritical care mortality." Journal of neurosurgical sciences **64**(3): 247-252.

BACKGROUND: Mortality is a marker of quality in neurocritical care, but it also provides potential for donors after brain death (DBD) following irreversible acute brain damage. The aim of this study was to analyze the neurointensive care unit (NICU) mortality rate and recovery of potential DBD., METHODS: We performed a 10-year prospective observational cohort computer database analysis of 6138 acute neurological and neurosurgical patients (pts, 58.2% male, mean: age 55.9+/-14.7 years, body weight 78.3+/-15.6 kg, body mass index 26.9+/-4.7, NICU stay 3.8+/-5.3 days): 3462 (56.4%) pts with brain disease (mostly stroke 43.2%, tumor 31.1%, trauma 13.6%); 10.3% pts with internal carotid artery (ICA) stenosis; 32.6% pts with spine diseases, and others. Mean Acute Physiology and Chronic Health Evaluation (APACHE) II score on admission was 10.63+/-5.2 and Glasgow Coma Scale on admission was 13.79+/-2.51., RESULTS: There were 159 (2.6%) cases of mortality with a significantly higher mortality rate in pts with brain diseases (95.6% of deceased pts, P<0.001) than in ICA stenosis (0.6%), spine (1.9%) and from others (1.9%). There were 23 (14.5%) pts with clinical signs of brain death, of whom 13 (56.5%) became donors. The main reasons for non-recovery of potential donors were hemodynamic instability (16.7%) and family reluctance (12.5%)., CONCLUSIONS: The study showed that our NICU mortality was 2.6%. There were relatively few clinical signs of brain death and not all potential donors were recovered.

5167. Specht, C. S., et al. (1992). "Orbitocranial wooden foreign body diagnosed by magnetic resonance imaging. Dry wood can be isodense with air and orbital fat by computed tomography." Survey of ophthalmology **36**(5): 341-344.

In computed tomographic (CT) scans, a wooden foreign body can appear as a lucency with nearly the same density as air or fat, and it can be indistinguishable from orbital adipose tissue. Magnetic resonance imaging (MRI) can localize these wooden foreign bodies in the orbit. We studied a case in which a wooden golf tee lodged in the right optic canal of a nine-year-old boy. The head portion lodged in the orbital apex and the tip entered the interpeduncular fossa. Clinical examination revealed a right paranasal laceration; the right eye had no light perception and a peripapillary hemorrhage, but was otherwise normal. Surgical exploration and evaluation by CT failed to locate the foreign body. However, the golf tee was demonstrated by MRI as a low intensity image. Although it was removed by craniotomy with good neurological results, bacterial panophthalmitis led to enucleation of the eye. This case emphasizes the diagnostic value of MRI and the hazards of retained wooden foreign bodies.

5168. Spencer, C. and J. Butler (2010). "Survival after cardiac arrest and severe lactic acidosis (pH 6.61) due to haemorrhage." Emergency medicine journal : EMJ **27**(10): 800-801.

This paper describes a 21-year-old man who presented to the emergency department with a knife wound to his buttock. He had a witnessed cardiac arrest with pulseless electrical activity in hospital as a result of further haemorrhage. His post-resuscitation arterial blood gas revealed a severe lactic acidosis (pH 6.61, lactate 22.0 mmol/l). Despite poor expectations he went on to make a full neurological recovery. To the authors' knowledge, he had the fourth-lowest pH for a cardiac arrest survivor with normal neurology. Severe lactic acidosis occurs post cardiac arrest due to imbalance between cellular oxygen supply and demand. Severe lactic acidosis is associated with hypoxic brain injury but has a low specificity in its prediction. The case illustrates that, especially in younger adults, severe lactic acidosis may be a poor predictor of outcome if it reflects a period of relative hypoperfusion preceding cardiac arrest.

5169. Spennato, P., et al. (2005). "Double concentric craniotomy for a craniocerebral penetrating nail. Case report and technical note." Surgical neurology **64**(4): 368-371.

BACKGROUND: Craniocerebral penetrating injuries from nail-gun accidents are rare and usually are discovered immediately after the trauma. Several surgical procedures have been described to extract a foreign body that is infixed in the skull and has penetrated the surrounding structures; blind extraction, craniectomy, and craniotomy., CASE DESCRIPTION: We report the case of a 25-year-old ex-carpenter who presented with jacksonian seizure at the left limb. Plain radiography of the skull revealed the unexpected presence of a nail hammered in the right parietal bone, penetrating the underlying structures of the frontoparietal area up to a depth of 3 cm. The patient was operated on; a small craniotomy (1 x 1 cm) just around the head of the nail, and a concentric larger frontoparietal bone flap, involving the first craniotomy, were performed. The larger bone flap was elevated first, whereas the small bone flap with the nail infixed was carefully elevated along the axis of the nail, under direct vision of the nail tract., CONCLUSIONS: Double

concentric craniotomy is the only technique that permits the removal of a foreign body that has penetrated both the skull and the brain, under direct vision, without transmitting any undue forces to the underlying structures. With this technique, control of bleeding can also be easily achieved.

5170. Sperry, K. and E. S. Sweeney (1988). "Terminal ballistic characteristics of Hydra-Shok ammunition: a description of three cases." Journal of forensic sciences **33**(1): 42-48.

The Hydra-Shok bullet is characterized by a hollow-point construction, with a distinctive central post in the base of the hollow. These features allow such missiles to be easily identified during the course of an autopsy examination of a gunshot victim. Higher velocity loadings of the Hydra-Shok may fragment along the wound path, occasionally forming a ring-like fragment that suggests this ammunition, but this feature cannot be considered unique. Although radiographic examination is helpful in bullet localization, the characteristic central post may be identified by X-ray only if sufficient expansion results in its exposure. Three cases of shooting deaths involving Hydra-Shok bullets are presented and discussed; in each case, the entrance wounds were indistinguishable from entrances associated with conventional ammunition, and in no instance did the missiles exit from the body (including head, chest, and abdominal wounds). Familiarity with relatively unusual ammunition types such as the Hydra-Shok allows for quick identification by the pathologist at the time of autopsy.

5171. Spiers, A. S. (1994). "Attempted suicide or hitting the nail on the head. Case report." The Journal of the Florida Medical Association **81**(12): 822-823.

A case is reported of attempted suicide by hammering nails through the skull into the brain. This unique attempt at self-destruction was unsuccessful and the treatment, initially by an untrained first-aider and then by a neurosurgeon, was surprisingly simple. There were no long-term sequelae.

5172. Spinella, P., et al. (2009). "Predictors of mortality for penetrating injuries excluding isolated head injury." Shock **31**(1): 91-92.

Introduction: Many clinical trials have used admission systolic blood pressure (SBP) to determine inclusion criteria to identify shock. Inaccurate estimates of mortality in clinical trials have lead to underpowered results. Our hypothesis was that measures of coagulopathy and shock upon admission such as International Normalized Ratio (INR), base deficit (BD), and hemoglobin (Hb) when added to SBP improve prediction of mortality. Methods: Patients with penetrating combat-related injuries who were transfused blood products were included. Patients with isolated severe traumatic brain injury (Head AIS ≥3) and those with any of the variables analyzed missing were excluded. Logistic regression with stepwise elimination was used with receiver operator curve (ROC) analysis for admission SBP, Hb, BD, and INR to determine their ability to predict in-hospital mortality. Results: There were 840 patients included with a median (IQR) age of 24 years (21-28), Injury severity score of 19 (11-29), and mortality of 90/840 (10.7%). The AUC for in hospital mortality increased significantly ($p < 0.05$) as BD, and(Table Presented). INR were included in the prediction model compared to models that did included only SBP and Hb (models 3-5 vs. 1-2). Conclusion: The addition of admission BD and INR as inclusion criteria may improve the ability to select patients with expected mortality for trials in penetrating traumatic injury which exclude isolated severe head injury. Approaches similar to this are needed to improve study design of large clinical trauma trials.

5173. Spiotta, A. M. and S. M. Matoses (2011). "Neurosurgical considerations after bull goring during festivities in Spain and Latin America." Neurosurgery **69**(2): 455-461.

Bullfighting is a highly popular activity during festivities in Spain and Latin America. A scientific society for bullfight injuries, Congreso Internacional de Cirugia Taurina, was founded on November 24, 1974, in recognition of the distinctive pattern of injury that results from bull goring, and a subspecialty of general surgical trauma with emphasis on the acute surgical management of bull-goring injuries has emerged. Injuries to the head and neck are less frequent than genitourinary, inguinal, and abdominal injuries, but are more severe and more likely to result in death. This report reviews the primary venues in which bull goring and associated injuries occur, including the bullfight and the running of the bulls. The biomechanics of the primary and secondary goring injuries are reviewed, with an emphasis on those with the potential to result in neurosurgical injuries. This results in a very unique and devastating pattern of injury that

combines penetrating and blunt mechanisms and results in polytrauma. Neurosurgical expertise should be immediately available on-site in the event of a life-threatening neurological injury.

5174. Spittler, J. F. and H. Langenstein (1991). "[Diagnosis of brain death: limitations of angiography after osteoclastic trepanation]." Diagnose des Hirntodes: Grenzen der Angiographie nach osteoklastischer Trepanation. **116**(48): 1828-1831.

A 50-year-old man sustained severe skull-brain trauma with intracerebral bleeding, cortical contusion foci and fracture of the petrosal bone. He went into coma a few hours after the accident. Three days after surgical removal of an intracerebral bleeding via a frontoparietal osteoclastic trepanation (removal of a 4 x 5 cm piece of bone) there occurred complete brainstem areflexia, respiratory arrest and drop in temperature; the encephalogram was isoelectric. There was thus no clinical-neurological doubt of brain death. But cranial digital subtraction angiography, generally considered to give the most reliable evidence of irreversible loss of cerebral functions, showed contrast medium in the branches of the left cerebral artery. The diagnostic criteria of brain death, as proposed by the Federal German Chamber of Physicians (Bundesarztekammer), were thus not exactly met, and despite the clinically obvious brain death a contemplated removal of organs for transplantation was therefore not undertaken. The patient died 6 hours after the angiography. This case shows that the value of angiography for the diagnosis of brain death may sometimes be limited, at least in those cases in which osteoclastic trepanation has been performed or there are other causes for a skull defect, because they can prevent the rise of intracranial pressure which brings about the cerebral circulatory arrest.

5175. Spitzer, N. and J. K. Singh (2018). "Pediatric ocular trauma caused by recreational drones: two case reports." Journal of AAPOS : the official publication of the American Association for Pediatric Ophthalmology and Strabismus **22**(3): 237-238.

Drones are increasingly being used by children and adults recreationally and commercially. The propeller blades when spinning at high speeds may cause serious harm to the eye and orbital structures. We report 2 cases of injuries to the eye and orbital structures caused by drones.

5176. Splavski, B., et al. (2000). "Intracranial infection as a common complication following war missile skull base injury." Injury **31**(4): 233-237.

The purpose of this paper is to stress the importance of clinical observation, the appropriate antimicrobial therapy, and early surgery in the management of intracranial infection following war missile penetrating skull base injury. There were 21 skull base missile injuries treated surgically in a 4-year period. Careful removal of devitalised brain tissue with dural closure was performed with all patients to prevent the development of intracranial infection. Subsequent clinical and radiological surveillance was performed to detect evidence of infection and abscess formation if fragments were left in place. Broad range antibiotic coverage, and the antioedematous agents were applied in the early postoperative period. Infection about the brain was seen in four cases. We recorded three cases of brain abscess formation, while one patient developed bacterial meningitis. The incidence of infectious complications was relatively high in our series. After the organisms causing infection were known, treatment was modified to be as specific as possible. It was not necessary to reoperate on intracranially retained foreign bodies and fragments since they did not increase the infection rate. However, repeated surgery is necessary for a brain abscess.

5177. Splavski, B., et al. (2006). "[Clinical predictors correlated to outcome of war missile penetrating brain injury]." Klinicki pokazatelji u.spjesnosti lijecenja ratnih penetrirajucih ozljeda mozga. **60**(4): 369-373.

AIM OF THE STUDY: The purpose of this retrospective study was to review and discuss the outcome of surgical management and other clinical predictors influencing the prognosis of war missile penetrating brain injuries., PATIENTS AND METHODS: To determine clinical predictors that influence the prognosis of war missile penetrating brain injury, 126 surgically treated patients who had sustained such an injury during the two-year period of war in Croatia (1991-1993) were retrospectively analyzed. Investigated clinical features were: Glasgow Coma Scale (GCS) score on admission; extent of brain injury; time between injury and hospital admission; presence of intracranially retained foreign bodies or bone fragments; development of postinjury and posttraumatic complications; and Glasgow Outcome Score (GOS) at six-

month follow up. The data were statistically analyzed., RESULTS: Sixty-seven patients survived penetrating missile brain injury, in most of them with GCS score above 8 on admission. The mean time interval to hospital admission in this group of patients was less than two hours. Twelve of 67 patients developed different complications. All patients recovered well according to GOS (GOS 5 and 4) at six-month follow up. Fifty-nine patients died. The wounded who were in moribund state on the hospital admission (n = 11), and those who died during surgery (n = 8) were excluded from the analysis. The remaining 40 patients who did not survive were analyzed. The majority of them had GCS score 3-8 on admission. They mostly sustained bilateral hemispheric lesion, and/or ventricular lesion, and developed brain edema. The mean time interval between injury and hospital admission was over two hours in this group of patients. Postoperative complication developed in 9 of 40 patients., DISCUSSION: The patients with GCS score exceeding 8 had by far more favorable outcome in comparison to those with GCS score less than 8. Considering the extent of injury, patients suffering unihemispheric brain wounds had a more favorable outcome than those with lesions of both hemispheres, and particularly those with transventricular lesions. The time between injury and hospital admission proved to be another important prognostic factor. The majority of patients admitted up to one hour of injury survived, while two thirds of those admitted between one and three hours of injury succumbed. The presence of intracranially retained foreign bodies and bone fragments, and postinjury and postoperative complications implied worse outcome in comparison with their absence., CONCLUSION: The state of consciousness on admission was the most sensitive criterion as far as the prognosis is concerned. The outcome also depended on the extent of brain damage since the wounds associated with a high mortality rate were predominantly bihemispheric. Concerning survival, the time between injury and hospital admission also appeared to be important, as well as intracranially retained foreign bodies and bone fragments, and development of complications. There was no relationship between the presence of retained fragments and development of infection, suggesting that it is not necessary to reoperate for retained fragments. We assume that early surgery is essential for treatment outcome, although it is not necessary to reoperate for retained fragments.

5178. Splavski, B., et al. (1998). "Early surgery and other indicators influencing the outcome of war missile skull base injuries." Surgical neurology **50**(3): 194-199.

BACKGROUND: The aim of this study was to analyze the effect of early surgical management protocol and other important clinical features on the prognosis of patients suffering from war missile skull base injuries., METHODS: Twenty-one patients who suffered from war missile skull base injuries were analyzed in this study. The wounds were mainly caused by shells and/or bullets. Craniotomy represented the standard treatment in all patients. Investigated clinical features included Glasgow Coma Scale score on admission, the mode and the extent of brain injury, time to patient admission to hospital, and the presence of an intracranially retained foreign body. The prognostic importance of complications such as infection, intracranial hemorrhage, cerebrospinal fluid leak, and epileptic seizures was also investigated., RESULTS: The outcome of 21 skull base injuries was as follows: death in seven patients, vegetative state in three, severe disability in two, moderate disability in seven, and good recovery in two patients. The clinical characteristics that implied favorable outcome were: Glasgow Coma Scale score greater than 12, location of injury in the anterior cranial fossa, time to admission shorter than 1 hour, and absence of an intracranially retained foreign body and postoperative complications. The statistical significance of those predictors was at the level of $p < 0.001$ in all cases., CONCLUSIONS: Although the wounds were associated with a high mortality rate, this study showed that there are major differences in prognosis of patients with war missile skull base injuries with respect to certain presenting clinical features.

5179. Spoor, T. C. (1987). "Penetrating orbital injuries." Advances in ophthalmic plastic and reconstructive surgery **7**: 193-216.

Seemingly trivial adnexal injuries may be associated with extensive injuries to the globe, orbit, and brain. A meticulous ophthalmologic examination and orbital and brain computed tomography (CT) scans (axial and coronal views) are essential for complete evaluation of these patients. The ophthalmologist must remain an active participant in the management of these patients to preserve the integrity of the globe.

5180. Springborg, J. B., et al. (2007). "Cranio-cerebral injuries caused by nail guns: report on two cases, review of the literature and treatment algorithm." The Journal of trauma **63**(2): E59-64.

5181. Spurlock, M., et al. (2017). "Perilesional neural stem cell transplantation mitigates lesion volume following penetrating ballistic-like brain injury (PBBI)." Journal of neurotrauma **34**(13): A23.

We previously confirmed engraftment of NSI566 human neural stem cells (hNSC) in PBBI. In this study, we aimed to determine the optimal transplant location relative to PBBI lesion. To do so, we transplanted one million hNSC into each animal one week following injury either in the core of injured tissue (intralesional) or in undamaged tissue immediately surrounding the core (perilesional). We also transplanted the same dose of cells into an uninjured sham group. In a final vehicle group, we transplanted only media with no cells one week following injury. After 12 weeks, we assessed the survival of the transplanted cells and the overall volume of the lesion. Although the survivability of the cells was not significantly different between intra and perilesional groups, there was greater cell survival in the inujred groups compared to non injured control. This suggests that engraftment of cells was not adversely by the PBBI lesion milleu. The injury environment after one week may be conducive to transplanted stem cells in terms of survivability and/or proliferation. PBBI-injured animals that received perilesional hNSC engraftments showed a significant reduction in lesion volume compared to animals that received intralesional hNSC transplants [Unijured + hNSC= 2.64- 0.68mm3; PBBI+ Vehicle = 64.35 - 4.48mm3; PBBI+ Perilesional hNSC= 27.57 - 3.78mm3; PBBI+ Intralesional hNSC= 55.74 - 4.77mm3]. The lesion volume was significantly less in the perilesional transplant group when compared to the vehicle group ($p < .05$ vs. PBBI + Vehicle). Both transplant groups had reduced lesion volume compared to vehicle group.

5182. Spurlock, M., et al. (2013). "Focal neurodegeneration in rat following penetrating ballistic-like brain injury despite acute global metabolic pathophysiology." Journal of neurotrauma **30**(15): A16.

Introduction Penetrating traumatic brain injury (PTBI) is associated with the worst outcomes in TBI. The aim of our study is to document the effects of PBBI on cerebral vascularity, glucose uptake and oxygen consumption (VO2 at 2.5h) and their translation into neuronal degeneration (at 24h). Methods For each experiment, male Sprague-Dawley rats were allocated to control (n = 5) or PBBI groups (n = 6-10) 1) Unilateral PBBI model: A burrhole was made in the right frontal skull, and computed-inflatable probe inserted and inflated (140psi/40ms). 2) 14C-2-deoxy Glucose (2-DG) autoradiography: 2 h post PBBI, radioactive 14C-2-deoxy-D-glucose (50lCi) was administered and serial blood samples taken over 45 minutes and estimated using scintillation counter. Brain sections were exposed to X-ray films. Signals were digitalized and analyzed using densitometry with custom software. 3) Vascular imaging: Fluorescent lectin was perfused from the ascending aorta, at 2.5h, or 24 h after injury, brains were cleared and imaged using Ultramicroscopy. Labeling was quantified by 3D rendered volume reconstructions of cerebral vessels. 4) VO2: 2.5 h after PBBI, animals were perfused with glucose phosphate buffer. Cortex samples were assessed by microrespirometery. 5) FJB Histopathology: Brain sections were stained with Fluoro-Jade B (FJB), a marker for neuronal degeneration, and stereologically assessed. Results Compared to control, at 2 h post PBBI global decrease of glucose utilization and oxygen consumption were observed (1) Global glucose uptake: PBBI; MEAN± SEM; 44.9 ± 0.5µmol/100g/min, Control; 75.2 ± 0.9 µmol/100g/min; $p < 0.05$. A radial gradient of glucose impairment was observed, with the most severe impairment at the lesion core. However, at 24 h post PBBI degenerating neuron incidence caused by primary injury was limited to the focal injury core and peri-injury area: PBBI ipsilateral 128583 ± 27160 cells, PBBI contralateral 3711 ± 1148 cells, $p < 0.001$. Decreased vascular labeling volume was also observed in the ipsilateral hemisphere compared to the contralateral hemisphere: ipsi 2.18E + 10 µm3; contra 6.23E + 10 µm3. An inverse relationship between cerebral metabolism (glucose uptake, oxygen consumption) and FJB labeling along the rostro-caudal axis was observed. Conclusions In PBBI, global 2-DG suppression was consistent with the area of lowered cerebral perfusion pressure (CPP), based on labeling of vasculature with lectin and previous literature on CPP. Thus it could be one possible cause of globally impaired metabolism. The areas with perfect overlap of impaired metabolism and focal FJB labeling appear to be the primary, unsalvagable injury. In contrast, large swathes of brain with acutely impaired metabolism experience significantly less neurodegeneration, appearing to be the salvageable hypoxia/ischemic ''penumbra.'' In the clinic, metabolic preservation via circulatory manipulation may improve PTBI outcomes.

5183. Spurlock, M. S., et al. (2017). "Amelioration of Penetrating Ballistic-Like Brain Injury Induced Cognitive Deficits after Neuronal Differentiation of Transplanted Human Neural Stem Cells." Journal of neurotrauma **34**(11): 1981-1995.

Penetrating traumatic brain injury (PTBI) is one of the major cause of death and disability worldwide. Previous studies with penetrating ballistic-like brain injury (PBBI), a PTBI rat model revealed widespread perilesional neurodegeneration, similar to that seen in humans following gunshot wound to the head, which is unmitigated by any

available therapies to date. Therefore, we evaluated human neural stem cell (hNSC) engraftment to putatively exploit the potential of cell therapy that has been seen in other central nervous system injury models. Toward this objective, green fluorescent protein (GFP) labeled hNSC (400,000 per animal) were transplanted in immunosuppressed Sprague-Dawley (SD), Fisher, and athymic (ATN) PBBI rats 1 week after injury. Tacrolimus (3 mg/kg 2 days prior to transplantation, then 1 mg/kg/day), methylprednisolone (10 mg/kg on the day of transplant, 1 mg/kg/week thereafter), and mycophenolate mofetil (30 mg/kg/day) for 7 days following transplantation were used to confer immunosuppression. Engraftment in SD and ATN was comparable at 8 weeks post-transplantation. Evaluation of hNSC differentiation and distribution revealed increased neuronal differentiation of transplanted cells with time. At 16 weeks post-transplantation, neither cell proliferation nor glial lineage markers were detected. Transplanted cell morphology was similar to that of neighboring host neurons, and there was relatively little migration of cells from the peritransplant site. By 16 weeks, GFP-positive processes extended both rostrocaudally and bilaterally into parenchyma, spreading along host white matter tracts, traversing the internal capsule, and extending ~13 mm caudally from transplantation site reaching into the brainstem. In a Morris water maze test at 8 weeks post-transplantation, animals with transplants had shorter latency to platform than vehicle-treated animals. However, weak injury-induced cognitive deficits in the control group at the delayed time point confounded benefits of durable engraftment and neuronal differentiation. Therefore, these results justify further studies to progress towards clinical translation of hNSC therapy for PTBI.

5184. Spurlock, M. S., et al. (2014). "Multineurotrophin expressing fetal cell transplant in penetrating ballistic brain injury (PBBI)." Journal of neurotrauma **31**(12): A110.

The purpose of this pilot study was to evaluate survival of genetically modified fetal cell transplants in PBBI. FDA approved naïve human fetal spinal cord neural stem cells were transplanted into Sprague Dawley (SD), Fischer344, or Athymic SD rats. Male rats were subjected to PBBI and two weeks later allocated to: Group1: no transplant, Group2: xenogeneic transplant. These groups were immunosuppressed via tacrolimus, mycophenylate, and depo-medrol. In Group 3, SD rat E14 cortical neural precursors lentivirally transduced to express multineurotrophin (MNTS1) were transplanted into PBBI injured SD rats. Group 3 was immunosuppressed with cyclosporine. Cells were microinjected into the peri-lesion region (400,000/rat). The brains were sectioned and assessed for cell specific markers for differentiation and immune response. The human-to-rat transplant rejection at 1 week was comparable to that in Fischer and Athymic at 4 weeks. All xenogeneic transplants were rejected by 8 weeks. In the allogeneic rat-to-rat MNTS-1 expressing transplant group, a robust graft spanning a millimeter square developed. Neurite lengths at week 1 were ~150 micron, and by week 8 extended 3 millimeters from the transplant to engraft the lesion. Varicosities suggestive of synaptic densities on neurites could be seen. Most grafted cells labeled with neural markers while few labeled ambiguously with glial markers. The pilot data indicates that the inflammation response of PBBI and lack of sufficient growth factors mediate rejection of transplanted naive stem cells. However, with appropriate growth factor enhancement, allogeneic fetal transplants can survive and develop in the PBBI model. Transduction of human cells with MNTS1 should allow for their engraftment in athymic rats. These transplants can then be evaluated for safety and therapeutic efficacy.

5185. Spyropoulos, N. D. and S. Anagnostopoulou (1991). "Unusual trajectory of a bullet trapped in the temporal area." Oral surgery, oral medicine, and oral pathology **71**(2): 253-255.

5186. Squire, L. R., et al. (1989). "Description of brain injury in the amnesic patient N.A. based on magnetic resonance imaging." Experimental neurology **105**(1): 23-35.

N.A. has been amnesic since 1960 when at the age of 22 years he sustained a penetrating brain injury with a miniature fencing foil. The amnesia primarily affects verbal material and occurs in the absence of other detectable cognitive deficits. Previous CT scans demonstrated a lucency in the region of the left mediodorsal thalamic nucleus, but no additional damage was revealed. Beginning in 1986 when he was 48 years old, N.A. was evaluated with a series of magnetic resonance imaging (MR) studies. Three major areas of damage were identified. In the left thalamus there is a prominent 3- to 4-mm-wide linear lesion that approximates the position and orientation of the internal medullary lamina. The defect extends for approximately 20 mm anteroposteriorly and likely involves the rostral group of intralaminar nuclei (central medial, paracentral, central lateral, rhomboid, and reuniens nuclei), the caudal group of intralaminar nuclei (centrum medianum and parafascicular nuclei), the ventral aspect of the mediodorsal nucleus, and the ventral lateral and ventral anterior nuclei. It also likely interrupts the trajectories of the mammillothalamic tract and

postcommissural fornix. The posterior hypothalamus is markedly disrupted and the mammillary nuclei appear to be missing bilaterally. Finally, the right anterior temporal lobe is damaged for a distance of about 3.5 cm from the pole to midway through the amygdaloid complex. This damage probably occurred during exploratory neurosurgery done at the time of N.A.'s injury. The hippocampal formation appears intact on both sides. A comparison of these findings with those from other patients with diencephalic amnesia suggests that amnesia can result when several diencephalic structures are damaged conjointly, including the internal medullary lamina, the intralaminar nuclei, the mediodorsal nucleus, and the mammillothalamic tract. Whether amnesia as severe as N.A.'s would result from selective damage to any one of these structures remains to be determined.

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5187. Squire, L. R. and R. Y. Moore (1979). "Dorsal thalamic lesion in a noted case of human memory dysfunction." Annals of neurology **6**(6): 503-506.

The extensively studied patient N.A. has had a severe verbal memory deficit since 1960, when he sustained a stab wound to the brain with a miniature fencing foil. His amnesia occurs in the absence of any other known cognitive defect. Recent CT scans have localized a lesion in the left dorsal thalamus of this patient in a position corresponding to the dorsomedial nucleus; there is no radiographic evidence of other damage in the diencephalon or cerebral cortex. The dorsomedial thalamus may be critical in the neuropathology of diencephalic amnesia and, in humans, may be required for normal memory functions.

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5188. Sreenivasan, V. and C. O. H. S. Nobleza (2018). "Challenges and ethical issues in the course of palliative care management for people living with advanced neurologic diseases." Annals of palliative medicine **7**(3): 304-319.

In the recent years, there has been an increase in awareness with regards to the role of palliative care (PC) in management of neurologic diseases. In 1996, the need to incorporate PC in the care for patients with neurologic conditions was recognized by the American Academy of Neurology (AAN) Ethics and Humanities Subcommittee. The gaps in research, education and the ability to deliver adequate PC were then acknowledged by the National Academy of Sciences with their publication of "Approaching death: improving care at the end of life" and most recently, continued goals in improving PC was highlighted by another recent publication "Dying in America: improving quality and honoring individual preferences near the end of life". The complexity of managing neurologic patients brings about challenges and ethical issues in this setting. The aim of this review is to discuss and summarize the challenges and ethical issues in the context of PC management of patients with advanced acute, rapidly progressive, slowly-progressive or degenerative neurological conditions that are commonly encountered in practice.

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5189. Srienc, A., et al. (2018). "Is Electroconvulsive Therapy a Treatment for Depression Following Traumatic Brain Injury?" Innovations in clinical neuroscience **15**(3-4): 43-46.

Traumatic brain injury (TBI) can be caused by blunt or penetrating injury to the head. The pathophysiological evolution of TBI involves complex biochemical and genetic changes. Common sequelae of TBI include seizures and psychiatric disorders, particularly depression. In considering pharmacologic interventions for treating post-TBI depression, it is important to remember that TBI patients have a higher risk of seizures; therefore, the benefits of prescribing medications that lower the seizure threshold need to be weighed against the risk of seizures. When post-TBI depression is refractory to pharmacotherapy, electroconvulsive therapy (ECT) could provide an alternative therapeutic strategy. Data remain sparse on using ECT in this seizure-prone population, but three case reports demonstrated good outcomes. Currently, not enough evidence exists to provide clinical recommendations for using ECT for treating post-TBI depression, and more research is needed to generate guidelines on how best to treat depression in TBI patients. However, the preliminary data on using ECT in patients with TBI are promising. If proven safe, ECT could be a powerful tool to treat post-TBI depression.

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5190. Srihawan, C., et al. (2016). "Clinical Characteristics and Predictors of Adverse Outcome in Adult and Pediatric Patients With Healthcare-Associated Ventriculitis and Meningitis." Open forum infectious diseases **3**(2): ofw077.

Background. Healthcare-associated meningitis or ventriculitis is a serious and life-threatening complication of invasive neurosurgical procedures or penetrating head trauma. Methods. We performed a retrospective study of adults and children with the diagnosis of healthcare-associated meningitis or ventriculitis, as defined by the 2015 Centers of

Disease Control and Prevention case definition, at 2 large tertiary care hospitals in Houston, Texas from July 2003 to November 2014. Patients were identified by infection control practitioners and by screening cerebrospinal fluid samples sent to the central laboratory. We collected data on demographics, clinical presentations, laboratory results, imaging studies, treatments, and outcomes. Results . A total of 215 patients were included (166 adults and 49 children). A positive cerebrospinal fluid culture was seen in 106 (49%) patients, with the majority of the etiologies being Staphylococcus and Gram-negative rods. An adverse clinical outcome was seen in 167 patients (77.7%) and was defined as death in 20 patients (9.3%), persistent vegetative state in 31 patients (14.4%), severe disability in 77 patients (35.8%), or moderate disability in 39 patients (18.1%). On logistic regression analysis, age >45 years (adjusted odds ratio [OR], 6.47; 95% confidence interval [CI], 2.31-18.11; P <= .001), abnormal neurological exam (adjusted OR, 3.04; 95% CI, 1.27-7.29; P = .013), and mechanical ventilation (adjusted OR, 5.34; 95% CI, 1.51-18.92; P = .01) were associated with an adverse outcome. Conclusions . Healthcare-associated meningitis or ventriculitis is associated with significant morbidity and mortality.

5191. Srihawan, C., et al. (2017). "Healthcare-Associated Meningitis or Ventriculitis in Older Adults." Journal of the American Geriatrics Society **65**(12): 2646-2650.

BACKGROUND/OBJECTIVES: Healthcare-associated meningitis or ventriculitis (HCAMV) is a serious and life-threatening complication of invasive neurosurgical procedures or penetrating head trauma. Older adults are at higher risk of adverse outcomes in community-acquired meningitis but studies of HCAMV are lacking. Therefore, we perform the study to define the differences in clinical outcomes between older and younger adults with HCAMV., DESIGN: Retrospective study., SETTING: A large tertiary care hospital in Houston, Texas, from July 2003 to November 2014., PARTICIPANTS: Adults with a diagnosis of HCAMV (N = 160) aged >=65 (n = 35), aged 18-64 (n = 125)., MEASUREMENTS: Demographic characteristics, clinical presentation, laboratory results, treatments, and outcomes (Glasgow Outcome Scale)., RESULTS: Older adults had more comorbidities and CSF abnormalities [pleocytosis, high cerebrospinal fluid (CSF) protein, low CSF glucose) and were more likely to have altered mental status than younger adults (P < .05). An adverse clinical outcome was seen in 142 participants (89%) (death (n = 18, 11%), persistent vegetative state (n = 26, 16%), severe disability (n = 68, 43%), moderate disability (n = 30, 19%). There was no difference in adverse outcomes between older (97%) and younger (86%) adults (P = .13). On logistic regression analysis, abnormal neurological examination (adjusted odds ratio (aOR) = 7.13, 95% confidence interval (CI) = 2.15-23.63, P = .001) and mechanical ventilation (aOR = 11.03, 95% CI = 1.35-90.51, P = .02) were associated with adverse clinical outcomes., CONCLUSION: Older adults with HCAMV have more comorbidities and CSF abnormalities and are more likely to have altered mental status than younger adults but have similar high rates of adverse clinical outcomes.

5192. Srinivasan, H., et al. (2020). "Transorbital Penetrating Brain Injury by a Knife: A Neurological Singularity." Neurology India **68**(4): 937-938.

5193. Sri-Pathmanathan, R. (1990). "The mobile X-ray image intensifier unit in maxillofacial surgery." The British journal of oral & maxillofacial surgery **28**(3): 203-206.

The removal of foreign bodies in the maxillofacial region is often a tedious and time consuming process. The image intensifier, which is a standard piece of hospital equipment, facilitates and expedites this surgical procedure and minimises disfigurement. In addition the image intensifier can be useful in the surgical treatment of maxillofacial trauma. Some applications of such use are illustrated with clinical examples. The use of the image intensifier is presented highlighting the advantages to both patient and clinician in the reduction of radiation exposure, cost effectiveness and saving of time in maxillofacial surgical work.

5194. Srirangam, R., et al. (2012). "Unusual intraorbital foreign body." BMJ case reports **2012**.

A case of a 41-year-old patient presenting late post-trauma with out any major signs or symptoms is presented herewith. On radiological investigation, a peculiar foreign body was identified in the orbital floor. To our surprise the point of entry of the foreign body was not proportionate with the size of it. Moreover, the trajectory and final location of foreign body did not concur with the symptom less presentation of patient. After what was thought to be adequate

investigation, the patient was taken under general anaesthesia to reveal an additional foreign body that put most of the preoperative queries to rest. This case in retrospect emphasises the need for ruling out foreign body in the case of any penetrating injury of orbit with the help of not just radiographs and CT scans but also ultrasonography and MRI.

5195. Srivastava, A. K. and C. S. Cox (2018). Traumatic brain injury. **139:** 1-14.

Traumatic brain injury (TBI) is a common, complex, and costly condition. It is a multidimensional and highly complex condition and an important cause of disability and mortality all around the world. To date, there are no effective treatments available that are able to mitigate subacute injuries and improve long-term functional recovery in TBI. A major reason that several experimental treatments for TBI have failed in the past is the appreciation that TBI is not a single acute event but chronic and progressive tissue damage. Better understanding of the anatomy and pathophysiology of brain injuries, new biomarkers, advanced neuroimaging, and the reorganization of trauma systems have led to a significant reduction in deaths and disability resulting from TBI. In this chapter, we discuss the pathophysiology, classification, clinical presentation, and diagnosis of this condition.

5196. Stack, B. C., Jr. and J. B. Farrior (1995). "Missile injuries to the temporal bone." Southern medical journal **88**(1): 72-78.

Gunshot injuries to the head and neck are frequently seen in patients brought to a level I trauma center. These injuries result in great morbidity and mortality and a significant expenditure of health care dollars. Missile injuries to the temporal bone, though less common, can likewise be devastating. Common sequelae include vertigo, deafness, facial nerve paralysis, and death. A series of missile injuries to the temporal bone treated at Tampa General Hospital during 1993 prompted a review of head and neck missile injuries in our trauma registry over the past 4 years (1989 to 1993). More than 100 patients were shot in the head or neck; 25 of them had injury to the temporal bone. Outcomes included facial nerve injury (8), deafness (9), vertigo (3), and death (13).

5197. Stack, S. and I. Wasserman (2008). "Social and racial correlates of Russian roulette." Suicide & life-threatening behavior **38**(4): 436-441.

The epidemiology of a neglected form of suicidal behavior, Russian roulette, is addressed. Also tested is an explanation of racial differences based on the opportunity theory of deviant behavior related to the availability of revolvers, necessary weapons with which to play Russian roulette. Data refer to 15 cases of Russian roulette found through a search of the medical examiner's suicide files (N = 1,412) and 75 matched controls who suicided by a gunshot to the head. The results support an opportunity perspective: 80% of the Russian roulette victims were African American compared to 30.7% of the controls. Further, among the controls, Blacks were three times more likely than Whites to use revolvers in suicides, a pattern indicating Blacks' greater access to revolvers. Russian roulette victims were entirely male, significantly younger, and less apt to be married than the control group.

5198. Stajcic, Z. and V. Konstantinovic (1997). "Galeal skin island flap in the reconstruction of scalp defects caused by missile injuries." International journal of oral and maxillofacial surgery **26**(5): 331-335.

The use of the galeal skin island flap pedicled either on the superficial temporal or occipital vessels for coverage of scalp defects following neurosurgical treatment of cranial missile injuries, is presented. This technique was applied in seven consecutive patients. The defect was closed in all patients, however, only in three without complications. Indications, advantages and disadvantages of the treatment described are discussed.

5199. Stalder, M. W., et al. (2013). "Versatility of subscapular chimeric free flaps in the secondary reconstruction of composite posttraumatic defects of the upper face." Craniomaxillofacial Trauma and Reconstruction **8**(1): 42-49.

High energy injuries to the upper face present challenging reconstructive problems. In some cases, initial reconstructive efforts result in unfavorable outcomes that require secondary intervention. Chimeric free flaps based on the subscapular system offer the tissue components and volume needed for these complex reconstructions. This is a series of five patients who underwent secondary reconstruction of the middle and upper face following traumatic injury. Mechanism of injury, prior attempts at reconstruction, and characteristics of the tissue defects and the flaps used in

their reconstruction are described. Two patients were female and three were male. Three injuries resulted from gunshot wounds, and two from motor vehicle accidents. All patients had multiple prior failed attempts at reconstruction using local/regional tissue. Defects included symptomatic oronasal or oro-orbital fistulas, enophthalmos, and forehead contour deformities. Two of the flaps used included scapular bone and latissimus muscular components, and three included scapular bone and thoracodorsal artery perforator-based skin paddle components. All free tissue transfers were successful, and no patients suffered significant complications. Chimeric free flaps based on the subscapular system offer a valuable secondary strategy for reconstruction of composite defects of the upper face when other options have been exhausted through previous efforts.

5200. Stallmeyer, M. J. B., et al. (2006). "Imaging of traumatic neurovascular injury." Radiologic clinics of North America **44**(1): 13-vii.

Traumatic injury to the major vessels of the head and neck can result in potentially devastating neurologic sequelae. Until recently, conventional angiography was the primary imaging modality used to evaluate these often challenging patients. Advances in cross-sectional imaging have improved the ability to screen for these lesions, which have been found to be more common than previously thought; however, accepted protocols of imaging evaluation have not yet been fully established. This article presents a general approach to the patient with suspected neurovascular injury. This includes a discussion of the histopathologic spectrum, clinical presentation, mechanisms, radiologic work-up, pertinent issues of the most common lesions, and some of the endovascular techniques used in their management.

5201. Stanbouly, D. and S. K. Chuang (2022). "What Factors Influence the Hospitalization of Self-Inflicted Craniomaxillofacial Gunshot Wounds?" Craniomaxillofacial Trauma and Reconstruction.

Study Design and Objectives: The purpose of this retrospective cohort study is to compare the hospitalization outcomes of managing maxillofacial trauma attempted suicide among handguns, shotguns, and hunting rifles. Materials and Methods: The following retrospective cohort study was competed using data from the Nationwide Inpatient Sample a database from the Healthcare Cost and Utilization Project (HCUP). The primary predictor variable was the type of firearm. The outcome variables were the hospital charges (U.S. dollars) and length of stay (days). We used SPSS version 25 for Mac (IBM Corp., Armonk, NY, USA) to conduct all statistical analyses. Results: A final sample of 223 patients was statistically analyzed. Relative to patients within the Q2 median household income quartile, patients in the Q4 median household income quartile added +$ 172’609 (P <.05) in hospital charges. Relative to patients living in “central” counties of metro areas, patients in micropolitan counties added +13.18 days (P <.05) to the length of stay. Relative to patients in the Q2 median household income quartile, patients in Q3 added +9.54 days (P <.05) while patients in Q4 added +11.49 days (P <.05) to the length of stay. Conclusions: Being within the highest income quartile was associated with increased hospital charges. Patients living in micropolitan counties have prolonged hospitalization relative to patients in metropolitan counties. Relative to the second income quartile, length of stay was higher in the third income quartile and highest in the fourth income quartile. Increase income grants access to deadlier firearms.

5202. Stanec, Z., et al. (1993). "High-energy war wounds: flap reconstruction." Annals of plastic surgery **31**(2): 97-102.

In this article, we emphasize that knowledge of terminal ballistics is essential for understanding the pathophysiology of war wounds. We present our own experiences in treatment of high-energy war wounds in 75 patients treated in the Institute of Plastic and Reconstructive Surgery, Department of Surgery, Clinical Hospital Center in Zagreb. Patients were divided into three groups with regard to the time of definite reconstruction, using local or free microvascular flaps. About 12% of patients underwent flap reconstruction in the acute phase, associated with low complication rate and the shortest hospital stay. Group II was comprised by 18% of the patients and, considering the number of complications, presented the most unfavorable time for reconstruction. Flap reconstruction in the chronic phase resulted in a substantial prolongation of the hospital stay in 82% of patients. Therefore, we advocate proper primary treatment of wounds aimed at early flap closure. This type of management results in a significantly shorter hospitalization and leads to more effective rehabilitation and recovery of patients.

5203. Stanitsas, L., et al. (2016). "If the initial head CT of a trauma patient on antithrombotics is negative, is a second ct necessary?" Critical care medicine. Conference: 46th critical care congress of the society of critical care medicine, SCCM **44**(12 Supplement 1): 466.

Learning Objectives: Studies have indicated delayed intracranial bleeding in patients on chronic oral antithrombotic agents. However, there is a lack of literature addressing aspirin. Few studies have addressed the need for a repeat head computed tomography (CT) after an initial negative head CT in patients on antithrombotics. We hypothesized that patients taking antithrombotics with an initial negative head CT would not have a delayed ICH on a repeated head CT. Methods: Data were retrospectively collected from the trauma registry and electronic medical records at a level 1 trauma center. Patients were included if: seen by Trauma Services 7/1/14-12/31/14, had a blunt mechanism of injury, were taking antithrombotics, and had evidence of cranial/facial injury with a negative initial head CT. Patients were excluded if they were <18 years old or had penetrating head trauma. Results: Seventy-one patients were included. The average age was 77.4 years, ISS 6.7, and GCS 14.6. Mechanism of injury was falls, 80.3%, vehicular 18.3%, and 1.4% other. Twenty-one patients were on warfarin, 10 clopidogrel, 30 aspirin, 3 apixaban, 1 dabigatran, and 6 dual therapy. Seven patients died (1 apixaban, 3 warfarin, 2 aspirin, 1 dual) from other injuries/ co-morbidities. Older patients were more likely to die compared to younger (p=0.009). No patients demonstrated a delayed bleed on a repeat head CT. Conclusions: Patients prescribed antithrombotic agents with evidence of cranial/ facial injury and an initial negative head CT did not demonstrate a delayed bleed on repeated head CT. Discussion will consider implications of this study, but a repeat head CT may not be necessary.

5204. Stanley, R. B., Jr. (1999). "Use of intraoperative computed tomography during repair of orbitozygomatic fractures." Archives of facial plastic surgery **1**(1): 19-24.

OBJECTIVE: To assess the practicality and potential benefits of intraoperative computed tomography using a mobile scanner in the operating room during repair of orbitozygomatic fractures., SETTING: Level I trauma center., DESIGN: Twenty-five patients undergoing open reduction of a unilateral displaced fracture of the zygoma and/or repair of a blow-out fracture of the orbit with cranial bone grafts were placed into a radiolucent head holder and interfaced with the mobile scanner. Spatial vectors were drawn on scans displayed on a computer monitor to allow intraoperative side-to-side comparison of the position of the malar prominences and orbital walls. Corrections of fracture reduction or bone graft position were made as indicated by the comparisons., RESULTS: All scans were accomplished without apparent contamination of the surgical field. Major revisions were performed, based on the scans, in 2 patients whose displaced, comminuted zygoma fractures had been initially reduced with wide exposure of all fracture sites. Minor revisions were performed in 3 patients with displaced but less severely comminuted fractures that had been reduced without exposure of all fracture sites. Bone grafts were repositioned within the orbit in 2 patients with large 2-wall blow-out fractures., CONCLUSIONS: Intraoperative computed tomographic evaluation of the adequacy of repair of orbitozygomatic fractures is feasible with the mobile computed tomographic scanner. The scanner allows correction of discrepancies in position of the malar prominences and orbital walls at the time of acute repair, rather than during costly, more difficult delayed revisions. It may eliminate the need for direct visualization of all fracture sites to ensure adequate reduction in selected cases with displaced, comminuted fractures, thus decreasing operating room time and expense. Further study is required to fully document the cost-effectiveness of this approach to facial fracture management.

5205. Staples, J. A., et al. (2016). "The application of IMPACT prognostic models to elderly adults with traumatic brain injury: A population-based observational cohort study." Brain injury **30**(7): 899-907.

OBJECTIVE: To examine the performance of the International Mission for Prognosis and Clinical Trial Design in Traumatic Brain Injury (IMPACT) prognostic models in older patients., METHODS: Using data from the National Study on Costs and Outcomes of Trauma (NSCOT), this study identified adult patients presenting to US hospitals in 2001 and 2002 with non-penetrating moderate or severe traumatic brain injury (GCS <= 12). IMPACT model calibration and discrimination in the older stratum (65-84 years) was compared to that in the younger stratum (18-64 years)., RESULTS: IMPACT model discrimination did not differ significantly between the older (n = 202; weighted n = 268) and younger strata (n = 613; weighted n = 1632) and was generally adequate (c-statistic for the core-death model = 0.81 [0.77-0.84] vs 0.75 [0.66-0.84], respectively; p = 0.26). IMPACT model calibration was poor for both older and younger strata (Hosmer-Lemeshow p-value for the core-death model = 0.01 vs < 0.0001, respectively). Pre-specified qualitative graphical evaluation suggested substantial under-prediction of mortality in the oldest decades of life, but not among

younger patients., CONCLUSIONS: The examined IMPACT prognostic models demonstrated adequate discrimination and poor calibration in both older and younger patients, yet particular caution may be required when applying these models to the elderly.

5206. Starchenko, A. A., et al. (1994). "[The immune reactions of the cerebrospinal fluid in victims of gunshot wounds of the skull and brain in relation to the treatment procedure and outcome]." Immunnye reaktsii tserebrospinal'noi zhidkosti u postradavshikh s ognestrel'nymi raneniiami cherepa i golovnogo mozga v zavisimosti ot taktiki i iskhoda lecheniia.(1): 23-26.

The paper shows the formation of immunopathological syndromes in the cerebrospinal fluid in the victims with gunshot wounds in relation to the policy and outcome of treatment. Suturing the dura mater during a primary surgical treatment should be regarded as a protective process to limit antigen release, the development of immunological paralysis and autoimmunization. Deaths are caused by the neurogenic immune dysfunction induced by the inadequate functioning of the psychoneuroimmunoendocrine connections of the whole body.

5207. Starnes, B. W. and Z. M. Arthurs (2006). "Endovascular management of vascular trauma." Perspectives in vascular surgery and endovascular therapy **18**(2): 114-129.

Over the past several decades, catheter-based and endovascular techniques have been used with increasing frequency for the management of trauma. This is particularly true for the management of solid organ injury and vascular injuries resulting from pelvic fracture with the use of embolization techniques for successful arrest of active hemorrhage. Likewise, there is a large body of literature regarding the management of acute traumatic vascular injuries involving traditional open surgical techniques. Currently, however, there is sparse literature on the management of vascular trauma with endovascular techniques. The endovascular management of vascular trauma seems particularly appealing in the management of blunt truncal injuries, especially in the setting of severe concomitant brain and lung injury. Extremity and neck injuries are probably best handled by traditional methods of surgical proximal and distal control, the exception to this being base of skull injuries where there is no ability for distal vessel control, and "watershed" areas between the trunk and extremities where proximal vascular control can be quite difficult. This chapter reviews current literature with regard to the endovascular management of traumatic vascular injuries with regions being broadly defined as neck, trunk, and extremity.

5208. Starosta, A. J., et al. (2021). "Scoping Review of Opioid Use After Traumatic Brain Injury." The Journal of head trauma rehabilitation **36**(5): 310-327.

OBJECTIVE: To summarize the current literature to identify what research has been conducted, examine the approaches used, and determine what is presently known about prescription and nonprescription opioid receipts and use among individuals with traumatic brain injury (TBI)., DATA SOURCES: The search strategy included the following: opioid; opiate; analgesics, opioid; opiate alkaloids; or opioid-related disorders; AND brain injury; brain injuries; brain injuries, traumatic; head injury; head injuries; head injuries, closed; head injuries, penetrating; brain concussion; diffuse axonal injury; diffuse axonal injuries; brain trauma/s; head trauma/s; concussion; craniocerebral trauma/s; or TBI. Filters included English and Adults (19+ years). Study Selection: Inclusion: English language, adults with stable TBI, and prescription opioid receipt or use after TBI. Exclusion: Animal models, populations with other acquired brain injury, acute TBI management, and non-peer-reviewed articles, theses, or conference abstracts. Multiple reviewers screened abstracts and full-text articles for eligibility. In total, 771 abstracts were screened, 183 full texts were reviewed, and 21 met eligibility criteria. Data Extraction: Relevant content was independently extracted by multiple observers, including authors, design, sample identification and data source/s, TBI severity, TBI assessment, opioid assessment, study population (demographics, N), military affiliation, comparison groups, date of data collection, and summary of findings., RESULTS: Studies were published between 1987 and 2019; most data were collected prior to 2015. The majority utilized administrative and electronic medical record data from the Department of Veterans Affairs and retrospective cohort designs, and most focused on prescription opioids. There were no studies evaluating interventions to reduce use of opioids in TBI populations. Preliminary findings suggest that prescription opioid receipt is strongly related to psychological symptoms, including comorbid depression, anxiety, and posttraumatic stress disorder., CONCLUSIONS: Despite increased awareness of opioid receipt and use following TBI, there is limited investigation on the examination of

this issue. Future studies should include more varied patient populations as well as evaluate interventions to reduce opioid use following TBI.

5209. Starr, M. R., et al. (2018). "String Technique for Anterior Orbital Fish Hook Removal." Ophthalmic plastic and reconstructive surgery **34**(4): e136-e137.

Removing fish hooks is a common procedure performed by many emergency department providers. There are several techniques that are commonly employed to aid in successful removal. However, when a fish hook becomes embedded within the orbit, there are limited options as to avoid damaging vital surrounding structures. The authors report the removal of a fish hook within the anterior orbit using the string technique in a 25-year-old patient. The procedure was performed under general anesthesia with the aid of size 5 polyglactin suture wrapped around the hook. The procedure itself took less than 10 seconds and was successful in swiftly and safely removing the hook without damaging surrounding orbital structures. The patient recovered well without any permanent sequelae.

5210. Stavrakas, M. and D. Rachovitsas (2017). "Splinting the external auditory canal." Trauma (United Kingdom) **19**(3): 228.

5211. Staworn, D., et al. (1994). "Brain death in pediatric intensive care unit patients: incidence, primary diagnosis, and the clinical occurrence of Turner's triad." Critical care medicine **22**(8): 1301-1305.

OBJECTIVES: To determine the incidence and characteristics of children with brain death in the pediatric intensive care unit (ICU), and to assess the incidence of the clinical triad (Turner's triad) of central diabetes insipidus, low glucose demand, and low CO2 production., DESIGN: Retrospective review of medical records., SETTING: Two multidisciplinary pediatric ICUs., PATIENTS: Medical records of pediatric patients declared brain dead and admitted to two multidisciplinary pediatric ICUs., MEASUREMENTS AND MAIN RESULTS: Patient records were reviewed for demographic data, primary diagnosis, severity of illness (Pediatric Risk of Mortality score and calculated risk of mortality), methods by which brain-death diagnosis was determined, presence of central diabetes insipidus, low glucose demand, low CO2 production in the final 24 hrs before the diagnosis was made, and whether organ donation was accomplished. The incidence of brain death among all patients admitted to the pediatric ICUs was 0.9%, accounting for 11% of patients who died during the same period. The most common presentation leading to brain-death diagnoses was trauma, followed by drowning/near drowning, and meningitis. The majority of brain-death diagnoses were made using both clinical criteria and confirmatory tests (66%). The incidence of clinical signs of Turner's triad was 41% for central diabetes insipidus, 49% for low glucose demand, and 53% for low CO2 production. Two of the three features were present in 38% of patients, and 12% of the patients had all three features., CONCLUSIONS: Our series of brain-dead patients in the pediatric ICU showed a 0.9% incidence of brain death. The most common primary diagnosis was trauma, a finding that is similar to other series. We also demonstrated that the clinical triad (Turner's triad) is present in this patient population, although only 12% of study patients demonstrated all three features.

5212. Steel, B. J., et al. (2022). "A 10-year study of penetrating head and neck injury by assault in the North East of England." Oral and maxillofacial surgery **26**(2): 213-222.

INTRODUCTION: Assaults inflicting penetrating head and neck trauma have potential for serious morbidity or mortality. This paper studies in-depth all cases treated at a level one trauma centre in the North East of England over 10 years., METHODS: All patients assaulted with sharp implements to the head and neck treated from 2010 to 2019 were identified using clinical codes., RESULTS: Retrospective data collection were as follows: 214 patients identified (189 male, 25 female). Average age was 31.5 years (range 3-80). The majority presented between 20:00 and 05:00. Knives were the commonest weapon. Fifty-two had scalp, 137 face and 69 neck injuries. Forty-eight percent had additional non-head and neck injuries. Eighty-six percent required admission, 16.6% to intensive care. Oral and maxillofacial and plastic surgeons provided most treatment. One hundred two required treatment under general and 96 local anaesthetic. Sixteen patients had significant vascular injury, 1 brachial plexus injury, 4 facial nerve injuries (of which 3 repaired) and one required parotid duct repair. Mean length of stay was 3.7 days. No mortality was recorded. Incidence significantly increased from 2010 to 2019., CONCLUSIONS: Head and neck penetrating injuries occur frequently, often with other injuries and mainly in young males. Incidence of significant vascular or nerve injury was low. This study provides

important data for those planning trauma services. Copyright © 2021. The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature.

5213. Steen, T., et al. (2015). "Intracranial Injuries from Dog Bites in Children." Pediatric neurosurgery **50**(4): 187-195.

BACKGROUND/AIMS: Infants are especially at risk for intracranial injuries from dog bites due to their small stature and thin skull. Only 21 case reports have been published in the literature. We aim to add knowledge and treatment recommendations based on a more substantial sample., METHODS: Ten pediatric patients with a penetrating skull injury as a result of a dog bite, treated at our institution between 1992 and 2010, were identified and analyzed descriptively. A literature review of the 21 case reports was also conducted., RESULTS AND CONCLUSION: Early diagnosis and treatment can prevent complications from hemorrhage or infections. Based on our results, we recommend obtaining a head CT for all victims sustaining injuries to the head, early use of broad spectrum antibiotics, debridement and irrigation of tissue, and follow-up to identify late infectious complications. Copyright © 2015 S. Karger AG, Basel.

5214. Steenburg, S. D. and C. W. Sliker (2012). "Craniofacial gunshot injuries: an unrecognised risk factor for blunt cervical vascular injuries?" European radiology **22**(9): 1837-1843.

OBJECTIVES: To review our institutional experience with cervical arterial injuries remote from the penetrating tract seen in the setting of craniofacial gunshot injuries., METHODS: Institutional Review Board approval was obtained. Our institutional trauma registry was queried over a 5-year period for patients with cervical arterial injuries due to penetrating craniofacial gunshot wounds who underwent CT angiography. Imaging results and clinical notes were reviewed., RESULTS: A total of 427 patients sustained gunshot wounds to the head, face and/or neck, of whom 222 underwent CT angiography yielding 56 patients with 78 vascular injuries. There were five internal carotid artery injuries remote from the wound tract. The incidence of these "indirect" cervical arterial injuries in our patient population was 1.2%, or 2.8% of patients who underwent CT angiography., CONCLUSIONS: The incidence of "indirect" cervical arterial injuries with craniofacial gunshot wounds is comparable to or slightly higher than those seen in pure blunt trauma. Screening patients with craniofacial gunshot injuries with CT angiography may yield unexpected cervical vascular injuries remote from the penetrating tract. The significance and optimal therapy of these injuries are unknown. Additional experience will be needed to determine the significance of "indirect" cervical arterial injuries in the setting of craniofacial gunshot wounds.

5215. Stein, D. G., et al. (2008). "Does progesterone have neuroprotective properties?" Annals of emergency medicine **51**(2): 164-172.

In this article, we review published preclinical and epidemiologic studies that examine progesterone's role in the central nervous system. Its effects on the reproductive and endocrine systems are well known, but a large and growing body of evidence, including a recently published pilot clinical trial, indicates that the hormone also exerts neuroprotective effects on the central nervous system. We now know that it is produced in the brain, for the brain, by neurons and glial cells in the central and peripheral nervous system of both male and female individuals. Laboratories around the world have reported that administering relatively large doses of progesterone during the first few hours to days after injury significantly limits central nervous system damage, reduces loss of neural tissue, and improves functional recovery. Although the research published to date has focused primarily on progesterone's effects on blunt traumatic brain injury, there is evidence that the hormone affords protection from several forms of acute central nervous system injury, including penetrating brain trauma, stroke, anoxic brain injury, and spinal cord injury. Progesterone appears to exert its protective effects by protecting or rebuilding the blood-brain barrier, decreasing development of cerebral edema, down-regulating the inflammatory cascade, and limiting cellular necrosis and apoptosis. All are plausible mechanisms of neuroprotection.

5216. Stein, K. M., et al. (2000). "Detection of gunshot residues in routine CTs." International journal of legal medicine **114**(1-2): 15-18.

The forensic assessment of non-fatal gunshot wounds often proves to be difficult as wounds have usually been cleaned and protected with a sterile bandage by the time of the examination. The aim of our investigation was to test the possible application of computed tomography (CT) for the forensic assessment. Doing so raised the questions

whether gunshot residues in the soft tissues, detected by means of 3-dimensional CT, can be used as evidence of a close-range shot and whether conclusions can be drawn pertaining to the range of the shot or the type of bullet used based on the distribution of the radiologically detectable material? In this experimental study 39 shots were fired at fresh pig skin and it was possible to distinguish shots fired from distances of more than 10 cm and contact shots independent of the type of bullet. For unjacketed lead bullets, radiopaque material could be seen in the depth of the entrance would for firing distances up to 10 cm. In individual cases, CT data and the 3-D reconstruction could provide valuable information in the forensic assessment of patients with gunshot wounds.

5217. Steinbruner, D., et al. (2007). "Intracranial placement of a nasopharyngeal airway in a gun shot victim." Emergency medicine journal : EMJ **24**(4): 311.

5218. Steiner, M., et al. (1997). "Myositis ossificans traumatica of the masseter muscle: review of the literature and report of two additional cases." Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics **84**(6): 703-707.

Myositis ossificans traumatica of the masseter muscle is uncommon. The condition is benign and results in reactive heterotopic bone formation, usually producing limitation of opening of the jaws. Radiographic and microscopic examination can confirm the diagnosis. Treatment of myositis ossificans traumatica of the masseter muscle is surgical, with other modalities used when occurring in other muscles of the body.

5219. Steinfath, M., et al. (1994). "[Implications of concomitant therapy with psychotropic drugs in emergency care. Discussion of current literature with reference to a case report]." Bedeutung einer bestehenden Therapie mit psychotropen Pharmaka in der Notfallversorgung. Diskussion der aktuellen Literatur anhand eines Fallberichts. **29**(3): 180-183.

This case report deals with an acute psychotic suicidal patient who stabbed two nail-scissors straight into his eyes. The extent of the trauma was unknown primarily during emergency treatment, and an intracranial trauma had to be considered. Furthermore, there was no information on the patient's history including medical therapy or abuse of psychotropic drugs like monoamine oxidase inhibitors, tri- or tetracyclic antidepressants, neuroleptic agents, or lithium salts which could have consequences for subsequent drug administration. The emergency aid management of psychotic patients with the possibility of both an intracranial trauma and an existing psychotropic drug therapy is discussed in this case report.

5220. Steinsvag, S. (2005). "[Penetrating injuries in the head and neck region]." Penetrerende skader i hode- og halsomradet. **125**(17): 2369.

5221. Stendel, R., et al. (1997). "The relationship between cortical injury and brain tumour. Report of two cases and review of the literature." Acta neurochirurgica **139**(3): 208-214.

We report on two cases of brain tumour and discuss the possible relationship to previous cortical trauma. The first patient, a 67-year-old male patient developed a glioblastoma at the same site of an open shell-splinter injury of the brain after a latency of 48 years. The second patient, a 55-year-old male, had a malignant anaplastic astrocytoma in the right frontal lobe 10 years after clipping of an aneurysm of the anterior communicating artery. Both cases fulfill the criteria of Zulch [52] for the correlation between cortical trauma and tumour. We believe that the development of a brain tumour following a cortical injury is very rare, although possible. Probably the brain must display some form of predisposing genetic alteration for a tumour to develop following a cortical injury.

5222. Stepaniants, A. B. (2006). "[Potentialities of magnetic resonance imaging and computed tomography in the diagnosis of visual organ injuries]." Vestnik oftalmologii **122**(4): 46-49.

5223. Stephanov, S. (1999). "Severe craniocerebral injury by an axe with good outcome: case report." Swiss surgery = Schweizer Chirurgie = Chirurgie suisse = Chirurgia svizzera **5**(2): 80-82.

We report a young patient who was operated on for a penetrating slow impact craniocerebral injury in the left frontal region caused by an axe. The patient was admitted comatose, with right hemiplegia. The blade of the axe was embedded deeply into his head. A craniectomy was carried out around the axe blade and it was removed easily. The cerebral wound was 6 cm long in horizontal plane and about 7 cm deep. Significant amount of contused and necrotic brain tissue was aspirated. The patient showed an uneventful recovery.

5224. Stephens, F. L., et al. (2010). "Cranioplasty complications following wartime decompressive craniectomy." Neurosurgical focus **28**(5): E3.

OBJECT: In support of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom-Afghanistan (OEF-A), military neurosurgeons in the combat theater are faced with the daunting task of stabilizing patients in such a way as to prevent irreversible neurological injury from cerebral edema while simultaneously allowing for prolonged transport stateside (5000-7000 miles). It is in this setting that decompressive craniectomy has become a mainstay of far-forward neurosurgical management of traumatic brain injury (TBI). As such, institutional experience with cranioplasty at the Walter Reed Army Medical Center (WRAMC) and the National Naval Medical Center (NNMC) has expanded concomitantly. Battlefield blast explosions create cavitary injury zones that often extend beyond the border of the exposed surface wound, and this situation has created unique reconstruction challenges not often seen in civilian TBI. The loss of both soft-tissue and skull base support along with the need for cranial vault reconstruction requires a multidisciplinary approach involving neurosurgery, plastics, oral-maxillofacial surgery, and ophthalmology. With this situation in mind, the authors of this paper endeavored to review the cranial reconstruction complications encountered in these combat-related injuries., METHODS: A retrospective database review was conducted for all soldiers injured in OIF and OEF-A who had undergone decompressive craniectomy with subsequent cranioplasty between April 2002 and October 2008 at the WRAMC and NNMC. During this time, both facilities received a total of 408 OIF/OEF-A patients with severe head injuries; 188 of these patients underwent decompressive craniectomies in the theater before transfer to the US. Criteria for inclusion in this study consisted of either a closed or a penetrating head injury sustained in combat operations, resulting in the performance of a decompressive craniectomy and subsequent cranioplasty at either the WRAMC or NNMC. Excluded from the study were patients for whom primary demographic data could not be verified. Demographic data, indications for craniectomy, as well as preoperative, intraoperative, and postoperative parameters following cranioplasty, were recorded. Perioperative and postoperative complications were also recorded., RESULTS: One hundred eight patients (male/female ratio 107:1) met the inclusion criteria for this study, 93 with a penetrating head injury and 15 with a closed head injury. Explosive blast injury was the predominant mechanism of injury, occurring in 72 patients (67%). The average time that elapsed between injury and cranioplasty was 190 days (range 7-546 days). An overall complication rate of 24% was identified. The prevalence of perioperative infection (12%), seizure (7.4%), and extraaxial hematoma formation (7.4%) was noted. Twelve patients (11%) required prosthetic removal because of either extraaxial hematoma formation or infection. Eight of the 13 cases of infection involved cranioplasties performed between 90 and 270 days from the date of injury ($p = 0.06$)., CONCLUSIONS: This study represents the largest to date in which cranioplasty and its complications have been evaluated in a trauma population that underwent decompressive craniectomy. The overall complication rate of 24% is consistent with rates reported in the literature (16-34%); however, the perioperative infection rate of 12% is higher than the rates reported in other studies. This difference is likely related to aspects of the initial injury pattern-such as skull base injury, orbitofacial fractures, sinus injuries, persistent fluid collection, and CSF leakage-which can predispose these patients to infection.

5225. Stephens, S., et al. (2019). "Traumatic brain injuries in a paediatric neurosurgical unit: A Queensland experience." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **70**: 27-32.

Traumatic brain injury (TBI) is a leading cause of morbidity and mortality in children with a broad injury spectrum and associated continuum in the level of care required. A dearth of data exists regarding children requiring inpatient neurosurgical admission following TBI. A retrospective study of children 0-16years-old admitted to the neurosurgical unit of a level-1 paediatric trauma hospital in Queensland, Australia following TBI was conducted focusing on the demographics, clinical characteristics, and management of these patients to guide those involved in their management, and identify areas for improvement in injury prevention and trauma system management. Over 48months, 671 patients were identified (62.6% male) with median age 5.0years, the majority transferred from

peripheral centres. Falls (47.2%) and traffic accidents (21.5%) were the most common mechanisms. Non-displaced skull fracture was the most common injury. Moderate or severe TBI (GCS 3-12) was seen in 14.8% of whom were more likely to require surgery, intensive care, or suffer polytrauma. Clinically significant TBI, defined as moderate/severe TBI, polytrauma, death, requiring neurosurgery, intensive care admission, intubation, or admission three or more nights was detected in 57.97% with higher rates in transferred patients (62.9%) versus primary presentations (50.6%). Mechanisms involving low kinetic forces especially low-height falls and children with non-surgical pathology were less likely to meet criteria for clinically significant TBI. Opportunity exists to optimise triage and transfer practices within the trauma network to minimise the economic and social implications of over-triage with many children requiring only brief observation.

5226. Stephenson, G. C. and R. M. Gibson (1992). "Fatal penetrating head injury during a game of soccer." Injury **23**(3): 197-198.

5227. Stepien, J., et al. (2004). "[Orbital trauma inflicted by a butcher's knife without any injury of the eyeball]." Uraz oczodolu bez zranienia galki ocznej zadany nozem rzezniczym. **106**(4-5): 664-665.

We present a 25 year old man, who suffered from an apparently serious orbital injury inflicted by a butcher's knife during a fight. The knife perforated the upper lid of the right eye, and than penetrated the orbita along its medial wall into the right maxillary sinus, the ethmoid sinus, finally reaching the left maxillary sinus. The eye bulb, as well as the optic nerve and the muscles remained intact. A major hemorrhage from the nasal cavity, which occurred immediately after the extraction of the knife, was managed successfully by means of anterior and posterior nasal packing. Intranasal synechias developed in the days following the injury, leading to obstruction of the nasal cavities. The synechias were later almost entirely eliminated through appropriate treatment, leaving the patient with practically no complications of this dramatic injury.

5228. Sternbergh, W. C., Jr., et al. (1971). "Bullet within the fourth ventricle. Case report." Journal of neurosurgery **34**(6): 805-807.

5229. Stevens, J. R. and J. Brennan (2016). "Management of Battlefield Injuries to the Skull Base." Journal of Neurological Surgery, Part B: Skull Base **77**(5): 430-438.

High velocity skull base injuries on the battlefield are unique in comparison to most civilian sector trauma. With more than 43,000 United States military personnel injuries during Operations Iraqi Freedom (OIF) and Enduring Freedom (OEF), the most recent conflicts in Iraq and Afghanistan have significantly expanded the understanding of the physiology of modern battlefield trauma and how to appropriately address these injuries. The acute care principles of effective triage, airway management, and hemorrhage control in these injuries can be life saving and are reviewed here. Specific injury patterns and battlefield examples are reviewed as well, with a review of some of the lessons learned while providing care in a deployed setting. Utilization of the knowledge learned in Iraq and Afghanistan, which have improved casualty care of deployed service members, can be used both in future military conflicts and in civilian trauma care.

5230. Stevens, M. R., et al. (1998). "The use of osseointegrated implants in craniofacial trauma." The Journal of cranio-maxillofacial trauma **4**(1): 27-34.

The objective in treating patients with injuries sustained in craniofacial trauma is to reinstate preinjury facial projection and function. The capability of providing spatially related facial reconstruction is predicated on basic craniofacial surgical principles, generally accepted as the standard of care. These principles include early surgical intervention, immediate bone grafting, and the use of internal rigid fixation. The introduction of osseointegrated dental implants has significantly improved the overall reconstruction of patients with cranio-maxillofacial injuries, including soft tissue repair and cosmetic surgery. The purpose of this article is to review the utilization of dental implants in the context of maxillofacial trauma, using three cases to document the clinical procedure.

5231. Stewart, C. M. (1983). "Nursing management of gunshot wounds to the head." Journal of neurosurgical nursing **15**(5): 277-282.

5232. Stiernberg, C. M., et al. (1992). "Gunshot wounds to the head and neck." Archives of otolaryngology--head & neck surgery **118**(6): 592-597.

Gunshot wounds to the head and neck contribute to substantial medical, economic, and social problems in the United States today. The treatment of these patients requires the contemporary head and neck surgeon to be precisely informed in anatomy, wound ballistics, resuscitation, and surgical decision making. Ninety recent cases at the University of Texas Health Science Center affiliated hospitals in Houston were reviewed and are reported. Data show substantial trends in patient demographics and corroborate other reports in the trauma literature. Controversies in patient management continue, but current evidence favors a protocol of selective surgical exploration.

5233. Stievenart, J. L., et al. (1993). "A survey of different high resolution visualization modes of a volumetric object with applications." Surgical and radiologic anatomy : SRA **15**(1): 47-54.

In view of the variety of 3D representation techniques, a clinical study was carried out in order to evaluate their respective usefulness. It appears that a single technique cannot be claimed to be valid for all clinical situations and that a combination of representations brings more relevant information. Among the different techniques a clear delineation must be established between those which allow the accurate definition of landmarks (multiplanar reformation, surface representation), and those which do not (integral shading, reconstructed radiology). The main point is the possibility to recognize anatomical landmarks on these latter modes and to choose oblique cut planes in relation to them. Visualization quality is strongly dependent upon the acquisition protocol which must provide a spatial resolution as isotropic as possible.

5234. Stocchetti, N., et al. (2008). "Bryan Jennett and the field of traumatic brain injury. His intellectual and ethical heritage in neuro-intensive care." Intensive care medicine **34**(10): 1774-1778.

William Bryan Jennett, one of the leading figures in neurosurgery of the twentieth century, has died on 26 January 2008, at the age of 81. He made fundamental contributions to the field of traumatic brain injury (TBI) that still shape diagnosis, management and prognosis worldwide, in the second part of the last century. This paper is meant to gratefully acknowledge his contributions and to reflect on the implications that his work has for neurointensive care today. Starting from his early steps, we tried to highlight his fundamental work on diagnosis of severity in TBI, on rescue, treatment and prognosis of severe TBI. Moreover, his contribution in the definition of vegetative state, minimally conscious state and brain death has been emphasized. The contribution of Professor Bryan Jennett was in fact seminal in many aspects: the application of a common language in brain damage evaluation, where GCS and GOS are now universally employed; a critical approach to TBI diagnosis and treatment, in the search of proven better therapies; a quantitative approach to TBI prognosis, based on large clinical series and appropriate statistics; a strong commitment to the ethical implication of survival after severe injury, including the vegetative status; social responsibility in the diagnosis of brain death and in organ donors procurement. For these reasons, he can be considered one of the leading figures in neurosurgery and neurology of the twentieth century. This paper is meant to gratefully acknowledge his contributions and to reflect on the implications that his work has for neuro-intensive care today.

5235. Stocker, R. and O. Wruhs (1995). "[An unusual case of gunshot wound to the head]." Ein besonderer Fall einer Kopfschussverletzung. **21**(6): 298-302.

We are going to present a special case of head injury caused by a gunshot. In this case it resulted in a fracture of the skull, but the bullet did not penetrate the skull. It was deflected by the bone, leaving the body at an angle. But bone fragments, acting as secondary bullets, penetrated the brain. In spite of a massive cerebral trauma and brain injury, no retrograde amnesia could be diagnosed. The patient recovered to such an extent, that he could return to his former job. Special characteristics of head injuries caused by bullets will be referred to.

5236. Stockhausen, S., et al. (2017). "Homicide-suicide, double suicide or homicide followed by suicide 2 case reports." Archiv fur Kriminologie **239**(3-4): 87-98.

Cases in which several persons who died from an unnatural cause are found together are often difficult. It is necessary to exclude homicide committed by another person and to clarify whether the deaths are the result of a homicide-suicide or a joint suicide of persons wishing to die. Two cases in which couples with gunshot wounds to the head had been found lifeless in their homes are presented. In both cases, the deceased were of advanced ages and suffered from severe pre-existing diseases. Due to the circumstances at the scene, the results of the investigations and the autopsies as well as the suicide notes found, a double suicide was assumed in both cases. The husbands killed themselves after shooting their wives. Based on the presented cases the so-called double suicide and the need for a thorough investigation of the death scene with the problem of differentiating it from homicide-suicide and double homicide are discussed.

5237. Stockmann, P., et al. (2007). "Conventional radiographs: are they still the standard in localization of projectiles?" Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics **104**(4): e71-75.

The penetration of air gun pellets in facial soft tissue can cause major problems during the removal of foreign bodies, although conventional radiography, computed tomography, image-guided surgical removal, and ultrasound have been applied to facilitate the procedure. It was the aim of the present case report to introduce a modified intraoperative method for the localization of air gun pellets, based on the use of radiopaque markers in conventional radiographs. A 66-year-old patient attempted to commit suicide by using an air gun. The pellet hit the right temporal region. A computed tomographic (CT) scan was acquired to localize the foreign body. The first attempt to remove the pellet through the penetrating wound failed. Because of a dislodgement of the pellet, the CT scan could no longer be used for the localization of the air gun pellet. As the air gun pellet was positioned under the zygomatic arch, ultrasound was unable to identify its position. Successful intraoperative localization of the projectile was performed after fixation of radiopaque markers to the skin in the region of the estimated localization, with conventional radiographs in 2 planes, acquired with a mobile dental x-ray device. Although the markers remained attached to the patient as reference makers, the air gun pellet was removed easily. The use of radiopaque markers in conventional radiographs in 2 planes allows fast, intraoperative localization of radiopaque foreign bodies within soft tissue. The procedure can be carried out with a conventional x-ray device that should be available in every oral and maxillofacial practice. The use of reference markers should be considered a standard procedure for the localization of radiopaque foreign bodies in the head and neck.

5238. Stoffel, M., et al. (2009). "Cerebral gunshot wounds: a score based on three clinical parameters to predict the risk of early mortality." ANZ journal of surgery **79**(11): 789-793.

BACKGROUND: To provide a score to predict the risk of early mortality after single craniocerebral gunshot wound (GSW) based on three clinical parameters., METHODS: All patients admitted to Baragwanath Hospital, Johannesburg, South Africa, between October 2000 and May 2005 for an isolated single craniocerebral GSW were retrospectively evaluated for the documentation of (i) blood pressure (BP) on admission; (ii) inspection of the bullet entry and exit site; and (iii) initial consciousness (n= 214)., RESULTS: Conscious GSW victims had an early mortality risk of 8.3%, unconscious patients a more than fourfold higher risk (39.2%). Patients with a systolic BP between 100 and 199 mm Hg had an 18.2% risk of mortality. Hypotension (<100 mm Hg) doubled this risk (37.7%) and severe hypertension (> or =200 mm Hg) was associated with an even higher mortality rate of 57.1%. Patients without brain spilling out of the wound ('non-oozer') exhibited a mortality of 19.7%, whereas it was twice as high (43.3%) in patients with brain spill ('oozer'). By logistic regression, a prognostic index for each variant of the evaluated parameters could be established: non-oozer:0, oozer:1, conscious:0, unconscious:2, 100 < or =RR(sys) < 200 mm Hg:0, RR(sys) < 100 mm Hg:1, RR(sys)>/= 200 mm Hg:2. This resulted in a score (0-5) by which the individual risk of early mortality after GSW can be anticipated., CONCLUSIONS: Three immediately obtainable clinical parameters were evaluated and a score for predicting the risk of early mortality after a single craniocerebral GSW was established.

5239. Stoiber, J., et al. (2002). "[Amniotic membrane transplantation with limbal stem cell transplantation as a combined procedure for corneal surface reconstruction after severe thermal or chemical burns]." Amnion-Limbus-Transplantation zur Oberflachenrekonstruktion nach schwerer Veratzung und Verbrennung. **99**(11): 839-848.

BACKGROUND: Severe thermal and chemical burns may result in limbal deficiency leading to persistent epithelial defects, complete conjunctival epithelial ingrowth and vascularisation of the cornea. If sufficiently severe, these burns may lead to very significant visual impairment. Amniotic membrane transplantation with limbal transplantation has recently been proposed as a new method for corneal surface reconstruction., PATIENTS AND METHODS: A total of 14 patients (age 18-62 years, mean age 42 years) with limbal deficiency resulting from thermal (n=1) or chemical burns (n=13) underwent surgery. The corneal pannus was completely removed and the amniotic membrane was grafted onto the cornea. Limbal transplantation using autografts obtained from contralateral eyes was performed simultaneously in seven cases. Allografts from a donor were transplanted in seven cases with bilateral involvement. These patients received oral cyclosporin A postoperatively. The mean follow-up time was 18 months., RESULTS: In all cases of limbal autografts the corneal surface showed a complete and stable epithelialisation within a few weeks. Out of seven patients with limbal allografts three displayed recurrent epithelial defects in the long term. The initially semitransparent amniotic membrane became more translucent and biomicroscopically invisible within several months after surgery. There was an increase in visual acuity in most cases, limited mostly by irregular astigmatism due to the initial stromal loss., CONCLUSIONS: Amniotic membrane transplantation with limbal transplantation allows reconstruction ocular surfaces severely damaged by chemical or thermal burns. In most cases, however, additional surgical procedures such as lamellar or penetrating keratoplasty are required for adequate visual rehabilitation.

5240. Stokely, M. E. and E. L. Orr (2008). "Acute effects of calvarial damage on dural mast cells, pial vascular permeability, and cerebral cortical histamine levels in rats and mice." Journal of neurotrauma **25**(1): 52-61.

UNLABELLED: Neurological complications after mild head injury can include vasogenic edema and/or subsequent development of epilepsy, conditions associated with elevated histamine. In the present study we assessed the potential of mast cells located in the dura mater to contribute to elevated cortical histamine and breakdown of the blood-brain barrier after minor head injury, modeled by either a parietal craniectomy or producing a groove in (scoring) the parietal bone surface to model a grazing head injury. We measured the following effects at 5-20 min after a unilateral parietal craniectomy (rats) or unilateral scoring of the parietal bone (mice): (1) mast cell integrity in subjacent dura mater; (2) subjacent vs. contralateral histamine in dura mater and cerebral cortex; (3) vascular permeability of cerebral cortical blood vessels subjacent to the injury, and; (4) the effects of an H(2)-receptor antagonist on cerebral cortical vascular permeability., RESULTS: Dural mast cells subjacent to the craniectomy became activated (degranulated) concomitant with (1) decreased histamine in dura mater subjacent to the craniectomy; (2) increased histamine in the subjacent cerebral cortex; and (3) extravasation of Evans blue-albumin which stained the subjacent cerebral cortex, indicating a localized breakdown of the blood-brain barrier. Similar results were observed in mice after scoring the parietal bone surface and, additionally, pretreatment with the histamine H(2)-receptor antagonist zolantadine (1 h before injury) dose-dependently inhibited extravasation of Evans blue-albumin. We conclude that even a minor grazing injury of the skull, in the absence of penetrating brain injury or concussion, can activate dural mast cells and elevate cortical histamine, a novel mechanism with potential contributions to neurotraumatic complications arising from a relatively minor or grazing head wound.

5241. Stone, J. A., et al. (1997). "Gunshot wounds of the brain: Influence of ballistics and predictors of outcome by computed tomography." Emergency radiology **4**(3): 140-149.

Gunshot wounds of the head commonly are encountered in the practice of emergency radiology. Radiologists play a vital role in the initial evaluation of patients who present after a gunshot injury and can guide the neurosurgeon's approach to surgery and the forensic pathologist's collection of evidence. It is useful to understand the ballistics that influence missile course and wound potential for accurate assessment of injury patterns that occur in gunshot wounds to the head. Additionally, it is imperative to recognize important prognostic findings on computed tomographic imaging to ensure optimal management of the patient.

5242. Stone, J. L., et al. (1981). "Traumatic subdural hygroma." Neurosurgery **8**(5): 542-550.

The authors report a series of 80 cases of traumatic subdural hygroma and discuss the clinical and radiological features, management, surgical results, and pathogenesis. Changes in mental status without focal signs of brain damage were noted in over 50% of the cases. A clinical course marked by stabilization without complete recovery of neurological function was found in over 40% of the cases of "simple hygroma." The lumbar cerebrospinal fluid often showed

hemorrhage and elevation of the protein content. Skull fractures were found in 39% of the cases, and subdural hygromas were associated with cerebral atrophy, cortical contusions, subdural hematomas, and overlying epidural hematomas. The characteristic angiographic and computed tomographic scan findings are discussed, as are surgical pathology and outcome. Several theories of pathogenesis are presented. The authors advocate simple burr hole drainage as the treatment of choice. Significant reaccumulation may occur occasionally.

5243. Stone, J. L., et al. (1995). "Demographics of civilian cranial gunshot wounds: devastation related to escalating semiautomatic usage." The Journal of trauma **38**(6): 851-854.

The demographics and outcome of patients with gunshot wounds to the head over the past 10 years at Chicago's Cook County Hospital was examined. The study group consisted of 476 consecutive patients admitted to this urban level I trauma center with a diagnosis of penetrating craniocerebral missile injury. All patients followed a protocol that included aggressive surgical management when indicated. The Glasgow Outcome Score was used to assess outcome. There is an alarming rise in firearm violence in general and craniocerebral injury in particular. Some patients with severe neurologic deficits and massive cerebral damage can benefit from aggressive treatment and make a good recovery. A large proportion of this violence is most likely attributable to gang activity. Factors correlating with poor outcome included hypotension, apnea, bihemispheric injuries, or ventricular penetration. Although aggressive surgical and medical management improves the outcome of these patients, much more stringent preventative measures are required to control this violent epidemic.

5244. Stone, J. L., et al. (1996). "Civilian cases of tangential gunshot wounds to the head." The Journal of trauma **40**(1): 57-60.

A series of 168 civilian cases of tangential gunshot wounds to the head is presented. Neurologic deficits on presentation were generally minimal. Computed tomographic (CT) scans were performed in 51% of patients, and abnormal CT findings were noted in 35% (18% of all patients). Major operative procedures were required in 9% of the patients. Serious sequelae of tangential injuries are described even with patients who initially have no neurologic abnormality. We suggest that a CT scan is warranted in all cases of tangential gunshot wounds to the head.

5245. Story, C., et al. (2016). "A Rare Case of Penetrating Trauma Resulting in Isolated Third Nerve Palsy." Neuro-Ophthalmology **40**(1): 32-36.

A 23-year-old male presented to the emergency department with right eye pain, right upper eyelid ptosis, blurry vision, and binocular diplopia that developed immediately after he bent over in a parking lot and the antenna of a car penetrated his right upper eyelid. An extensive workup was performed, and he was found to have an isolated traumatic oculomotor nerve palsy with pupil involvement. No other ocular findings of a traumatic injury were present. The patient was observed for 14 months, during which he continually improved, with almost complete resolution of his diplopia, anisocoria, and ptosis.

5246. Stosic, S., et al. (2005). "[Microvascular osteoseptocutaneous radial flap in reconstruction of mandible following war injury]." Vojnosanitetski pregled **62**(6): 429-434.

BACKGROUND: Vascularized osteoseptocutaneous radial flap is commonly used in the reconstruction of composite bony and soft tissue defects of the lower third of the face due to the outstanding quality of its cutaneous component. The aim was to evaluate the primary and overall success in the reconstruction of mandibular defects, following war injuries, with vascularized osteoseptocutaneous radial flap., METHODS: At the Department of Maxillofacial Surgery of the Military Medical Academy Belgrade, there were eight patients with this kind of defect following war injury, and the mandible was reconstructed with a vascularized osteoseptocutaneous radial flap. Bony compartment of the graft was harvested as up to 11 cm long segment of radial circumference., RESULTS: The localization and structure of the defect, features of a harvested compound graft, the procedure of the reestablishment of the mandibular continuity was presented as well as immediate and late complications during the consolidation period, and the primary successful reconstruction in 87.5% of the patients., CONCLUSION: The primary and overall success in the mandibular defects reconstruction with a vascularized osteoseptocutaneous radial flap was equal or even better than those presented in the literature on the reconstruction of the similar defects after tumor resections.

5247. Stowsand, D. (1971). "[Unusual head injuries]." Ungewohnliche Kopfverletzungen. **42**: 1643-1646.

5248. Straka, L., et al. (2013). "A planned complex suicide by gunshot and vehicular crash." Forensic science international **228**(1-3): e50-53.

Complex suicide is usually defined as the application of more than one killing mechanism to ensure a fatal outcome. Herein we report an unusual case of a planned complex suicide of a 20 year old-male combining gunshot with coincidental intentional vehicular crash. The case was initially assumed to be a simple traffic accident until a rimfire pistol was found in close proximity to the deceased as well as gunshot wound of the head. This paper demonstrates the importance of careful inspection of the death scene, as well as the complex performance of autopsy examination to explain the manner of death and distinguish accidental deaths from suicides in such cases. Nevertheless, this assessment might by very difficult or even impossible. It has to be assumed that a high number of suicides in road traffic remain undetected.

5249. Strandvik, G., et al. (2020). "Rapidly fatal pneumococcal meningitis following non-penetrating traumatic brain injury." BMJ case reports **13**(2).

A previously healthy young man presented to hospital with severe traumatic brain injury following a motor vehicle collision. Within 24 hours of admission, and despite antibiotic coverage, he developed a fever. On the second day, the source of infection was discovered to be purulent pneumococcal meningitis. At 48 hours post-accident, he developed brain-stem death without evidence of raised intracranial pressure or trans-tentorial herniation. Initial CT scans of the head were essentially normal, but early repeat scans revealed evidence of pneumocephalus and possible frontal bone fracture. Current recommendations do not make room for targeted antibiotic prophylaxis in traumatic brain injury patients with traumatic skull fracture. We argue that our case demonstrates the need for aggressive targeted antibiotic prophylaxis in the presence of certain features such as frontal or sphenoid bone fracture and pneumocephalus.

5250. Strashun, A., et al. (1992). "Reversible increased technetium-99m-HMPAO cerebral cortical activity: a scintigraphic reflection of luxuriant hyperperfusion." Journal of nuclear medicine : official publication, Society of Nuclear Medicine **33**(1): 117-119.

A hemiparetic and aphasic patient, 3 days after acute traumatic transection of the left internal carotid artery requiring life-saving total embolic occlusion, revealed ipsilateral increased peripheral hemispheric 99mTc-HMPAO activity. Ten days postocclusion, HMPAO peripheral cortical flow normalized as hemiparesis and aphasia significantly cleared. The initial lateralized HMPAO hyperactivity pattern may reflect reactive hyperemia, a sign previously identified by contrast angiography and often associated with a better prognosis in evolving CVA. Evanescent peripheral cerebral hyperemia may represent beneficial cortical collateralization of the periinfarct area of a deeper lacunar (white matter) CVA.

5251. Strelzow, V. V. and W. S. Goodman (1978). "Nasoseptal perforation--closure by external septorhinoplasty." The Journal of otolaryngology **7**(1): 43-48.

The successful correction of perforations of the nasal septum is still difficult. This treatment has been greatly facilitated by the use of the external septorhinoplasty, without compromising the airway or causing cosmetic deformity. Supportive autogenous graft material is used routinely and bipedicled mucoperichondrial flaps are used when necessary. Seven consecutive patients have been successfully treated by this method.

5252. Strickland, R. D., et al. (1983). "Phenytoin-induced agranulocytosis after treatment for a gunshot wound to the face." Oral surgery, oral medicine, and oral pathology **56**(5): 500-501.

A case of phenytoin-induced agranulocytosis is presented. This syndrome is characterized by a decrease in the blood neutrophil count to very low levels. Patients are generally asymptomatic, but they may become febrile and develop an infection, which is frequently fatal. Practitioners treating trauma patients or other patients in whom phenytoin treatment is initiated should be aware of the potential development of agranulocytosis.

5253. Strohm, M. and D. Petersen (1987). "[Otogenic extradural pneumatocele, 36 years after a gunshot injury]." Otogene extradurale Pneumatozele, 36 Jahre nach Schussverletzung. **66**(1): 25-29.

In the reported case an extradural pneumatocele developed 36 years after the mastoid tip had been destroyed by a bullet. It had reached the occiput and led to destruction of the bone surrounding its distal end, so that air could be found directly under the galea. In the literature there are only few case reports referring the otogenic origin of a posttraumatic extradural pneumatocele. Furthermore, an overpressure in the middle ear cleft or mastoid could be excluded because of the presence of a tympanic membrane perforation. In spite of a chronically infected middle ear, there was no infection of the pneumatocele.

5254. Strojnik, T. (2004). "A review of civilian gunshot wounds to the head in northeast Slovenia: 1992 to 2002." Wiener klinische Wochenschrift **116 Suppl 2**: 19-23.

BACKGROUND: Surgical management of gunshot wounds to the head has remained a controversial issue. There are considerable regional differences in the causes of civilian gunshot wounds (GSW) to the head and various devices are used in different countries. The aim of our study was to review the demographic factors, treatment and outcome of patients with GSW to the head over the past 10 years at Maribor Teaching Hospital., PATIENTS AND METHODS: Thirty-seven patients with GSW to the head (35 male and 2 female; mean age 43.3 +/- 15.5 years) were included in the study. Clinical and radiological findings are described. Statistical analysis was used to find the effects of all independent variables on mortality and prognostic factors., RESULTS: The great majority (86.5%) of our patients suffered self-inflicted wounds. The weapon used was a stunning device in 54% of cases and a handgun in 46%. Alcohol consumption was documented in 40% patients. Nearly half (48.9%) of our patients were either industrial workers or farmers. Postresuscitation Glasgow Coma Scale (GCS) scores of 3-8 were recorded in 54%. The pupils were fixed and dilated in 32.4% of our patients; hypotension was documented in 8.1% and apnea in 27%. These parameters were significantly correlated with poor outcome. A bihemispheric lesion was found in 37.8%, a transventricular lesion in 54% and a multilobar lesion in 70.3% of patients. Those factors were also associated with poor outcome. The majority of patients (56.8%) underwent operation immediately, in 13.5% the operation was delayed and 29.7% of patients had no surgery. The overall mortality was 51.4%, a poor outcome was noted in 24.3% and a good one was achieved in 24.3%., CONCLUSION: The results of our study support previous ones stating that patients with GSW to the head can benefit from aggressive treatment and still make satisfactory recoveries. Clearly, there are ethical dilemmas involved in withholding operative treatment from any individual. Guidelines dictating when to surgically intervene must be made.

5255. Strub, W. M. and K. L. Weiss (2003). "Self-inflicted transorbital and intracranial injury from eyeglasses." Emergency radiology **10**(2): 109-111.

Orbital injuries are commonly seen in the emergency department, and if they are high-energy they can lead to concomitant intracranial injuries. Plain films, CT, MRI, and ultrasound are used in various combinations to evaluate the extent of these injuries. We describe a unique case of self-inflicted transorbital penetrating intracranial injury from the temporal wire rim of a pair of eyeglasses. Imaging well demonstrates the full course of the wire rim in situ, and pathoanatomic correlates are highlighted.

5256. Struckhoff, G. (1995). "Transforming growth factor beta 1 and parathyroid hormone-related protein control the secretion of dipeptidyl peptidase II by rat astrocytes." Neuroscience letters **189**(2): 117-120.

Meninges synthesize parathyroid hormone-related protein (PTHrP) and transforming growth factor (TGF beta 1). Both factors control the activity of the glial enzyme dipeptidyl peptidase II (DPP II): TGF beta 1 induces the secretion of enzyme activity by cultivated astrocytes in a dose dependent manner. The maximal effect is achieved with a concentration of 10 ng/ml and is dependent on the time of incubation. PTHrP itself has no effect on the release of DPP II

activity but considerably reduces the effect of TGF beta 1. It is assumed that DPP II influences the course of cicatrization after penetrating injuries of the brain and thus, meninges control glial scarring by the release of TGF beta 1 and PTHrP.

5257. Struffert, T., et al. (2003). "[Craniocerebral trauma. 2: Intra-axial injuries, secondary injuries]." Schadel- und Hirntrauma. Teil 2: Intraaxiale Verletzungen, sekundare Verletzungen. **43**(11): 1001-1006.

5258. Strunk, T., et al. (2014). "Infection-induced inflammation and cerebral injury in preterm infants." The Lancet. Infectious diseases **14**(8): 751-762.

Preterm birth and infectious diseases are the most common causes of neonatal and early childhood deaths worldwide. The rates of preterm birth have increased over recent decades and account for 11% of all births worldwide. Preterm infants are at significant risk of severe infection in early life and throughout childhood. Bacteraemia, inflammation, or both during the neonatal period in preterm infants is associated with adverse outcomes, including death, chronic lung disease, and neurodevelopmental impairment. Recent studies suggest that bacteraemia could trigger cerebral injury even without penetration of viable bacteria into the CNS. Here we review available evidence that supports the concept of a strong association between bacteraemia, inflammation, and cerebral injury in preterm infants, with an emphasis on the underlying biological mechanisms, clinical correlates, and translational opportunities.

5259. Stuehmer, C., et al. (2009). "Influence of different types of guns, projectiles, and propellants on patterns of injury to the viscerocranium." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **67**(4): 775-781.

PURPOSE: Gunshot injuries to the oral and craniomaxillofacial region vary with the type of gun used. Computed tomography (CT) is the standard diagnostic tool for assessing tissue damage in patients with gunshot injuries. Cone-beam computed tomography (CBCT) is a new imaging technique that has recently become available for clinical diagnosis. The objective of this study was to characterize injury patterns with a focus on gun types and identify the imaging modality that is best suited to assessing injuries caused by different gun types., PATIENTS AND METHODS: We present the cases of 14 patients who sustained gunshot injuries to the viscerocranium during the past 10 years. The injuries were caused by 8 basic combinations of handguns or long guns with soft lead core projectiles, partial or full metal-jacketed bullets, and different propellants. Diagnosis was based on clinical and radiological findings (including CT and CBCT)., RESULTS: We found a direct correlation between the gun/projectile combination on the one hand and the diameter of the wound track, tissue contamination, and tissue destruction on the other. Entrance and exit wounds are indicative of certain gun/projectile combinations. High-density projectiles cause severe artifacts in CT, unlike CBCT, making it difficult to evaluate anatomic structures in close proximity to the projectile., CONCLUSIONS: Every gun/projectile combination is associated with a typical pattern of injury. Even in the absence of the offending projectile, it is thus possible to narrow down the likely gun and/or projectile. In the diagnostic imaging of injuries caused by high-density projectiles, CBCT is more suitable than CT.

5260. Stuehmer, C., et al. (2008). "Cone beam CT imaging of airgun injuries to the craniomaxillofacial region." International journal of oral and maxillofacial surgery **37**(10): 903-906.

In airgun injuries, the removal of the projectile is often recommended. The material properties of airgun projectiles make it difficult to determine their precise anatomical location using conventional radiological techniques. Conventional X-rays give only a two-dimensional representation of projectiles and do not allow a foreign object to be located precisely. Multi-slice computed tomography (CT) has become a standard tool in diagnosis. Metal objects can cause artefacts in CT scans and make it difficult to identify adjacent anatomical structures. By contrast, cone-beam CT (CBCT) provides three-dimensional images largely free from metal artefacts. The authors present three cases of airgun injuries and discuss the diagnostic and treatment approaches used. CBCT has proved to be a useful diagnostic tool in planning the treatment of craniofacial airgun injuries. It is superior to CT in detecting hard-tissue structural damage in the immediate vicinity of high-density metal projectiles.

5261. Stuehmer, C., et al. (2008). "Intraoperative navigation assisted reconstruction of a maxillo-facial gunshot wound." Oral and maxillofacial surgery **12**(4): 199-203.

INTRODUCTION: This case report describes a suicidal gunshot wound to the head using a handgun (9 x 19 mm). During mandibular penetration, the solid hollow point projectile (Aktion4) was deformed but did not fragment. The mandible, mid-face, orbit, and nasal complex were severely damaged. Here, the authors present, for the first time, a new approach for bilateral mid-facial fractures., MATERIALS AND METHODS: For virtual reconstruction, a naso-orbito-ethmoidal complex of an unaffected skull (same age, sex, and ethnic group) was merged into the computed tomography (CT) data set. Based on this data set, a navigation assisted operation was performed., CONCLUSION: The favorable outcome leads us to recommend the technique of merging comparable CT data for reconstructive planning of bilateral mid-facial fractures.

5262. Sturdivant, N. M., et al. (2016). "Acetazolamide Mitigates Astrocyte Cellular Edema Following Mild Traumatic Brain Injury." Scientific reports **6**: 33330.

Non-penetrating or mild traumatic brain injury (mTBI) is commonly experienced in accidents, the battlefield and in full-contact sports. Astrocyte cellular edema is one of the major factors that leads to high morbidity post-mTBI. Various studies have reported an upregulation of aquaporin-4 (AQP4), a water channel protein, following brain injury. AZA is an antiepileptic drug that has been shown to inhibit AQP4 expression and in this study we investigate the drug as a therapeutic to mitigate the extent of mTBI induced cellular edema. We hypothesized that mTBI-mediated astrocyte dysfunction, initiated by increased intracellular volume, could be reduced when treated with AZA. We tested our hypothesis in a three-dimensional in vitro astrocyte model of mTBI. Samples were subject to no stretch (control) or one high-speed stretch (mTBI) injury. AQP4 expression was significantly increased 24 hours after mTBI. mTBI resulted in a significant increase in the cell swelling within 30 min of mTBI, which was significantly reduced in the presence of AZA. Cell death and expression of S100B was significantly reduced when AZA was added shortly before mTBI stretch. Overall, our data point to occurrence of astrocyte swelling immediately following mTBI, and AZA as a promising treatment to mitigate downstream cellular mortality.

5263. Stuss, D. T. and V. Anderson (2004). "The frontal lobes and theory of mind: developmental concepts from adult focal lesion research." Brain and cognition **55**(1): 69-83.

The primary objective in this paper is to present a framework to understand the structure of consciousness. We argue that consciousness has been difficult to define because there are different kinds of consciousness, hierarchically organized, which need to be differentiated. Our framework is based on evidence from adult focal lesion research. The different types of consciousness are associated with distinct brain regions, with the higher levels of consciousness related to self-awareness and theory of mind (both facets of consciousness), with an emphasis on the role of the frontal lobes. The secondary objective is to use this structure to suggest hypotheses about the potential effect of frontal dysfunction at various developmental stages, and including both congenital and acquired brain injury.

5264. Stylli, S. S., et al. (2000). "Induction of CD44 expression in stab wounds of the brain: long term persistence of CD44 expression." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **7**(2): 137-140.

We studied the expression of the hyaluronan receptor protein CD44 in the mouse brain in response to stab injuries. CD44 expression was strongly activated in the area surrounding the injury within 2 days and then persisted for over 2 months. The expression extended in a direct line the depth of the actual wound inflicted. It appears that CD44 may be involved in the wound healing processes following injury to the brain. Copyright 2000 Harcourt Publishers Ltd.

5265. Su, P., et al. (2021). "Trends in Operative Complex Middle and Upper Maxillofacial Trauma: A 17-Year Study." The Laryngoscope **131**(9): 1985-1989.

OBJECTIVES/HYPOTHESIS: Over 3 million incidents of facial trauma occur each year in the United States. This study aims to determine trends in operative middle and upper maxillofacial trauma in one of the largest US cities., STUDY DESIGN: Retrospective case-control study., METHODS: Retrospective chart review of all operative middle and upper maxillofacial trauma from July 1993 to July 2010 presenting to Los Angeles County Hospital, a Level I Trauma Center. Data included demographics, mechanism of injury, and fracture characteristics., RESULTS: Analysis was

performed for a total of 4,299 patients and 5,549 facial fractures. Mean patient age was 34.6, and most patients were male (88%). Between the two time periods (1993-2001 and 2002-2010), there was a 42% reduction in operative maxillofacial trauma (3,510 to 2,039). Orbital floor and zygomaticomaxillary complex fractures were the most prevalent types of fractures. Panfacial fractures demonstrated the largest reduction in number of fractures (325 to 5, P<0.01). Assault and motor vehicle accidents (MVA) were the two most common mechanisms of injury. Operative fractures due to MVAs decreased (390 to 214, P = .74), whereas fractures due to assault increased (749 to 800, P<0.01). Compared to adults, pediatric facial trauma (age < 18) were caused by a higher percentage of MVAs (27% vs. 13%), auto versus pedestrian (9% vs. 5%), and gunshot wounds (8% vs. 4%) (P<0.01)., CONCLUSIONS: Operative middle and upper maxillofacial trauma decreased over a 17-year period. Assault was the most significant mechanism of trauma overall. These trends suggest that focusing future prevention strategies on curtailing interpersonal violence may more effectively address the burden of facial trauma., LEVEL OF EVIDENCE: 3 Laryngoscope, 131:1985-1989, 2021.

5266. Suarez Pinilla, M. A., et al. (2000). "[Neurologic deficit secondary to shot wound in a hunting accident]." Deficit neurologico secundario a perdigonada por accidente de caza. **200**(12): 697-698.

5267. Subbotin, S. I., et al. (2000). "[The successful treatment of a penetrating gunshot wound of the skull and brain in a child]." Uspeshnoe lechenie ognestrel'nogo pronikaiushchego raneniia cherepa i golovnogo mozga u rebenka.(2): 25-27.

5268. Subke, J., et al. (2001). "[Gunshot reconstructions based on individually parametrical 3-dimensional victim models]." Schussrekonstruktionen anhand individuell parametrisierbarer dreidimensionaler Opfermodelle. **208**(3-4): 72-79.

In cases of lethal firearm injuries computer enhanced anatomical feasibility studies can provide unambiguous clues concerning self-versus extraneous infliction. To this end individualized digital 3-dimensional geometrical models of the victim and the weapon are generated true to scale with the help of the CAD software (POSER Version 4, egi.sys AG). All anatomical data relevant to the motion apparatus and the range of movement as well as the injuries of the individual victim are carefully documented and serve as input parameters for the digital geometrical model. The bullet path is visualized as a cylinder between entrance and exit wound. A series of simulation sequences then can be carried out by the variation of anatomically possible shot positions and the virtual grasp of the weapon. An exact alignment of the firearm's barrel and the bullet path is a reliable statement for the feasibility of self-infliction. In addition to circumstantial evidence the digital reconstruction of the firearm shot admits of unambiguous conclusions about the course of the traumatic event.

5269. Subke, J., et al. (2002). "[Fatal craniocerebral trauma in a young child. I: Forensic documentation, model generation and geometric impact conditions]." Todliches Schadelhirntrauma bei einem Kleinkind. Teil I: Forensische Dokumentation, Modellgenerierung und geometrische Impactbedingungen. **209**(5-6): 147-157.

The aim of forensic biomechanics is the reconstruction of traumatic events based on the pathological findings in the victim's morphology and on the traces and shapes of the traumatizing tools. The introduction of Streifenlichttopometrie into forensic science enables 3-dimensional and proportionally accurate documentation of the victim's body and injuring agent with submillimeter precision. The advantages of this method of documentation are the possibilities of producing animated models which correspond exactly to the body's shape and injury topography, and of ascertaining the physical parameters (centers of mass, moments of inertia) of the various body parts and the geometrical impact conditions for the reconstruction of the injury dynamics. This way of proceeding thus enables more precise models than hitherto possible for kinetic and dynamic reconstruction. In the case of an infant who was fatally injured by a wooden sculpture the generation and application of computer aided 3-dimensional reconstruction models are shown.

5270. Subramanian, A., et al. (2008). "A decade's experience with temporary intravascular shunts at a civilian level I trauma center." The Journal of trauma **65**(2): 316-316.

BACKGROUND: A 10-year review of temporary intravascular shunts (TIVS) at a regional trauma center., METHODS: Retrospective chart review of all patients treated with temporary intravascular shunts from January 1, 1997 to January 1, 2007., RESULTS: Seven hundred eighty-six patients were treated for vascular injuries. Sixty-seven (9%) had a total of 101 (72 arterial, 29 venous) TIVS placed to facilitate damage control or to allow for reconstruction of Gustilo IIIc fractures or limb replantation. Seven patients who, on trauma day 0, died or had an extremity which was deemed unsalvageable were excluded. Of 60 patients who met inclusion criteria, seven died from TBI (3%), MOF (3%), sepsis (2%), deceleration of care (2%), and loss of airway (2%), which was deemed preventable., CONCLUSIONS: TIVS have a shunt thrombosis rate of 5%, amputation rate of 18%, overall survival of 88%, and combination limb/patient survival rate of 73%. TIVS have an established role primarily in patients requiring either "damage control" for exsanguination or temporary vascular conduits during stabilization of Gustilo IIIc fractures. Truncal injuries are associated with the highest mortality likely due to accompanying multisystem trauma.

5271. Suddaby, L., et al. (1987). "The management of .22 caliber gunshot wounds of the brain: a review of 49 cases." The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques **14**(3): 268-272.

We analyzed the charts and CT scans of 49 cases of civilian .22 caliber gunshot wounds of the brain admitted to the University of Alberta and Royal Alexandra Hospitals between 1975 and 1985. The average age of the patients was 30 years, 88% were males, 88% were suicide attempts. There were no deaths among patients with an initial coma score above 12 whereas the mortality rate was 85% for those admitted with a score of 7 or less. All those with fixed pupils on admission died. The overall mortality rate of 61% is comparable to that of other series of civilian gunshot wounds including those in which more aggressive surgical management was undertaken. We recommend that no treatment be given those cases with an admission coma score of 3 and/or fixed pupils and that simple scalp wound debridement be employed with those having a coma score of 7 or less. Tract exploration and retrieval of bullet fragments is not indicated, as retained fragments carry a very low incidence of complications (e.g. abscess formation). In patients in good condition (GCS greater than or equal to 12) the management of intracranial hematomas should be independent of their etiology and approached aggressively.

5272. Suess, O., et al. (2002). "Self-inflicted intracranial injury caused by a crossbow arrow." European Journal of Trauma **28**(5): 310-313.

The availability of sophisticated hunting and sports weapons such as modern crossbows increases the incidence of uncommon types of accidental, suicidal, and homicidal head injuries. This report describes the case of a 47-year-old man with a nonfatal head injury due to a crossbow broadhead hunting arrow penetrating the left frontal lobe. The injury was accidentally self-inflicted by the intoxicated patient. A review of the literature has shown that self-inflicted head injuries caused by arrows are a very rare or, at least, a seldom reported entity. The mechanisms and pathophysiology of penetrating head injuries caused by different kinds of projectiles are discussed in order to clarify the management of these cases.

5273. Sugerman, D. E., et al. (2012). "Patients with severe traumatic brain injury transferred to a Level I or II trauma center: United States, 2007 to 2009." The journal of trauma and acute care surgery **73**(6): 1491-1499.

BACKGROUND: Patients with severe traumatic brain injury (TBI), head Abbreviated Injury Scale (AIS) score of 3 or greater, who are indirectly transported from the scene of injury to a nontrauma center can experience delays to definitive neurosurgical management. Transport to a hospital with appropriate initial emergency department treatment and rapid admission has been shown to reduce mortality in a state's trauma system. This study was conducted to see if the same finding holds with a nationally representative sample of patients with severe TBI seen at Level I and II trauma centers., METHODS: This study is based on adult (>=18 years), severe TBI patients treated in a nationally representative sample of Level I and II trauma centers, submitting data to the National Trauma Databank National Sample Program from 2007 to 2009. We analyzed independent variables including age, sex, primary payer, race, ethnicity, mode of transport, injury type (blunt vs. penetrating), mechanism of injury, trauma center level, head AIS, initial Glasgow Coma Scale (GCS), Injury Severity Score (ISS), and systolic blood pressure by transfer status. The primary outcome variable was inpatient death, with discharge disposition, neurosurgical procedures, and mean hospital, intensive care unit, and ventilator days serving as secondary outcomes., RESULTS: After exclusion criteria were applied (ISS < 16; age < 18 years; GCS motor score = 6; non-head AIS score >= 3; head AIS < 3; patients with missing transfer status, and death on arrival),

a weighted sample of 51,300 (16%) patients was eligible for analysis. In bivariate analyses, transferred patients were older (>=60 years), white, insured, less severely injured (head AIS score <= 4, ISS <= 25), and less likely to have sustained penetrating trauma (p < 0.001). After controlling for all variables, direct transport, 1 or more comorbidities, advanced age, head AIS score, intracranial hemorrhage, and firearm injury remained significant predictors of death. Being transferred (adjusted odds ratio, 0.79; 95% confidence interval, 0.64-0.96) lowered the risk of death., CONCLUSION: Patients with severe TBI who were transferred to a Level I or II trauma center had lower injury severity, including less penetrating trauma, and, as a result, were less likely to die compared with patients who were directly admitted to a Level I or II trauma center. The results may demonstrate adherence with the current Guidelines for Prehospital Management of Traumatic Brain Injury and Guidelines for Field Triage of Injured Patients, which recommend the direct transport of patients with severe TBI to the highest level trauma center. Patients with severe TBI who cannot be taken to a trauma center should be stabilized at a nontrauma center and then transferred to a Level I or II trauma center. Regional and national trauma databases should consider collecting information on patient outcomes at referral facilities and total transport time after injury, to better address the outcomes of patient triage decisions., LEVEL OF EVIDENCE: Prognostic study, level III; therapeutic study, level IV.

5274. Sugita, K., et al. (1969). "Successful removal of intracranial air-gun bullet with stereotaxic apparatus." Journal of neurosurgery **30**(2): 177-181.

5275. Sugiura, S., et al. (2000). "Leukaemia inhibitory factor is required for normal inflammatory responses to injury in the peripheral and central nervous systems in vivo and is chemotactic for macrophages in vitro." The European journal of neuroscience **12**(2): 457-466.

The cytokine leukaemia inhibitory factor (LIF) is up-regulated in glial cells after injury to the peripheral and central nervous systems. In addition, LIF is required for the changes in neuropeptide expression that normally occur when the axons of sympathetic and sensory neurons are transected. We investigated whether LIF is also necessary for the initial inflammatory response that follows mechanical injury to the sciatic nerve and cerebral cortex of adult mice. We find that inflammatory cell infiltration into crushed sciatic nerve is significantly slower in LIF knock-out (KO) mice compared with wild-type (WT) mice. Similarly, the microglial and astroglial responses to surgical injury of the cortex are significantly slower in LIF KO mice compared with WT mice. Consistent with these in vivo results, LIF is chemotactic for peritoneal macrophages in a microchamber culture assay. Thus, LIF is a key regulator of neural injury in vivo, where it is produced by glia and can act directly on neurons, glia and inflammatory cells. We also find that the initial inflammatory response to cortical injury is diminished in interleukin (IL)-6 KO mice. Surprisingly, however, the inflammatory response in LIF-IL-6 double KO mice is very similar to that of the single KO mice, suggesting that these cytokines may act in series rather than in parallel in this response.

5276. Suhendar, A., et al. (2022). "Pediatric gunshot penetrating on transverse sinus without graft." Interdisciplinary Neurosurgery: Advanced Techniques and Case Management **27**.

A gunshot is a rare subset of penetrating head injury, and generally, the victim dies before arriving at the hospital. This paper reported an intracranial gunshot injury in an eight-year-old boy shooting by a hunter who has hunted a bird using an airgun. A missile projectile penetrated from the right zygoma and entering the transverse sinus. Vital signs were stable with GCS 14 from a physical examination. After the patient had an immediate craniotomy debridement, evacuated the foreign body (bullet) in C-arm guiding, the patient was administered to the pediatric intensive care unit (PICU) for three days. Than, patient was discharged from our hospital with a stable condition, GCS 15, without any significant neurological deficits.

5277. Suisa, H. and G. E. Sviri (2020). "Disseminated pneumocephalus secondary to air compressor injury." Acta neurochirurgica **162**(3): 509-512.

We report an unusual case of a young male patient who presented with severe pain and swelling of his left eyelid following an air compressor tip accident. He suffered extensive facial edema accompanied by deep tissue emphysema and an elevated intraocular pressure. On noncontrast CT scan, air was detected in the intraconal and extraconal orbital compartments, and intracranially within the subarachnoid spaces as well as in the suprasellar and

perimesencephalic cisterns. There were no detectable fractures. We presume that by perforating the orbital septum, Tenon's capsule, and the optic nerve sheath, air had managed to penetrate the cranium through the optic nerve subarachnoid space and into the intracranial subarachnoid space.

5278. Sukoff, M. H., et al. (1971). "Retained intracranial fragments following missile injuries." Bulletin of the Los Angeles neurological societies **36**(2): 64-71.

5279. Sulla, I., et al. (1990). "[Penetrating head injuries caused by animal anesthesia guns]." Penetrierende Kopfverletzungen mit Viehbetaubungsgeraten. **115**(4): 219-222.

An account is given of experience recorded from 15 patients who had been surgically treated for head injuries from animal stunning guns. All of them were male patients and were aged from 19 to 66 years. All cases were attempted suicides. Three patients died, including one of pyocephalus and two of injuries of vital structures. Eight patients whose first treatment had been restricted to wound suturing developed dangerous intracranial purulence. Seven patients of this group survived, following treatment of the bullet path. Patients with such injuries can be saved, if wound dressing is accompanied by removal of foreign bodies, bone fragments, blood clots, and devitalised tissue and if the dura mater is sealed watertight.

5280. Sullivan, D., et al. (2003). "The assassination of President John F Kennedy: a neuroforensic analysis--part 1: a neurosurgeon's previously undocumented eyewitness account of the events of November 22, 1963." Neurosurgery **53**(5): 1019-1027.

SUBSTANTIAL LITERATURE EXISTS on the assassination and subsequent pathological examination of President John F. Kennedy. The Warren Report, the United States Government's official report on the assassination, instead of providing definitive answers on the precise cause of President Kennedy's death, sparked intense and on-going debate. Since the publication of the Warren Report in September 1964, many issues have been woven into a wide array of theories concerning the assassination. One element continues to generate debate, namely, the exact sites of the wounds that President Kennedy sustained. A neuroforensic analysis of the wounds, from the perspective of the neurosurgeon, would establish a reasonable hypothesis for the mechanics of the shooting. Eyewitness accounts of the events surrounding the assassination represent one critical source of data for such an analysis. This report provides a previously undocumented neurosurgeon's eyewitness account of what transpired in Trauma Room 1 of Parkland Memorial Hospital on November 22, 1963.

5281. Sullivan, R. P., et al. (2011). "Increased risk of inpatient mortality among uninsured traumatic injury patients in a rural state trauma registry." Annals of emergency medicine **58**(4): S289.

Study Objectives: Recent research has demonstrated an increase in mortality for uninsured patients following traumatic injury independent of likely contributing factors such as age, race, injury severity, co-morbidities, mechanism of injury, and treating hospital. Previous studies have focused on patients in a national trauma database with a large proportion ofurban trauma centers, leading some to hypothesize that the increase in mortality is related to characteristics of injuries sustained in an urban environment. To determine whether an increased risk of mortality exists among uninsured trauma patients in a rural setting, we analyzed a state trauma registry from a predominantly rural state with markedly different patient demographics and injury characteristics relative to urban centers. Methods: This study was a retrospective review of the Iowa State Trauma Registry for the years 2002-2009 (N=80;,716). The State Trauma Registry contains records from all traumatically injured patients in the state of Iowa, including demographics, injury mechanism, hospital, and insurance data, as well as disposition at discharge. Exclusion criteria for this analysis included burns and age <18 years old. We used multivariate logistic regression analysis to estimate the risk of inpatient mortality byinsurance status at the time of injury. Several characteristics of the traumatic injury event including emergency department disposition, length of hospital and intensive care unit stay (days), transfer to a tertiary trauma center, hospital charges, and hospital discharge disposition were examined for their potential confounding effects on mortality. Results: A total of 63,702 patient records met inclusion criteria. Uninsured trauma patients were more likely to be male, non-white, 18-30 years old, have a penetrating injury and an intentional injury than those with commercial insurance. In unadjusted analyses, uninsured patients had a 50% (OR = 1.5 [CI: 1.21 - 1.77]) increased risk of mortality

compared to insured patients. Furthermore, a higher percentage of uninsured patients died in the emergency department (1.8%) than did those with commercial insurance (0.8%). After controlling for likely confounders (age, sex, injury severity score, mechanism and intent of injury, co-morbidities, and traumatic brain injury) the odds of mortality were largelyunchanged (adjusted OR = 1.5 [CI: 1.19 - 1.82]) suggesting that being uninsured, or an unknown mechanism for which being uninsured is a proxy, is stronglyrelated to risk of mortality. Conclusion: In a predominantly rural setting, uninsured patients were more likely to die following traumatic injury than their insured counterparts. This is in agreement with prior research findings showing increased mortality rates for uninsured patients in a predominantly urban national trauma registry. This finding suggests that insurance status and not the characteristics of an urban or rural environment contributes to increased risk of death from traumatic injuries. Further research is needed to identify the causative factors that contribute to increased mortality for the uninsured following traumatic injury, and to develop effective policies to address this healthcare inequity.

5282. Summers, R. W., et al. (1970). "Acute hepatic coma treated by cross circulation with irreversibly comatose donor." JAMA **214**(13): 2297-2301.

5283. Sun, D., et al. (2022). "Intrinsically Bioactive Manganese-Eumelanin Nanocomposites Mediated Antioxidation and Anti-Neuroinflammation for Targeted Theranostics of Traumatic Brain Injury." Advanced healthcare materials **11**(16): e2200517.

Overproduced reactive oxygen species and the induced oxidative stress and neuroinflammation often result in secondary injury, which is associated with unfavorable prognosis in traumatic brain injury (TBI). Unfortunately, current medications cannot effectively ameliorate the secondary injury at traumatic sites. Here, it is reported that intrinsically bioactive multifunctional nanocomposites (ANG-MnEMNPs-Cur, AMEC) mediate antioxidation and anti-neuroinflammation for targeted TBI theranostics, which are engineered by loading the neuroprotective agent curcumin on angiopep-2 functionalized and manganese doped eumelanin-like nanoparticles. After intravenous delivery, efficient AMEC accumulation is observed in lesions of TBI mice models established by controlled cortical impact method, evidenced by T1 -T2 magnetic resonance and photoacoustic dual-modal imaging. Therapeutically, AMEC effectively alleviates neuroinflammation, protects blood-brain barrier integrity, relieves brain edema, reduces brain tissue loss, and improves the cognition of TBI mice. Mechanistically, following the penetration into the traumatic tissues via angiopep-2 mediated targeting effect, the efficacy of AMEC is synergistically improved by combined functional moieties of curcumin and eumelanin. This is achieved by the alleviation of oxidative stress, inhibition of neuroinflammation via M1-to-M2 macrophage reprogramming, and promotion of neuronal regeneration. The as-developed AMEC with well-defined mechanisms of action may represent a promising targeted theranostics strategy for TBI and other neuroinflammation-associated intracranial diseases.

5284. Sun, G., et al. (2016). "Management Strategy of a Transorbital Penetrating Pontine Injury by a Wooden Chopstick." World neurosurgery **95**: 622.e627-622.e615.

BACKGROUND: Transorbital penetrating pontine injuries from small spear-like objects, which are extremely rare, provide neurosurgeons with life-threatening and challenging conditions to manage., CASE DESCRIPTION: We present an unusual case of transorbital penetrating pontine injury and discuss imaging, diagnosis, management strategy, and anatomy-injury correlation. A 23-year-old man sustained a penetrating cranial injury from a bamboo chopstick that extended from the right orbit to the pons and cerebellum. Using a frontotemporal approach, we successfully removed the chopstick. Follow-up studies confirmed a good outcome., CONCLUSIONS: Preoperative imaging, correct diagnosis, and surgical treatment are necessary to manage transorbital penetrating pontine injuries caused by spear-like objects, with specific attention paid to effective exposure and inventive means with total removal of the foreign object without causing further injury. A trajectory through the superior orbital fissure and paralateral to the cavernous sinus and into the pons seems to be the most prevalent and influences management of removal and injuries.

5285. Sun, G. H., et al. (2012). "Inpatients with gunshot wounds to the face." The Journal of craniofacial surgery **23**(1): e62-65.

Microvascular free tissue transfer (FTT) is an increasingly used method of reconstruction for traumatic defects of the head and neck. We describe the immediate management, FTT reconstruction techniques, and outcomes of 6 individuals who sustained maxillofacial gunshot trauma and were treated at a single tertiary-care level I trauma center. All 6 patients were white men with a mean age of 33 years. The mandible, nose, and orbital contents were the most frequently affected critical structures. All patients initially underwent primary wound debridement and tracheostomy, with concurrent maxillomandibular wire fixation and/or midface or mandible plate fixation in 5 patients. The mean time from injury to definitive FTT was 38 days. Five patients underwent fibula osteocutaneous FTT and 1 underwent radial forearm fasciocutaneous FTT. One patient also underwent concurrent local tissue rearrangement and pedicled flap surgery for nasal reconstruction. The mean hospital length of stay after FTT was 6 days. All FTT survived without necrosis. Oral incompetence and poor cosmesis from undesirable scarring patterns were the most common long-term complications. In summary, successful reconstruction of head and neck defects caused by gunshot trauma begins with airway stabilization, wound management, and bony fracture reduction and fixation. Definitive microvascular FTT is a useful method of repairing traumatic head and neck defects, although long-term functional and cosmetic complications may still occur.

5286. Sun, V., et al. (2018). "Combined Central Retinal Artery and Vein Occlusion From a Presumed Arteriovenous Fistula After Retrobulbar Anesthesia." JAMA ophthalmology **136**(11): 1307-1309.

5287. Sun, X.-c. and Y. Jiang (2008). "Genetic susceptibility to traumatic brain injury and apolipoprotein E gene." Chinese journal of traumatology = Zhonghua chuang shang za zhi **11**(4): 247-252.

Traumatic brain injury (TBI) is defined as an injury caused by a blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain. It is a common emergency and severe case in neurosurgery field. Nowadays, there are more and more evidences showing that TBI, which is apparently similar in pathology and severity in the acute stage, may have different outcomes. The known prognostic factors (such as age, severity of injury and treatments, etc.) explain only part of this variability and the concept of genetic susceptibility of traumatic brain injury has already been accepted by more and more people. It is now demonstrated that genetic polymorphism may play a key role in the susceptibility to TBI, even outcome following TBI. Although there are many genes that may involved in pathophysiological processes influencing TBI, apolipoprotein E gene has become one of the most extensive studied genes in neurotrauma and neurodegenerative disease and seems to take an important part in the neural responses to TBI. In this article, we will review the current understanding of the genetic susceptibility of TBI and the advancements regarding the impact of apolipoprotein E genotype on the severity and/or outcome following TBI.

5288. Sun, Z., et al. (2020). "VX765 Attenuates Pyroptosis and HMGB1/TLR4/NF-kappaB Pathways to Improve Functional Outcomes in TBI Mice." Oxidative medicine and cellular longevity **2020**: 7879629.

BACKGROUND: Traumatic brain injury (TBI) refers to temporary or permanent damage to brain function caused by penetrating objects or blunt force trauma. TBI activates inflammasome-mediated pathways and other cell death pathways to remove inactive and damaged cells, however, they are also harmful to the central nervous system. The newly discovered cell death pattern termed pyroptosis has become an area of interest. It mainly relies on caspase-1-mediated pathways, leading to cell death., METHODS: Our research focus is VX765, a known caspase-1 inhibitor which may offer neuroprotection after the process of TBI. We established a controlled cortical impact (CCI) mouse model and then controlled the degree of pyroptosis in TBI with VX765. The effects of caspase-1 inhibition on inflammatory response, pyroptosis, blood-brain barrier (BBB), apoptosis, and microglia activation, in addition to neurological deficits, were investigated., RESULTS: We found that TBI led to NOD-like receptors (NLRs) as well as absent in melanoma 2 (AIM2) inflammasome-mediated pyroptosis in the damaged cerebral cortex. VX765 curbed the expressions of indispensable inflammatory subunits (caspase-1 as well as key downstream proinflammatory cytokines such as interleukin- (IL-) 1beta and IL-18). It also inhibited gasdermin D (GSDMD) cleavage and apoptosis-associated spot-like protein (ASC) oligomerization in the injured cortex. In addition to the above, VX765 also inhibited the inflammatory activity of the high-mobility cassette -1/Toll-like receptor 4/nuclear factor-kappa B (HMGB1/TLR4/NF-kappa B) pathway. By inhibiting pyroptosis and inflammatory mediator expression, we demonstrated that VX765 can decrease blood-brain barrier (BBB) leakage, apoptosis, and microglia polarization to exhibit its neuroprotective effects., CONCLUSION: In

conclusion, VX765 can counteract neurological damage after TBI by reducing pyroptosis and HMGB1/TLR4/NF-kappaB pathway activities. VX765 may have a good therapeutic effect on TBI. Copyright © 2020 Zhezhe Sun et al.

5289. Sundaram, C., et al. (2004). "Cranial and intracranial actinomycosis." Clinical neuropathology **23**(4): 173-177.

Five patients with central nervous system actinomycosis are presented. There were risk factors in 2 patients like penetrating head injury and tetralogy of Fallot. All the cases were diagnosed by histopathology. Four patients recovered after surgery and antibiotic therapy, and 1 patient died.

5290. Sung, E. K., et al. (2014). "Injuries of the globe: what can the radiologist offer?" Radiographics : a review publication of the Radiological Society of North America, Inc **34**(3): 764-776.

Traumatic ocular injuries are a significant cause of blindness and visual deficits. In the setting of acute orbital trauma, urgent ophthalmologic evaluation and intervention are critical in preserving vision. However, in the acute trauma setting, clinical evaluation of the globe may be difficult in the presence of surrounding periorbital soft-tissue swelling and other associated injuries, and patient cooperation may be limited because of unresponsiveness, altered mentation, or sedation. Often, rapid access to imaging is part of the initial diagnostic evaluation, and radiologists may be the first to identify traumatic injuries of the globe. Because of this, radiologists should be familiar with normal orbital and globe anatomy at various imaging modalities and have a thorough understanding of the various patterns of ocular injury and their imaging appearances. Radiologists should also be familiar with the various mimics of ocular injury, including congenital and acquired conditions that may alter the shape of the globe, various types of ocular calcifications, and the different types of material used to treat retinal detachment. Such knowledge may help radiologists make accurate diagnoses, which facilitates prompt and appropriate patient care. Copyright RSNA, 2014

5291. Sungkar, A. A., et al. (2022). "Late-onset Seizure and Left Hemiparesis after Unusual Craniocerebral Penetrating Injury by a Rusty Sickle: A Case Report." Open access Macedonian journal of medical sciences **10**: 98-102.

BACKGROUND: Penetrating head injuries are a significant public health problem in worldwide, with an estimated 35.000 civilian deaths annually. Patients that survive to reach the hospital require rapid triage and imaging evaluation. This case report describes a patient with late-onset seizures and left hemiparesis after unusual craniocerebral penetrating injury by a rusty sickle. CASE PRESENTATION: A 26-year-old man reported that he had a sickle stabbed into the right-side parietal area. On admission, he had no neurological deficits. The rusty sickle was broken off just above the skull and did not protrude from the scalp. Computed tomography showed that the knife blade was in the parenchyma without underlying tract hematoma. Surgery was performed after 2 h of admission. Post-operatively, he recovered with no neurological deficit. After 16th days postoperatively, he was complaining of seizure and left hemiparesis. CT scan with contras showed edema and hypodense lesion at the right side of hemisphere. A course of intravenous phenytoin 100 mg/8 h and ceftriaxone 2 g/day was initiated. Physical therapy was done on the patient for 2 weeks. CONCLUSION: Traumatic brain injury (TBI) is the result of energy being transferred from an object to the human skull and underlying brain. Post-traumatic epilepsy is a common complication and can occur as early or late manifestations related to penetrating TBI. Prophylactic treatment of post-traumatic seizures (PTS) is currently not routinely recommended beyond 1 week following head injury (role of antiseizure prophylaxis). Phenytoin is the most rigorously tested AED for PTS.

5292. Sunshine, K., et al. (2020). "Antibiotic Prophylaxis in Penetrating Brain Injury: A Systematic Review of the Literature." Clinical neurosurgery **67**(SUPPL 1): 145.

INTRODUCTION: Civilian penetrating brain injury is a common pathology at trauma centers across the United States. The development of infection, including superficial wound infection, meningitis, or intracranial abscess can lead to significant morbidity in this patient population. Rates of infection vary among studies and there are few guidelines on interventions to prevent infections. METHODS: A systematic review of the literature was performed to identify studies regarding antibiotic use in civilian penetrating brain injury from 2000-2020. All types of studies were included. Abstracts were screened for inclusion based on English language, penetrating trauma involving dural puncture, age greater than 15 years, and patients within high income countries. Data was extracted to identify demographic information, type of penetrating object, type of intervention performed, prophylactic antibiotic regimen, rate and type of infection, and adverse events associated with antibiotics. RESULTS: Forty full text articles were identified, resulting in a study

population of 903 patients. Prophylactic antibiotics were administered in 577 patients (64.0%). Of the patients given prophylactic antibiotics, 8.32% developed infection [95% CI 6.07-10.57%] compared to 6.75% [95% CI 4.03-9.47%] in patients without prophylaxis. Of the patients with a documented antibiotic regimen (n = 71), 39.4% were given prophylaxis consisting of a single class of antibiotic. A variety of antibiotic classes were given for prophylaxis. Similarly, the duration of antibiotic prophylaxis varied throughout studies. CONCLUSION: Over the past 20 years, data has been published for many civilian patients with penetrating brain injury. In high income countries, antibiotic prophylaxis for these patients is not universal, with only a slight majority of patients receiving antibiotics with the intention of preventing infection. Further, antibiotic regimens vary widely between cases. Interestingly, our results show similar infection rates amongst patients regardless of the use of prophylaxis.

5293. Supomo and H. Darmawan (2018). "An Unusual Foreign Body in the Heart: A Case Report." Annals of thoracic and cardiovascular surgery : official journal of the Association of Thoracic and Cardiovascular Surgeons of Asia **24**(4): 205-207.

Penetrating foreign bodies in the heart is rare and may lead to life-threatening complications. Early diagnosis and removal are crucial for these rare cases. We report a case of accidental penetrating sewing needle in the right ventricle. The needle was successfully removed without open heart surgery and cardiopulmonary bypass (CPB), after accurate localization using transthoracic echocardiography (TTE).

5294. Supreeyathitikul, P., et al. (2020). "Epidemiology and Outcomes Following Open Globe Injury in Agricultural Region, an 11-Year Experience." Ophthalmic epidemiology **27**(4): 246-251.

PURPOSE: To determine the characteristics and epidemiology of open globe injury (OGI) in a third referral centre over 11 years., METHODS: The study was a retrospective observational study. The medical records of 978 OGI cases (a total of 998 eyes), admitted to Chiang Mai University Hospital, Thailand from January 2006 to December 2016, were reviewed., RESULTS: The mean age (SD) of patients was 39.1 (17.5) years. Patients were predominantly male (867, 88.7%). The age with the highest incidence of injury ranged from 41 to 60 years, in both genders. Most injuries happened at the workplace (64.8%), with flying objects from electric grass trimmers (23.9%) being the major injury-related mechanism. Penetration injuries were found in 479 eyes (48.0%). In elderly group (aged >60 years), a higher proportion of a globe rupture injuries were observed (13.3%). In general, intraocular foreign body group presented with better initial visual acuity (VA) compared to other injury types ($p< 0.001$). In all types of injury, final VA was significantly improved after treatment. However, rupture and perforation globe injuries had significantly worse final VA outcomes, compared to penetration and intraocular foreign body injuries ($p< 0.001$). With multivariable regression analysis, poor initial VA ($p< 0.001$), type of injury ($p= 0.028$), positive relative afferent pupillary defect (RAPD) ($p< 0.001$), and endophthalmitis ($p< 0.001$) were associated with poor visual outcomes., CONCLUSIONS: Work-related eye injury is a major cause of OGI. Poor initial VA, endophthalmitis, presence of RAPD, and rupture were the predictors for poor final visual outcomes.

5295. Suresh, V. and D. Powers (2018). "Foreign Body Removal in the Craniomaxillofacial Complex: Indications, Techniques, and Treatment." Craniomaxillofacial Trauma and Reconstruction Open **2**(1): e49-e54.

Foreign body migration in the deep spaces of the neck is particularly concerning due to the increased risk of damage to the great vessels and nerves. In addition, migration often cannot be easily predicted as objects may travel outside the confines of anatomic fascial planes. Although patients may be asymptomatic for years prior to presentation, timely removal of foreign bodies is ideal to preclude injury to important vascular and neurological structures as well as to prevent the development of recurrent infections and foreign body reactions. The authors report two cases of removal of migrated foreign bodies that presented at their institution. In one case, they report the use of intraoperative computed tomography (CT) imaging to help locate the position of a migrating dental needle. In another, they report the retrieval of a bullet fragment six months after the initial trauma. The classic method for retrieval of foreign bodies within the craniomaxillofacial complex centered around review of static radiographic imaging and a blind, broad exposure of the site in an attempt to localize and retrieve the material. This often resulted in iatrogenic injuries to surrounding structures or migration of the foreign body to a location, which may cause the patient additional harm. The utilization of intraoperative CT technology and computer navigation affords the craniomaxillofacial surgeon an additional tool for retrieval of these foreign bodies, often in a manner that affords minimally invasive surgical approaches, identification of

vital structures within the operative field, and decrease in overall operative time for removal. Referral to institutions, which have this technology, should be considered early in the operative care of patients who encounter retained foreign bodies in the craniomaxillofacial region.

5296. Surlin, C., et al. (1989). "[ENT involvement in lesions due to firearms]." Implicatii O.R.L. in leziuni prin arme de foc (consideratii in legatura cu 3 cazuri). **34**(2): 139-144.

5297. Susak, R., et al. (2010). "Predicting epilepsy in patient with open head injuries causedbywar missiles." Epilepsia **51**: 95-96.

Purpose: Detecting risk factors influencing the incidence of posttraumatic epilepsy after war missiles penetrating brain injuries. Method: We analyzed sixty-five patients regarding the following parameters: age, traumatic mechanism, type, extend and localization of injury, presence of intracranially retained foreign bodies, neurological deficits, appearance of epileptic phenomena, cognitive dysfunction and Elecroencephalographic changes. Result: Posttraumatic epilepsy was recorded in 14 patients (14/65 21.5%). Regarding the type of seizures there were six g.m., five complex partial and three motor partial seizures. Elecroencephalographic recording showed: focal changes in 15, normal EEG in 26, unspecific in three, unspecific + focal changes in 2 patients. Nineteen patients had not done EEG. Pathologic EEG changes are found in 11 of 14 patients who develop PTE (78.5% or 11/14). Nine pathological EEG was registered in 51 patient who did not develop PTE (17.6% or 9/51). Wounds in the parietal region and in the frontoparetial region resulted in the occurence of PTE in 3 cases each. Conclusion: The most important factors infuenting the incidence of PTE are: severity, extend and location of injury. The wounds in the frontal and parietal region were followed by epileptic seizures more frequently. Through-and-through brain injuries are more epileptogenic than others. Evidence of nurological deficit has strong correlation with PTE. There was no significant difference regarding the appearance of PTE in patients who are taking or those who are not taking AET. Considering our analyses we can not find sure predictors or specific parameters decisive for the future development of PTE.

5298. Suslu, H. T., et al. (2002). "[Self migrating intracranial bullets]." INTRAKRANYAL MERMI CEKIRDEKLERININ KENDILIGINDEN HAREKETI. **8**(3): 185-188.

We report herein two patients in whom bullets migrated into adjacent lateral ventricles in the brain and moved freely as a consequence of gravity. A rewiew ofthe literature suggests that spontaneous migration ofintracerebral bullets is being eased by cerebral softness, specific gravity of the bullet compared with brain tissue. ln patients undergoing the surgical removal of intracerebral or intraventricular bullets, an x-ray is recommended after final positioning.

5299. Süss, O. and F. Bode (2016). "Clinical Curiosity: Transnasal Head Trauma Caused by a Toilet Paper Holder." Indian Journal of Neurotrauma **13**(1): 35-38.

The risk of severe head injury during a seizure is usually small. Penetrating bony injuries to the skull caused by a fall on a sharp object during a seizure account for less than 3% of all ictal head injuries. Only few reports have been published on transoral, transnasal, and transorbital penetrating injuries suffered by patients who fell during a seizure. We report on a case of transnasal penetrating injury extending to the skull base and its treatment in a patient who fell on a toilet paper holder.

5300. Sutter, M. E., et al. (2010). "Transplant of multiple organs after suicide by acetaminophen overdose and self-inflicted gunshot wound." Clinical Toxicology **48**(6): 635.

Background: There are a shortage of organs available for transplant, and therefore many transplant centers are including poison related deaths. Few reports of organ donation after acetaminophen overdose exist. We describe the case of a 17-year-old male who had a simultaneous gunshot wound to the head in association with an acetaminophen overdose. Case report: A 17- year-old male was brought to the emergency department after a self inflicted gunshot wound to the head. His mother noted he had access to a recently purchased bottle of acetaminophen, which was missing 20 g. Upon arrival to the hospital, the patient was intubated without medication. He had a systolic blood pressure of 130 mmHg, a pulse of 111 beats per minute, a respiratory rate of 16 via bag assisted respirations and a

temperature of 36.5°C. Physical exam showed a single penetrating wound to the right temporal bone. The remainder of his physical exam was consistent with brain death. CT scan of his brain demonstrated a non-survivable head injury. Initial laboratories showed a hemoglobin, 11 g/ dL; platelets 218×103/mm3; sodium 138 mEq/L; potassium 2.9 mEq/L; chloride 104 mEq/L; bicarbonate 22 mEq/L; blood urea nitrogen 12 mg/dL; and creatinine 0.96 mg/dL. AST was mildly elevated at 50 IU/L and ALT was normal at 20 IU/L. INR was 1.26. Acetaminophen level drawn at arrival was 134 mg/L with unknown time of ingestion. N-acetylcysteine (NAC) therapy was initiated. Institutional policy for pediatric brain deaths required two exams on different days. Family expressed their interest in organ donation. Over the next 2 days his acetaminophen level declined to <10 mg/L. His AST and ALT never significantly increased. On day 2 organs were recovered and transplanted into six different recipients. The heart, lung, pancreas, liver and both kidneys were functioning well at 6 months. Discussion: Limited information exits on organ donation after acetaminophen ingestion. The patient's transaminases failed to change over the first 24 h. Surrogate markers such as acetaminophen half-lives were utilized to assess the risk of the donor organs while balancing optimal time of organ procurement without jeopardizing the other organs. Further prognostic testing needs investigation.

5301. Suvorov, N. B., et al. (1994). "[The adaptation of the human central nervous system to ecological job factors]." Adaptatsiia tsentral'noi nervnoi sistemy cheloveka k ekologo-professional'nym faktoram. **80**(6): 80-87.

The EEG, quantity of cation proteins in neutrophils, the opioid peptides concentration in the CSF, were analysed in military personnel after a prolonged climatic and specific stress complicated by traumas, at the Kabul military hospital in Afghanistan. The brain functional reserve was significantly lower in the control subjects. A positive correlation between the brain functional reserve and the average cytochemical coefficient, was found in certain phases of traumatic disease alone. Accumulation of opioid peptides occurred under the adaptation to stress, being more evident in wounded soldiers.

5302. Suzuki, H., et al. (2002). "Rapid sequence induction for penetrating head injury from a chopstick in a paediatric patient." Paediatric anaesthesia **12**(1): 88-89.

5303. Suzuki, T., et al. (2013). "Blood-brain barrier transport of an essential amino acid after cerebral ischemia reperfusion injury." Acta neurochirurgica. Supplement **118**: 297-302.

Under pathophysiological conditions such as -cerebral ischemia-reperfusion (IR), damage to cerebrovascular endothelial cells causes alterations in the blood-brain barrier (BBB) function that can exacerbate neuronal cell injury and death. Clarifying changes in BBB transport in the early period of IR is important for understanding BBB function during therapy after cerebral ischemia. The present study was aimed at clarifying changes during IR in the BBB transport of L-phenylalanine (Phe) as a substrate of L-type amino acid transporter 1. An IR model was produced in mice by blood recirculation following occlusion of the middle cerebral artery. Permeability of the BBB to [(3)H]Phe was measured after IR injury using the brain perfusion method. Confocal microscopy of the IR injury showed no brain penetration of fluorescent tracer, thus confirming BBB integrity during 45 min of ischemia. Tight junction opening was not observed at 30 min after reperfusion following ischemia for 45 min. At the time of IR, [(3)H]Phe uptake into the brain appeared saturated. The Michaelis constant and maximum transport velocity in the IR group was reduced by 22 % compared with those in controls. These results suggest that the intrinsic transport clearance of Phe is slightly decreased in the early phase of IR.

5304. Sviri, G. E. (2015). "Massive cerebral swelling immediately after cranioplasty, a fatal and unpredictable complication: report of 4 cases." Journal of neurosurgery **123**(5): 1188-1193.

Cranioplasty after decompressive craniectomy (DC) is associated with increased morbidity, but the reported mortality rate is low. Recently, some authors have reported a rare unexplained complication of sudden death in association with massive cerebral edema immediately after cranioplasty. The author reports on 4 patients who underwent cranioplasty after DC between January 2005 and August 2010 at his department and died because of massive cerebral edema immediately after uneventful surgery and anesthesia. All 4 of the new cases reported involved young male patients who underwent decompressive hemicraniectomy after traumatic brain injury. They developed massive cerebral swelling immediately after uneventful cranioplasty (3 patients) or after removal of an epidural hematoma

several hours after surgery (1 patient). All 4 patients had a large skull defect and significantly sunken craniotomy site, and all were treated with a closed vacuum suction system that was placed under the scalp and kept open at the end of the cranioplasty procedure. After surgery, the patients' pupils became fixed and dilated, and brain CT scans showed massive brain edema. Despite emergency DC, the patients did not recover, and all 4 died. A MEDLINE search showed 8 similar cases that were reported previously. Fatal cerebral swelling after uneventful cranioplasty is a distinct clinical entity, although it is unpredictable. It is postulated that a negative pressure difference from the elimination of atmospheric pressure that had been chronically applied on the injured sinking brain in combination with the negative pressure applied by the closed subgaleal suction drain may lead to a massive brain shift toward the cranioplasty site and initiate a fatal vasomotor reaction.

5305. Sviri, G. E., et al. (1999). "Penetrating head injuries caused by a new weapon, the side dome." Military medicine **164**(10): 746-750.

The "side dome" is a mix of high and low explosives with a multitude of small metal balls molded within a specially designed half-sphere that directs the explosion wave and the projectiles in one direction to augment the harm. This weapon, originally designed by guerrilla and terrorist groups, is now used by regular armies. This report presents one craniocervical and eight cranial injuries caused by this new weapon and discusses the cases' various clinical features, the paucity of intracerebral cavitation damage along the missile track, the need for only minimally aggressive surgery, and the relatively favorable outcome. In all cases, the helmet offered good protection and the entry of the projectiles was just below its rim in an upward direction.

5306. Svoboda, N., et al. (2019). "Civilian and military gunshot wounds to the head." Ceska a Slovenska Neurologie a Neurochirurgie **82**(6): 670-676.

Aim: Gunshot wound to the head is one of the most severe injuries with high morbidity and mortality. Appropriately indicated extensive surgical treatment leads to improved patient prognosis. Thus, the evaluation of preoperative factors that would predict patients` prognosis is of high importance at the time of admission to the hospital. Methods: A retrospective analysis of the results of patients with gunshot head wounds hospitalized in the Military University Hospital in Prague during the period 2000-2018 was performed. Epidemiological data; Injury cause, type, and motive; Glasgow Coma Scale (GCS) on admission; CT scan findings; therapeutic approach; and clinical outcome according to the Glasgow Outcome Score Extended (GOSE) were evaluated and statistically analyzed. Results: 81 patients were enrolled in the study. Out of these 81 patients, 71 (88%) were injured in a civilian and 10 (12%) in a military setting. Mean GCS on admission was 5.8 (3-15). We operated on 18 patients. Mean GOSE after surgery was 2.8 (1-8). Patients with an overpenetration type of injury, with low GCS value on admission, with a higher number of injured brain lobes and with a bullet trajectory crossing the midsagittal and/or midcoronal plane had statistically significantly worse outcome ($P \leq 0.0001$). Conclusion: GCS on admission, injury cause and motive, and CT findings proved to be significantly important predictive factors. Chosen therapeutic approach should reflect these factors as they correlate with patient’s prognosis.

5307. Swain, S. K., et al. (2021). "Migrating Souvenir Bullet: The Management Dilemma." Annals of Neurosciences **28**(1-2): 79-81.

The cranio-cerebral trauma following gunshot injuries has high mortality and morbidity, with 66% to 90% victims dying before reaching hospital and only half of those treated in hospital surviving. However, in case of most salvageable patients, the question which poses dilemma to treating physicians is the decision as to when and why remove the retained missile. A 21-year-old man was observing a gunfight in the street from his balcony. Suddenly something struck his forehead and there was a small amount of bleeding toward the medial end of his left eyebrow. He had moderate headache and dizziness. Because of nonresolution of headache over seven days he was hospitalized and underwent X ray of the skull and CT of the head, which showed a retained metallic bullet in left inferior parieto-occipital region without any significant hemorrhage. As there was no neurological deficit or meningeal signs, he was managed conservatively. His symptoms improved gradually within next week and he was discharged home. His most recent follow-up was 28 months since injury and imaging showed migration of the bullet to the right inferior temporal region. As he was completely asymptomatic throughout, no intervention was offered. However, long-term follow-up for potential complications of migration, hydrocephalus, and abscess formation is advisable.

5308. Swan, B. M. (1970). "Brain abscess: a world record?" Delaware medical journal **42**(12): 363-366.

5309. Swanson, J. L. and J. A. Augustine (1992). "Penetrating intracranial trauma from a fishhook." Annals of emergency medicine **21**(5): 568-571.

Fishhook injuries rarely pose a true emergency, and only a few cases of posterior ocular injury from fishhooks have been described. We present a case of penetrating ocular, orbital, and cranial trauma produced by a broken fishhook. The morbidity and mortality as well as the initial emergency evaluation of penetrating foreign objects in the orbital-cranial region are discussed.

5310. Swartz, J. D., et al. (1985). "Computerized tomographic evaluation of the middle ear and mastoid for posttraumatic hearing loss." The Annals of otology, rhinology, and laryngology **94**(3): 263-266.

High resolution computerized tomography has been proven valuable in all aspects of temporal bone study. The importance of the procedure in evaluation of traumatic lesions, particularly of the middle ear, has been underemphasized. Damage to the middle ear may occur with blunt trauma, penetrating injury, or barotrauma. Conductive hearing loss and/or CSF otorrhea may result. Detailed evaluation of the ossicles is the hallmark of properly performed computerized tomographic evaluation.

5311. Swartz, W. M., et al. (1986). "The osteocutaneous scapular flap for mandibular and maxillary reconstruction." Plastic and reconstructive surgery **77**(4): 530-545.

Microfil injections in 8 cadavers and clinical experience with 26 patients have demonstrated a reliable blood supply to the lateral border of the scapula based on branches of the circumflex scapular artery. This tissue has been used successfully for reconstruction of a variety of defects resulting from maxillectomy and mandibular defects from cancer and benign tumor excisions. Advantages of this tissue over previous reconstructive methods include the ability to design multiple cutaneous panels on a separate vascular pedicle from the bone flap allowing improvement in three-dimensional spatial relationships for complex mandibular and maxillary reconstructions. The lateral border of the scapula provides up to 14 cm of thick, straight corticocancellous bone that can be osteotomized where desired. The thin blade of the scapula provides optimum tissues for palate and orbital floor reconstruction. There have been no flap failures and minimal donor-site complications.

5312. Sweeney, J. D., et al. (2011). "Management of Nonmissile Penetrating Brain Injuries: A Description of Three Cases and Review of the Literature." Skull Base.

Nonmissile penetrating intracranial injuries are uncommon events in modern times. Most reported cases describe trajectories through the orbit, skull base foramina, or areas of thin bone such as the temporal squama. Patients who survive such injuries and come to medical attention often require foreign body removal. Critical neurovascular structures are often damaged or at risk of additional injury resulting in further neurological deterioration, life-threatening hemorrhage, or death. Delayed complications can also be significant and include traumatic pseudoaneurysms, arteriovenous fistulas, vasospasm, cerebrospinal fluid leak, and infection. Despite this, given the rarity of these lesions, there is a paucity of literature describing the management of neurovascular injury and skull base repair in this setting. The authors describe three cases of nonmissile penetrating brain injury and review the pertinent literature to describe the management strategies from a contemporary cerebrovascular and skull base surgery perspective. © Thieme Medical Publishers.

5313. Sweeney, J. M., et al. (2011). "Management of nonmissile penetrating brain injuries: a description of three cases and review of the literature." Skull base reports **1**(1): 39-46.

Nonmissile penetrating intracranial injuries are uncommon events in modern times. Most reported cases describe trajectories through the orbit, skull base foramina, or areas of thin bone such as the temporal squama. Patients who survive such injuries and come to medical attention often require foreign body removal. Critical neurovascular

structures are often damaged or at risk of additional injury resulting in further neurological deterioration, life-threatening hemorrhage, or death. Delayed complications can also be significant and include traumatic pseudoaneurysms, arteriovenous fistulas, vasospasm, cerebrospinal fluid leak, and infection. Despite this, given the rarity of these lesions, there is a paucity of literature describing the management of neurovascular injury and skull base repair in this setting. The authors describe three cases of nonmissile penetrating brain injury and review the pertinent literature to describe the management strategies from a contemporary cerebrovascular and skull base surgery perspective.

5314. Sweeney, J. M., et al. (2011). "Management of non-missile penetrating brain injuries: A description of three cases and review of the literature." Skull Base **21**.

Non-missile penetrating intracranial injuries are uncommon events in modern times. Most reported cases describe trajectories through the orbit, skull base foramina, or areas of thin bone such as the temporal squama. Patients who survive such injuries and come to medical attention often require foreign body removal. Critical neurovascular structures are often damaged or at risk of additional injury resulting in further neurologic deterioration, life-threatening hemorrhage, or death. Delayed complications can also be significant and include traumatic pseudoaneurysms, arteriovenous fistulas, vasospasm, CSF leak, and infection. Despite this, given the rarity of these lesions, there is a paucity of literature describing the management of neurovascular injury and skull base repair in this setting. The authors describe three cases of non-missile penetrating brain injury and review the pertinent literature to describe the management strategies from a contemporary cerebrovascular and skull base surgery perspective.

5315. Sweet, D. J. and C. H. Sweet (1995). "DNA analysis of dental pulp to link incinerated remains of homicide victim to crime scene." Journal of forensic sciences **40**(2): 310-314.

Teeth endure postmortem degradation and extreme changes in ambient temperature and pressure better than most human tissues. This ability to resist deterioration allows the teeth to be studied as a method of establishing the identity of a decedent. Additionally, dental hard tissues, and in some instances soft tissues, may provide investigators with other sources of forensic data. In this case, a female homicide victim was transported to a location where her remains were burned. The high temperatures of a gasoline fire effectively incinerated the body precluding deoxyribonucleic acid (DNA) analysis from conventional sites. However, most of the teeth survived the conflagration. They were used to identify the victim. Additionally, the dental pulps were found to be an excellent source of high molecular weight genomic DNA. This proved to be an effective method to link the victim's body to biological evidence recovered from the site of the murder.

5316. Sysoliatin, P. G., et al. (1976). "[Correction of mandibular defects with preserved homologous bone sterilized in ethylene oxide]." Zameshchenie defektov nizhnei cheliusti konservirovannoi gomokost'iu, sterilizovannoi okis'iu etilena **116**(4): 102-106.

The authors have elaborated the technic for procurement of homografts from the lower jaw bone taken from cadaver-donors, without observing aseptic rules, with their subsequent ethylene epoxide sterilization in a portable chamber. Experimental studies have demonstrated that ethylene epoxide renders no negative effect on osteoplastic properties of the homograft, the rate of its reconstruction was dependent on the method of preservation. The results of osteohomoplasty for mandibular defects in 46 patients are summarized.

5317. Szabo, B. and I. Szabo (2011). "Intraorbital foreign bodies." Neuro-Ophthalmology **35**: S94.

AIM: To describe the clinical features and the management of unusual penetrating intraorbital foreign bodies. METHODS: We present the clinical history, preoperative photographs, pertinent imaging studies, and the pathologic findings of 13 patients with penetrating intraorbital foreign bodies were treated in our institution between the years 2000 and 2010. RESULTS: They represent 2.5% of the total of 511 patients who underwent orbital surgery during the period. 11 patients of the 13 were operated on. The characteristic clinical features at presentation in all the patients were: orbital pain, conjunctival haemorrhage, periorbital wound of entry and periorbital fistula. Additionally, chemosis was observed in 4 patients, palpebral oedema and swelling in 10, displacement of the eyeball and diplopia in 8, orbital cellulitis and abscess in 2 patients. CONCLUSIONS: An orbital foreign body may be frequently overlooked at presentation

because a small penetrating wound can be associated with minimal signs of inflammation. Meticulous history and physical examination, a strong clinical suspicion and appropriate imaging studies are crucial for diagnosing such an orbital foreign body. The two most important methods of screening neuroimagery are orbital ultrasound and CT-scan. In case of organic foreign body a high resolution CT-scan with 3D reconstruction and MRI with gadolinium are recommended. MRI is contraindicated in cases of presumed intraorbital metallic foreign bodies. Surgical treatment is aimed at the complete removal of the penetrating intraorbital foreign bodies, especially in those of organic origin. At times it is a simple procedure, but in others it may cause more damage than the trauma itself.

5318. Szabo, G., et al. (2000). "Invited commentary to Osseous healing in alveolar ridge distraction - An experimental study in sheep (Acta Chir Austriaca 2000; 32: 76-81)." Acta Chirurgica Austriaca **32**(3): 148.

5319. Szarka, N., et al. (2017). "Enhanced myogenic response of cerebral arteries induced by pre-existing hypertension is intact after traumatic brain injury." FASEB Journal **31**(1).

Traumatic brain injury (TBI) impairs pressure-induced myogenic autoregulation of cerebral blood flow (CBF), which is associated with increased mortality and bad functional outcome of TBI patients. When blood pressure drops lack of myogenic autoregulatory function of cerebral vessels exposes brain tissue to hypoperfusion and ischemia; in case of high blood pressure it allows high blood volume to penetrate the brain exacerbating disruption of the blood brain barrier, development of hemorrhages and elevation of intracranial pressure. Hypertension, the most important cardiovascular risk factor in TBI patients, enhances myogenic tone of cerebral arteries via increased vascular production of 20- hydroxyeicosatrienoic acid (HETE), which protects brain tissue form pressure/volume overload but leads to increased susceptibility to cerebral ischemia. Although both effects may potentiate the vascular consequences of TBI, it is not known how hypertension modulates the effect of TBI on myogenic responses of cerebral vessels. To establish the effect of TBI on cerebral myogenic responses in hypertension we studied isolated middle cerebral arteries (MCA) of normotensive and spontaneously hypertensive rats (SHR) after severe impact acceleration diffuse brain injury. We found that TBI diminished myogenic constriction of MCAs in normotensive animals, but the 20-HETE mediated enhanced myogenic tone in SHRs was not affected by traumatic brain injury. These results suggest that following brain trauma hypertensive patients may be protected from high blood pressure, but are likely to be more prone to cerebral ischemia when blood pressure drops, and therefore require different therapeutic strategies than normotensive patients.

5320. Szleszkowski, L., et al. (2015). "The possibility of establishing causes of death on the basis of the exhumed remains of prisoners executed during the communist regime in Poland: the exhumations at Powazki Military Cemetery in Warsaw." International journal of legal medicine **129**(4): 801-806.

This study presents the results of the analysis of forensic examinations of the remains of 194 prisoners exhumed at Powazki Military Cemetery in Warsaw. In all probability, most of those buried there were judicially sentenced to death by firing squad or hanging in connection with activities of the Polish independence underground in its struggles with the postwar communist regime. Forensic medical research focussed on determining causes of death and reconstructing the mechanisms of injury leading to death. Most probable causes of death were found in 108 of 194 cases; of these, 76 were isolated gunshot wounds to the head, mostly directed to the occipital region. In 29 of 194 cases, only extensive skull fractures were observed, making it impossible to determine the mechanism of injury. The condition of these skulls do not permit the exclusion of injuries due to gunshots, which were very likely given the historical context of the studied location. In one case, it is assumed that the cause of death could be blunt force trauma to the head. In 86 of 194 cases, it was not possible to determine the cause of death. Of these cases, 20 skeletons were in such poor condition that erosive changes could have completely obliterated even very extensive head injuries leading to death. No injuries were observed that could be associated with execution by hanging.

5321. Szuflita, N. S., et al. (2020). "Penetrating Brain Injury Sustained by US Military Personnel in Iraq and Afghanistan, and the Use of Venous Thromboembolism Chemoprophylaxis: Initial and Interim Analysis." Clinical neurosurgery **67**(SUPPL 1): 142.

INTRODUCTION: There is evidence that US military personnel may have relatively high survival rates after penetrating brain injury (pTBI), which necessitates decisions regarding the timing, efficacy, and safety of venous

thromboembolism chemoprophylaxis (VTE PPx) in these patients. METHODS: Demographic and clinical data about US military personnel who sustained closed and penetrating brain injuries in Iraq and Afghanistan were abstracted from the Department of Defense Trauma Repository. Students T tests, Fisher's Exact Chi Square test, and Logistic regression models were used to describe the association between VTE PPx thromboembolic complications. These data are being supplemented with CT and MRI data to examine rates and predictors of intracranial hematoma expansion. RESULTS: To date, 326 records have been abstracted; 53.7% were pTBI. The most common mechanism of injury for pTBI was blast (75.4%) followed by gunshot wounds (18.3%). Overall mortality was 12.3% (18.9% pTBI vs 4.6% for closed head injury, P < .0001). VTE PPx was used in 63.8% of patients, and 16.6% received VTE PPx within 1 day of injury. There was no difference in the risk of DVT or PE among closed or pTBI based on the use or timing of VTE PPx. Administration of packed red blood cells was associated with an increased risk of DVT (OR 6.4, 95% CI 1.4-28.7), and PE (OR 5.2, 95% CI 1.1-23.8) after controlling for closed vs pTBI, as was the use of platelets (OR 7.0, 95% CI 2.0-24.3 for DVT and OR 5.6, 95% CI 1.6-20.0 for PE) and Fresh Frozen Plasma (OR 4.4, 95% CI 1.2-15.5 for DVT and OR 5.8, 1.3- 26.2 for PE). CONCLUSION: Penetrating brain injury in military personnel is often a survivable injury, and the risk of DVT and PE is low in both closed and pTBI, regardless of VTE PPx use. The use of blood products within 24 hours of injury is however, associated with an increased risk of thromboembolic complications. The rate of hemorrhagic expansion is currently being analyzed.

5322. Ta, C. N. and R. W. Bowman (2000). "Hyphema caused by a metallic intraocular foreign body during magnetic resonance imaging." American journal of ophthalmology **129**(4): 533-534.

PURPOSE: To report a 63-year-old man with a retained intraocular foreign body who developed a hyphema during magnetic resonance imaging (MRI) of the brain., METHODS: Case report and review of the current literature on ocular injury caused by intraocular foreign bodies when subjected to an electromagnetic field., RESULTS: Our patient underwent a brain MRI, and the intraocular foreign body caused a hyphema and increased intraocular pressure. The presence and location of the intraocular foreign body were determined by computed tomography (CT)., CONCLUSION: Magnetic resonance imaging can cause serious ocular injury in patients with ferromagnetic intraocular foreign bodies. This case demonstrates the importance of obtaining an occupational history, and, when indicated, a skull x-ray or CT to rule out intraocular foreign body before an MRI study.

5323. Tabakina, T. E. and A. M. Mytnikov (1983). "[Function of the hemostatic system in craniocerebral injury in children]." Sostoianie sistemy gemostaza pri cherepno-mozgovoi travme u detei. **28**(12): 29-32.

5324. Tabibkhooei, A., et al. (2019). "Childhood Transorbital Skull Base Penetrating Injury: Report of 2 Cases and Review of Literature." World neurosurgery **131**: 213-216.

BACKGROUND: A foreign object penetrating the brain via orbit is a rare occurrence. Accurate diagnosis and immediate intervention is essential to prevent ophthalmic or neurological deficits and to reduce chances of infection or hemorrhage., CASE DESCRIPTION: We report 2 cases of transorbital orbitocranial penetrating injury of metal objects in children. Computed tomography scan was obtained to assess the extent of the injury and to locate the objects. According to the trajectory, the best craniotomy approach was performed, and the objects were safely removed without any complication. Our cases are unique because of the absence of any neurological deficit on admission, before and after the removal., CONCLUSIONS: The importance of transorbital orbitocranial penetrating injury cannot be neglected because of possible orbital and intracranial damage. Therefore, in this report we aim to heighten awareness of the complexity and severity of transorbital penetrating brain injury.

5325. Tabibkhooei, A., et al. (2018). "Penetrating brain injury with a metal bar and a knife: Report of two interesting cases." The neuroradiology journal **31**(2): 203-206.

Introduction Penetrating brain injury (PBI) is uncommon among the civilian population. Here, we report two interesting cases of PBI. Case presentation The first patient was a 20-year-old male who sustained a penetrating head injury with a metal bar during an accident at work. The patient underwent early surgical intervention, and related meningitis was treated with antibiotics. The patient was discharged 45 days later with no deficit. The second patient was a 34-year-old male who was the victim of a violence attack and was admitted to hospital. He was struck by a knife to his right temporal bone. A brain computed tomography scan and magnetic resonance imaging (MRI) demonstrated the tract

of the knife within the brain parenchyma. The patient underwent conservative treatment. After several weeks, the patient was discharged in good health. Conclusion Although severe PBI has a poorer prognosis than a blunt brain injury, in treating of these patients, aggressive and timely surgical intervention, proper wide-spectrum antibiotic administration, stringent and diligent care in the intensive-care unit and careful management of the associated complications are mandated.

5326. Tabish, A., et al. (2009). "Guidelines for managing minor head injuries." Journal International Medical Sciences Academy **22**(2): 81-83.

Globally, thousands of people sustain head injury everyday. Early diagnosis and appropriate management improves outcome but is sometimes more difficult to achieve than might be imagined, injury to the brain is most likely to result in death or permanent disability. Estimates of traumatic brain injury (TB1) incidence, severity, and cost reflect enormous losses to individuals, their families, and society. Authors prospectively studied 485 consecutive patients of traumatic brain injury, out of which 280 with GCS of 1 3, 4, and 1 5 were subjected to routine early CT scan of head after 4 hours of reporting to Emergency Patients with penetrating head injury were excluded. 15 % of patients had abnormal CT scans and only 4% needed surgical intervention Though a small number of patients harbour potentially lethal intracranial lesions yet. most of these cases are salvageable if diagnosed and treated early. There is a strong need for improved methods of initial assessment including early CT scan and are treatment subsequently lead to reduction in the number of unnecessary admissions and a more focussed head injury care.

5327. Tabuse, J., et al. (1989). "[Traumatic ophthalmic artery-superior ophthalmic vein fistula: a case report]." No shinkei geka. Neurological surgery **17**(3): 291-295.

Traumatic intraorbital arteriovenous fistula is rare and only 2 cases have been reported. The authors report the case of a 70-year-old man with consciousness disturbance after non-penetrating head injury. CT scan showed diffuse subarachnoid hemorrhage in the basal cistern, and angiography on the next day revealed ophthalmic artery-superior ophthalmic vein fistula in the right orbit. During the clinical course of this lesion, there was mild chemosis of the right eye, without palsy of extraocular muscles. Both papilledema and bruit were absent. Conservative treatment was chosen. On the 26th day after the head injury, repeated angiography showed complete disappearance of the fistula. The patient was discharged on the 39th day without neurological deficit. In the other two reported cases, intraorbital A-V fistulae were caused by direct-penetrating injury. But, in the present case the head injury was non-penetrating and blunt type. The pathogenesis was considered to be indirect injury of the intraorbital vessels at the retrobulbar portion, approximately where the artery and the vein crossed. As regards to treatment, simple observation may be the first choice, and spontaneous obliteration can be expected. If this does not occur, either embolization or ligation of the ophthalmic artery is suggested as the second choice as proposed by Freitas MAL et al.

5328. Taghavi, S., et al. (2021). "Preinjury Use of Marijuana and Outcomes in Trauma Patients." The Journal of surgical research **257**: 42-49.

BACKGROUND: Recent studies have examined the effects of marijuana in various populations; however, there has been limited research on the effect of marijuana use in severely injured trauma patients. We hypothesized that preinjury use of marijuana would be associated with improved outcomes in severely injured trauma patients., METHODS: All adult (18+ y) level I and level II trauma activations who presented to two large regional trauma centers between 2014 and 2018 were reviewed. Delta-9-tetrahydrocannabinol (THC)- indicated absence of drugs confirmed by testing and as THC + confirmed THC without another drug present., RESULTS: Of the 4849 patients included, 1373 (28.3%) were THC+. The THC + cohort was younger, had more males, and was more likely to be injured by penetrating mechanism ($P < 0.001$ for all) than THC-. THC + patients had shorter median length of stay (LOS) ($P < 0.001$) and intensive care unit LOS ($P < 0.001$). Mortality rate was lower in the THC + group (4.3% versus 7.6%, $P < 0.001$), but not in multivariate analysis. THC + patients with traumatic brain injury had shorter hospital LOS ($P = 0.025$) and shorter ventilator days ($P = 0.033$) than THC- patients. In patients with Injury Severity Score >=16, THC + patients had significantly lower intensive care unit LOS ($P = 0.009$) and mortality (19.3% versus 25.0% $P = 0.038$) than drug-negative patients., CONCLUSIONS: Although preinjury use of marijuana does not improve survival in trauma patients, it may provide some improvement in outcomes in patients with traumatic brain injury and those that are more severely injured

(Injury Severity Score >=16). The mechanism behind this finding needs further evaluation.

5329. Tagle, P. and G. Torrealba (1985). "[Transorbital projectile simulating a carotid-cavernous fistula]." "Proyectil transorbitario simulando fistula carotido cavernosa". **56**(4): 259-261.

5330. Taha, J. M., et al. (1991). "Intracranial infection after missile injuries to the brain: report of 30 cases from the Lebanese conflict." Neurosurgery **29**(6): 864-868.

This study reviews the features of 30 intracranial infections complicating 600 penetrating head injuries from missiles in patients treated at the American University of Beirut Medical Center between 1981 and 1988. The follow-up period ranged from 1 month to 7 years (mean, 2.5 years). Sixteen patients had a brain abscess, 9 had cerebritis, 2 had an infected intracerebral hematoma, and 5 had meningitis. Infection developed 4 days to 7 years after the initial debridement. The infecting organisms were Gram positive in 11 patients (36%), Gram negative in 12 (40%), and a combination of Gram positive and Gram negative in 2 (7%). Twenty-four patients (80%) had wound dehiscence or cerebrospinal fluid leakage at the time the infection appeared. There was a 76% correlation between the organisms cultured from the dehiscent scalp wound and the brain. Twenty-three patients had intracranial retention of bone. Infection developed in 16 of the 30 patients (70%) around bone fragments, in 4 around a metallic fragment, in 2 around absorbable gelatin sponge, and in 3 along the missile tract; 2 had an infected intracerebral hematoma, and 3 had meningitis. At least one of the following risk factors was present in each patient: extensive brain injury, coma, trajectory through an air sinus, cerebrospinal fluid fistula, inadequate initial debridement, or incomplete dural closure. The incidence of intracranial infection in patients with postoperative retention of bone was 4% in the absence of scalp wound dehiscence, compared with 84.6% when wound dehiscence was present. Ten patients (43%) still retained a bone fragment measuring less than 1 cm after excision of a brain abscess or treatment of cerebritis or meningitis.(ABSTRACT TRUNCATED AT 250 WORDS)

5331. Taha, J. M., et al. (1991). "Missile injuries to the brain treated by simple wound closure: results of a protocol during the Lebanese conflict." Neurosurgery **29**(3): 380-384.

This is a prospective study of the treatment of penetrating missile injuries to the brain without intracranial surgery carried out at the American University of Beirut Medical Center between 1981 and 1988. Of 600 patients treated for missile injuries to the head, 32 satisfied the study criteria. There were 27 shrapnel and 5 bullet injuries. The mean patient age was 23 years (range, 3-51 years). Twenty patients had intracranial indriven bone fragments. Six patients had exposed brain tissue. The mean follow-up was 3.5 years (range, 1-7.5 years). The superficial entry wound was debrided and closed without drainage in the Emergency Room within a mean of 3 hours (range, 0.5-6 hours), and the patient received methicillin for 14 days. All patients survived and had no or improved neurological deficits. No leakage of the cerebrospinal fluid, infection, or seizures occurred in 31 patients. One patient with indriven bone fragments had leakage of the cerebrospinal fluid and developed seizures and a brain abscess 20 days after the injury. The management of penetrating missile injuries to the brain without intracranial surgery in a select patient population is a reasonable option. This treatment becomes important for a surgeon facing large numbers of casualties, or when operative personnel or resources are limited or unavailable.

5332. Taher, A. A. (1993). "Management and complications of middle- and upper-third facial compound injuries: an Iranian experience." The Journal of craniofacial surgery **4**(3): 153-161.

Surgery for 772 patients with middle- or upper-third facial injuries was carried out between 1984 and 1990 in two university hospitals in Tehran. The most common etiological factor was firearm injuries (69.04%; n = 533), followed by road traffic accidents (24.44%; n = 189). The most common associated nonfacial injuries were head injuries (36.97%; n = 285 followed by ocular injuries (23.18%; n = 179). Treatment of middle- or upper-third facial injuries ranged from minor repair to major surgery with autogenous or allogenous grafts. The complications associated with middle- or upper-third facial injuries were either postinjury complications or postoperative complications and ranged from minor infection to loss of vision.

5333. Taher, A. A. (1998). "Management of weapon injuries to the craniofacial skeleton." The Journal of craniofacial surgery **9**(4): 371-382.

One thousand one hundred thirty-five patients suffering from different types of facial injuries caused by various weapons were treated in two university hospitals in Tehran, Iran from 1984 to 1990. The referred patients suffered from one of three types of facial injuries: soft-tissues injuries, 9.16% (N = 104); bone fractures, 18.15% (N = 206); and soft-tissue injuries and bone fractures (mixed injuries), 72.69% (N = 825). The number of male patients was greater than females (1,123 males and 12 females). Anatomically the facial injuries were classified into seven groups (lower third; middle third; upper third; lower and middle third; lower and upper third; middle and upper third; and lower, middle, and upper third). Lower-third facial injuries were the most common injuries, 72.60% (N = 824); followed by the middle-third injuries, 36.30% (N = 412); and the upper-third injuries, 20% (N = 227). The mandible was the most common site of injury in the lower-third injuries, zygomatico-orbital fractures were the most common site in the middle-third injuries, and the frontal bone was the most common site in the upper-third injuries. Of the total number of patients, 3.17% were children (N = 36) with different types of maxillofacial injuries. The majority of the injuries (52.42%; N = 595) were from bullets. The most common injuries not associated with maxillofacial injuries were head and ocular injuries. The least common were abdominal injuries. The head injuries were classified into five grades according to clinical and computed tomographic findings. Treatment of facial injuries ranged from minor repair and/or closed reduction to major soft-tissue and/or bone reconstruction. Postinjury complications were very high. The follow-up period ranged from 3 months to 3 years. The aim of this study is to add our experience in the management of facial injuries to the literature.

5334. Tai, A., et al. (2017). "Civilian penetrating craniocerebral gunshot injuries: Post-operative management and complications." Clinical neurosurgery **64**: 275.

INTRODUCTION: Civillian cranial gunshot wounds (GSWs) remain a frequently lethal and highly morbid injury uncommon to many civilian trauma centers. The vast majority of these patients die prior to reaching medical care. Of those who do survive their initial injury, recent series have shown that over 50% will succumb to their injuries or in-the-hospital complications. Furthermore, experience from wartime theaters has taught us that these patients are vulnerable to a multitude of complications (i.e. CSF leak, wound breakdown, hydrocephalus, vascular injury). Thus, the need and potential for improvement in care and understanding of these patients is large.Here, we present our institution's series of cranial GSWs with an emphasis on detailing our complications. METHODS: We retrospectively performed a chart review from 2015-2017. RESULTS: We identified 9 patients that underwent operative intervention in the form of decompressive craniectomy following a craniocerebral gunshot injury at a level 1 trauma center in Washington, D.C. The average age of patients was 31 years (3 females, 6 males) and time to operative intervention from initial presentation was less than 4 hours in 7 out of 9 patients and less than 12 hours in all patients. All patients underwent further operation for a multitude of reasons of which wound breakdown and CSF leak were the most common. These complications extended the hospital initial hospitalization for the majority of patients beyond 2 weeks and were invariably the cause of readmission of these patients. CONCLUSION:Not only is aggressive and early intervention critical in caring for patients with cranial GSWs, but also it is important to be vigilant in looking for and preventing further secondary injury from subsequent complications such as wound infections/breakdown, CSF leaks, hydrocephalus and vasospasm. These almost inevitable complications must be anticipated in the treatment planning from the principal operation.

5335. Takahashi, C. E., et al. (2021). "Blunt and Penetrating Severe Traumatic Brain Injury." Neurologic clinics **39**(2): 443-469.

Severe traumatic brain injury is a common problem. Current practices focus on the importance of early resuscitation, transfer to high-volume centers, and provider expertise across multiple specialties. In the emergency department, patients should receive urgent intracranial imaging and consideration for tranexamic acid. Close observation in the intensive care unit environment helps identify problems, such as seizure, intracranial pressure crisis, and injury progression. In addition to traditional neurologic examination, patients benefit from use of intracranial monitors. Monitors gather physiologic data on intracranial and cerebral perfusion pressures to help guide therapy. Brain tissue oxygenation monitoring and cerebromicrodialysis show promise in studies.

5336. Takahashi, K., et al. (2011). "Medullar injury caused by sewing needle puncture." The Journal of emergency medicine **40**(1): 65-67.

5337. Takahashi, T. and T. Shimohata (2019). "Vascular Dysfunction Induced by Mercury Exposure." International journal of molecular sciences **20**(10).

Methylmercury (MeHg) causes severe damage to the central nervous system, and there is increasing evidence of the association between MeHg exposure and vascular dysfunction, hemorrhage, and edema in the brain, but not in other organs of patients with acute MeHg intoxication. These observations suggest that MeHg possibly causes blood-brain barrier (BBB) damage. MeHg penetrates the BBB into the brain parenchyma via active transport systems, mainly the l-type amino acid transporter 1, on endothelial cell membranes. Recently, exposure to mercury has significantly increased. Numerous reports suggest that long-term low-level MeHg exposure can impair endothelial function and increase the risks of cardiovascular disease. The most widely reported mechanism of MeHg toxicity is oxidative stress and related pathways, such as neuroinflammation. BBB dysfunction has been suggested by both in vitro and in vivo models of MeHg intoxication. Therapy targeted at both maintaining the BBB and suppressing oxidative stress may represent a promising therapeutic strategy for MeHg intoxication. This paper reviews studies on the relationship between MeHg exposure and vascular dysfunction, with a special emphasis on the BBB.

5338. Takamiya, M., et al. (2009). "An autopsy case related to a terrorist attack using a ball-bearing bomb." Legal medicine (Tokyo, Japan) **11**(2): 83-86.

We encountered an autopsy case related to a terrorist attack using a ball-bearing bomb. The decedent was a 51-year-old male without significant medical histories. During dinner in a restaurant, the perpetrator suddenly exploded a ball-bearing bomb, the blast from which blew the victim off his chair. The victim was found to be unresponsive, and pronounced dead. X-ray photographs taken before autopsy revealed six spherical shadows. Three penetrating wounds in the head, one in the neck and chest, and two in the left upper arm were observed in vivo. Six projectiles recovered from the body were identified as ball-bearings, one of which traveled through the midbrain, diencephalon, and left temporal lobe. Although blast injuries and penetrating wounds are often combined in bomb attack victims, penetrating brain injury would be the cause of death in this case. Lethal injuries to major organs can thus occur even though the destructive force of a ball-bearing bomb is weak. X-ray films were informative for detecting the ball-bearings in this case, suggesting that autopsy imaging is essential in cases of terrorism victims.

5339. Takanashi, Y., et al. (2002). "Penetrating brain injury with nasal entry by a plastic stick. Case report." Journal of neurosurgical sciences **46**(1): 25-27.

A case of a 52-year-old male presented with an unusual penetrating brain injury with nasal entry. At admission he had erythema of periorbital soft tissue in the left eye and epistaxis. His neurological condition was lethargic (Glasgow Coma Scale of 13) with nonfluent aphasia. Computed tomography scan revealed intracranial contusion hematoma in the left frontal lobe and fracture of the left frontal base, which were treated surgically. At the 6-month follow-up he still showed nonfluent aphasia. Disturbances, mostly cognitive, were noted on his psychological tests. A survey of the literature reveals a few cases of this nature in penetrating brain injury with nasal entry. A penetrating brain injury with nasal entry which causes nonfluent aphasia is discussing.

5340. Takarada-Iemata, M., et al. (2014). "Deletion of N-myc downstream-regulated gene 2 attenuates reactive astrogliosis and inflammatory response in a mouse model of cortical stab injury." Journal of neurochemistry **130**(3): 374-387.

N-myc downstream-regulated gene 2 (Ndrg2) is a differentiation- and stress-associated molecule predominantly expressed in astrocytes in the CNS. In this study, we examined the expression and the role of Ndrg2 after cortical stab injury. We observed that Ndrg2 expression was elevated in astrocytes surrounding the wounded area as early as day 1 after injury in wild-type mice. Deletion of Ndrg2 resulted in lower induction of reactive astroglial and microglial markers in the injured cortex. Histological analysis showed reduced levels of hypertrophic changes in astrocytes, accumulation of microglia, and neuronal death in Ndrg2(-/-) mice after injury. Furthermore, activation of the IL-6/signal transducer and

activator of transcription 3 (STAT3) pathway, including the expression of IL-6 family cytokines and phosphorylation of STAT3, was markedly reduced in Ndrg2(-/-) mice after injury. In a culture system, both of Il6 and Gfap were up-regulated in wild-type astrocytes treated with forskolin. Deletion of Ndrg2 attenuated induction of these genes, but did not alter proliferation or migration of astrocytes. Adenovirus-mediated reexpression of Ndrg2 rescued the reduction of IL-6 expression after forskolin stimulation. These findings suggest that Ndrg2 plays a key role in reactive astrogliosis after cortical stab injury through a mechanism involving the positive regulation of IL-6/STAT3 signaling. Copyright © 2014 International Society for Neurochemistry.

5341. Takatori, T., et al. (1983). "[Application of roentgenography to medicolegal diagnosis. I. Gunshot wounds]." Nihon hoigaku zasshi = The Japanese journal of legal medicine **37**(2): 115-120.

5342. Talibi, S., et al. (2016). Long-term outcome of traumatic brain injury patients managed at a major trauma centre in England. **30:** 503.

Objectives: UHCW is the second busiest Major Trauma Centre in England according to TARN (Trauma Audit and Research Network). Managing patients with traumatic brain injury (TBI) constitutes a significant proportion of the workload. The objective of our study was to document the management and the long term outcome of TBI patients admitted to UHCW. Design: Data about patients with TBI managed at UHCW for the years 2013 and 2014 have been gathered. Subjects: Nil. Methods: Information about patients with TBI managed at UHCW was gathered from the following two sources: The Trauma Audit and Research Network (TARN) (for patients with severe head injury) and the i.Patient Manager (iPM) database maintained at the UHCW (for patients with mild and moderate head injury). Extended GOS (Glasgow Outcome Scale) questionnaires are being sent out to patients/carers/G.P.s to collect long-term outcome data. Results: 696 patients were admitted to the regional neurosurgical centre with TBI. The mean age of the patient was 57.6 (range 16- 100) years. 233 were female and 463 male. Admissions were due to 65 having had blunt trauma, 4 sustaining crush injuries, 295 falling less than 2 m, 134 falling more than 2 m, 182 after road traffic collision, 3 gunshot wounds to the head, 1 stabbing to the head, and 12 unknown. 193 admissions with TBI required intubation. The mean length of stay was 18 (range 0 to 210) days. Outcome at discharge: 437, good recovery; 42, moderate disability; 87, severe disability and 119, died. 11 were lost to follow-up. 539 patients required further rehabilitation. Long-term neurological outcomes (more meaningful) results are being collated and will be presented at the meeting. Conclusions: With neurological injury, long-term outcome is more relevant compared with outcome at discharge. TARN data does not include long-term outcome for head injured patients. With this study, we make the case for collection of long-term outcome data for TBI patients.

5343. Tama, M. and B. Khodorkovsky (2017). "Does specialty training and practice setting effect adherence to the pediatric emergency care applied research network (PECARN) criteria for pediatric head trauma?" Academic emergency medicine. Conference: **24**: S32.

Background: Pediatric head injuries account for a significant portion of emergency department (ED) visits. While computed tomography (CT) use in these patients can be a definitive diagnostic test, the effects of ionizing radiation exposure are a significant consideration. In the past ten years, the Pediatric Emergency Care Applied Research Network (PECARN) developed an algorithm for the utilization of CT scans when evaluating pediatric patients with head trauma. The goal of this study was to determine the effects of specialty training in addition to practice settings on the adherence to PECARN criteria. Methods: A retrospective study was conducted on a two campus hospital. Chart documentation was used to determine adherence to PECARN criteria. Inclusion criteria was any traumatic head injury within 24 hours in patients under the age of 18 years over a one-year period. Exclusion criteria was penetrating trauma, brain tumors, pre-existing neurological disorders, or neuroimaging at an outside facility. Specialty training was subdivided into three groups: pediatric emergency medicine (PEM), emergency medicine (EM), and general pediatrics (GP). The two hospital campuses are distinctly different practice settings. One being an academic practice setting, which is also a trauma center that has a dedicated pediatric ED, staffed by PEM, EM and GP physicians. The second campus is a community practice and is staffed solely by EM physicians. Statistical analysis was performed utilizing chi2 and the Cochran-Mantel-Haenszel (CMH) test. All analyses were two-sided, and a P-value of < 0.05 was considered statistically significant. Results: A total of 709 pediatric patients with traumatic head injuries were analyzed during the study period. CT scans were obtained on 119 (16.8%) patients. Overall adherence to PECARN criteria was 93%. No statistical difference was found between

different specialty training on the academic campus. Additionally, the rate of adherence amongst EM physicians at the academic and community settings was 94.8% vs. 86.5% respectively, which was statistically significant (P=0.004). Conclusions: Practice setting had an effect on adherence to PECARN criteria in pediatric patients with acute traumatic head injury. The same determination on adherence was not demonstrated among physicians with different specialty trainings.

5344. Tamaoka, J., et al. (2019). "Osteonecrosis of the jaws caused by bisphosphonate treatment and oxidative stress in mice." Experimental and Therapeutic Medicine **17**(2): 1440-1448.

Aging is a significant risk factor for the development of bisphosphonate-related osteonecrosis of the jaws (BRONJ). Accumulating evidence suggests that bone aging is associated with oxidative stress (OS), and OS is associated with osteonecrosis. To elucidate the mechanisms of the onset of BRONJ, the present study focused on OS and the effects of treatment with the pro-oxidant DL-buthionine-(S,R)-sulfoximine (BSO), an oxidative stressor, on healing of a surgically induced penetrating injury of the palate. Six-week-old C57BL/6J mice were randomly divided into four groups (n=5 each) and treated with or without zoledronic acid (ZOL) and with or without BSO (experimental groups: ZOL, BSO, and ZOL+BSO; control group: saline solution). A penetrating injury of the midline palate was surgically created using a root elevator. ZOL (250 µg/kg/day) was injected intraperitoneally every day from 7 days prior to the surgical treatment to 4 days following the surgical treatment. BSO (500 µg/kg/day) was administered 7 days prior to the surgical treatment as a single intraperitoneal injection. The maxillae were harvested at 5 days following the surgical treatment for histological and histochemical studies. The presence of empty osteocyte lacunae in the palatal bone was increased by ZOL and BSO treatment. The highest number of empty osteocyte lacunae was observed in the ZOL+BSO group. The number of tartrate-resistant acid phosphatase-posi-tive cells was decreased by ZOL treatment and increased by BSO treatment. The number of canaliculi per osteocyte lacuna was significantly decreased by BSO treatment. The mineral apposition rate was significantly lower in the treatment groups than the control group. Bisphosphonates and OS suppressed bone turnover. The present study has demonstrated that BSO treatment affects osteocytes, and OS in osteocytes exacerbaimpairment of the osteocytic canalicular networks. As a resbisphosphonates and OS may induce osteonecrosis followinvasive dentoalveolar surgery. OS has been identified as additional risk factor for the development of BRONJ.

5345. Tamrazian, E. and B. Mehta (2018). "Dysphagia and tongue deviation: Collette-sicard syndrome after blunt head trauma." Journal of Neuroimaging **28**(2): 229.

Background and Purpose: The jugular foramen and the hypoglossal canal are both apertures located at the base of the skull. The jugular foramen contains the cranial nerves, IX, X, and XI, involved in normal cough and gag reflex. The hypoglossal canal contains the cranial nerve XII, responsible for movements of the tongue. Therefore, multiple lower cranial nerve palsies tend to occur with injuries to these structures. The pattern of injuries tends to correlate with the combination of nerves damaged. Case: A 28-year-old male was involved in an AVP injury while crossing the highway. Patient was brought to a local Level I Trauma Center. On admission, he was complaining of a headache and inability to swallow his own saliva. Exam showed a Glasgow coma scale of 15, awake, alert, and oriented to date, place, and person, with dysphagia, tongue deviation to the right, uvula deviation to the left, and a depressed palate. No other abnormal findings were noted. Initial imaging showed B/L frontal traumatic subarachnoid hemorrhage, left frontal epidural hematoma, and a basilar skull fracture. On HD 4, he was transferred out of the intensive care unit with persistent tongue deviation and inability to swallow. Initial radiology read by a radiologist did not reveal any further structural abnormalities then the ones stated above. Neurology was consulted and imaging was reviewed by neuroimaging-trained neurologist, which demonstrated injury to the wall of the jugular foramen and the hypoglossal canal. Nasogastric tube feeding was initiation and patient had percutaneous endoscopic gastrostomy tube placed on HD 17 and discharged home. At 3-month follow-up, patient's tongue normalized to midline and his dysphagia resolved. Conclusion: Collette-Sicard syndrome is a rare condition/syndrome characterized by unilateral palsy of CN: IX, X, XII, and XII first described by Dr. Collete in 1915 and by Dr. Sicard. This condition was historically attributed to tumors of the skull base, coiling and dissections of the internal carotid artery, multiple myeloma, vasculitis, carotid fibromuscular dysplasia, shotgun injuries, idiopathic cranial polyneuropathy, atlas fractures, and occipital condyle fractures. This condition has been rarely described as a consequence of blunt head trauma. Injuries to the jugular foramen and the hypoglossal canal are rare as most blunt head traumas resulting in basilar skull fracture involve the condyles. In most cases, the condition is self-limiting with patients regaining most to all of their neurological functions within 6 months. Several theories have been

proposed for the pathophysiology of this syndrome. Nerve traction injuries and soft tissue edema compressing the cranial nerves are the leading two hypotheses. In conclusion, injuries with focal neurological deficits which were not apparent on initial imaging should be reviewed by relevant experts with concomitant knowledge of the patient's history.

5346. Tan, M. H. and K. A. Choudhari (2003). "Penetrating head injury from an electrical plug." Injury **34**(12): 950-953.

5347. Tan, W.-F., et al. (2012). "Pretransplant neurological presentation and severe posttransplant brain injury in patients with acute liver failure." Transplantation **94**(7): 768-774.

BACKGROUND: Alterations in the central nervous system in patients with acute liver failure (ALF) present unique challenges in the perioperative period. In this retrospective study, we examined pretransplant neurological presentation and the incidence, clinical presentation, and risk factors associated with severe posttransplant brain injury (BI) in ALF patients undergoing orthotopic liver transplantation (OLT)., METHODS: After institutional review board approval, ALF patients who underwent OLT between 2004 and 2010 at our center were reviewed. Pretransplant neurological presentation and severe posttransplant BI were examined. Risk factors for the latter were identified., RESULTS: During the study period, 90 (67 adults and 23 children) ALF patients underwent primary OLT. Preoperatively, all patients developed encephalopathy, 6 had seizure activity, 32 had radiological evidence of cerebral edema, and 11 had severe cerebral edema. After OLT, 7 patients developed severe posttransplant BI. Of these 7 patients, 4 had brain death, and 3 had irreversible injury that precluded them from living independently. Severe pretransplant cerebral edema and a higher posttransplant international normalized ratio (odds ratios and 95% confidence intervals: 50.2, 5.8-433.5 [P<0.001] and 3.1, 1.1-8.8 [P=0.031], respectively) were risk factors associated with severe posttransplant BI., CONCLUSIONS: Pretransplant neurological complications were prevalent, and severe posttransplant BI occurred at a rate of 7.8% and was significantly associated with severe pretransplant cerebral edema and postoperative international normalized ratio. Our findings support the use of pretransplant computed tomography. If severe pretransplant cerebral edema is confirmed, efforts should be made to aggressively control intracranial pressure and select a proper donor to minimize the risk of severe posttransplant BI and futile transplantation.

5348. Tan, Y., et al. (1998). "A gross and microscopic study of cerebral injuries accompanying maxillofacial high-velocity projectile wounding in dogs." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **56**(3): 345-348.

PURPOSE: This study investigated the pathologic characteristics and some related factors of cerebral damage associated with maxillofacial high-velocity missile wounds., MATERIALS AND METHODS: Sixty dogs, divided into two groups, were wounded randomly by steel spheres weighting 1.03 g at impact velocities of 1,400 m/s (46 dogs) and 800 m/s (14 dogs). Six dogs served as controls. The maxillofacial wounds and cerebral injuries were examined grossly. The distance between the center of wound and the base of skull and the largest diameter of the wound were measured, and the incidence of the brain injury in the two groups was compared. The cerebral specimens, dissected at 1 and 6 hours after trauma, were observed by light and electron microscopy., RESULTS: Cerebral hyperemia, contusion, spotty hemorrhage, and intracerebral hematoma were found in some of the dogs. In the 1,400 m/s velocity missile wound group, the incidence of the brain injury was 71.7% (33 of 46), and in the 800 m/s group it was 7.1% (1 of 14) on macroscopic examination. Microscopic observation showed intracerebral microhemotomas and degeneration and necrosis of the nervous cells., CONCLUSION: High-velocity projectile maxillofacial wounds can induce associated brain injury.

5349. Tanaka, K., et al. (1985). "Pseudomonas labyrinthitis." Archives of oto-rhino-laryngology **242**(3): 273-277.

Pseudomonas aeruginosa is the gram-negative bacterial rod which is often isolated from chronic aural discharge. This microorganism may also cause necrotizing infection of the external auditory canal in certain patients with impaired host-defense mechanisms. Involvement of the inner ear by this microbe is extremely rare. In this communication, we report a case of pseudomonas labyrinthitis which resulted from traumatic middle ear injury. Infection produced massive granulations and extensive bone destruction of the otic capsule. This case shows that while P.aeruginosa is usually an avirulent opportunistic pathogen, it may also cause a highly destructive labyrinthitis if the inner ear is entered.

5350. Tanaka, T., et al. (1997). "Surgical extraction of traumatic orbital mercury." Ophthalmologica. Journal international d'ophtalmologie. International journal of ophthalmology. Zeitschrift fur Augenheilkunde **211**(6): 402-404.

Initial clinical observation of a 2-year-old boy whose right eyelid had been pierced by a glass thermometer 3 days earlier showed a scab-covered cicatrix and slight swelling in the eyelid. X-ray examination showed the broken thermometer tip, fine glass fragments, and mercury droplets beneath the eyelid and extending along the superior orbital margin. On surgical incision, glass fragments and the thermometer tip were found and extracted from the eyelid and orbital fatty tissue with forceps, and 70.3 mg of mercury droplets were readily removed from the same regions by suction via an elastic needle connected to an injection syringe. Blood mercury gradually rose from the normal range to a peak of 28.4 microg/dl 3 months after surgery, then declined during the following 7 months to a level of 15.1 microg/dl. No abnormality has been found in liver or renal function to present.

5351. Tancioni, F., et al. (1994). "Intracranial nail. A case report." Journal of neurosurgical sciences **38**(4): 239-243.

Penetrating cranio-cerebral trauma caused by fire-arm constitute the most frequent penetrating wounds in civilian ambit; in these cases the great extention of cerebral damage is the result of distructive forces generated by high velocity which moves this bodies. In civilian ambit cranio-cerebral wounds caused by penetrating bodies, but moved by low cinetic energy are increasing constantly, due to the development of industrial activities. The cases reported in literature are few; in the present paper we present the case of a cranio-cerebral wound caused by a nail, which is the longest nail ever reported in literature (9 cm). Cranio-cerebral penetrating wounds caused by nail are reported only as curious experience; none authors tried to standard the medical-surgical approach as for what concern the clinic valutation, as for treatment. We think that for these traumatic event, we can adapt the same valutations criteria used for wounds caused by fire-arms. For what concerns surgery of such injuries, we consider the emergency operation the best solution; generally in these cases the purpose of surgery is not the removal of devitalized tissues, evacuation of hematomas or removal of bone fragments or of penetrating bodies as happen in cases of penetrating bodies moved by high cinetic energy, but for the possible complications which can result immediately or after the trauma.

5352. Tandean, S., et al. (2017). "Pediatric gunshot penetrating head injury: A case report with 2-year follow-up." Medical Journal of Indonesia **26**(4): 302-306.

Gunshot is a rare subset of penetrating head injury, and generally the victim dies before arriving at the hospital. This paper reported a case of an intracranial gunshot injury in a 12 year-old boy that was shot by his friend, whose primary intention was to play around, using a revolver. A missile projectile penetrated from mid frontal and came out from right occipital. Vital signs were stable with GCS 8 from physical examination. A rational management strategy should permit a good outcome. The only complications that occured were hydrocephalus, yet it was managed by VP–shunt. Skull defect was closed using titanium mesh. A two-year follow-up showed a good result. The patient was able to do daily activity and back to school again.

5353. Tandon, R., et al. (2003). "Central serous retinopathy masquerading as sympathetic ophthalmia." Eye (London, England) **17**(5): 666-667.

5354. Taneri, S., et al. (2001). "[Eyelid edema and somnolence after hay fork injury of the eye. Penetrating orbital and brain injury]." Lidschwellung und Somnolenz nach Heugabelstoss ins Auge. Penetrierende Orbita- und Hirnverletzung. **98**(5): 492-493.

5355. Tang, O. Y., et al. (2022). "The Impact of Frailty on Traumatic Brain Injury Outcomes: An Analysis of 691,821 Nationwide Cases." Clinical neurosurgery **68**(SUPPL 1): 116.

INTRODUCTION: Earlier research has demonstrated that patient frailty, a decline in physiologic reserve, is associated with higher morbidity and mortality for several neurosurgical conditions. However, the impact of frailty on traumatic brain injury (TBI) outcomes is poorly characterized. METHODS: We identified all adult admissions for traumatic intracranial hemorrhage (tICH) in the National Trauma Data Bank from 2007-2017. Frailty was quantified via the

validated mFI-5 metric (0-5), with mFI-5 =2 denoting frailty. Analyzed outcomes included in-hospital mortality, favorable discharge disposition (discharge home or to shortterm care), complications, ventilator days, and intensive care unit (ICU) and total length of stay (LOS). Multivariable regression was used to assess the association between mFI-5 and outcomes, adjusting for patient demographics (age, sex, insurance, transfer status), hospital characteristics (teaching status, trauma center level, bed size), injury severity on admission (penetrating injury, Glasgow Coma Scale [GCS], Injury Severity Score, hypotension, number of tICH subtypes), and neurosurgical procedures. RESULTS: 691,821 tICH admissions were analyzed. 63.2% were male and average age was 57.6 years (standard deviation=21.2). 43.5% were above 65 years of age. 18.0% of patients were classified as frail (mFI-5 = 2), and the percentage of frail patients grew from 7.9% in 2007 to 21.9% in 2017. Frailty was associated with increased odds of mortality (odds ratio [OR] = 1.36, P < 0.001) and decreased odds of favorable discharge disposition (OR = 0.72, P < 0.001). Frail patients also exhibited an elevated rate of complications (OR = 1.06, P < 0.001), including unplanned return to the ICU (OR = 1.55, P < 0.001) and operating room (OR = 1.17, P = 0.003). Finally, ventilator days (+12%, P < 0.001), ICU LOS (+11%, P < 0.001), and total LOS (+13%, P < 0.001) were significantly higher in frail patients. All associations with death and disposition remained significant following stratification for age, polytrauma, ICU stay, and GCS on admission. CONCLUSION: For tICH patients, frailty was associated with elevated mortality, unfavorable discharge disposition, complications, ventilator days, and LOS, regardless of age or injury severity. Further research into integrated care pathways for this high-risk population is warranted.

5356. Tang, T.-Q., et al. (2020). "An Unusual Cause of Cholecystitis." Gastroenterology **159**(6): e12-e13.

5357. Tang, Z., et al. (2012). "Dynamic simulation and preliminary finite element analysis of gunshot wounds to the human mandible." Injury **43**(5): 660-665.

OBJECTIVE: Due to the complications arising from gunshot wounds to the maxillofacial region, traditional models of gunshot wounds cannot meet our research needs. In this study, we established a finite element model and conducted preliminary simulation and analysis to determine the injury mechanism and degree of damage for gunshot wounds to the human mandible., METHODS: Based on a previously developed modelling method that used animal experiments and internal parameters, digital computed tomography data for the human mandible were used to establish a three-dimensional finite element model of the human mandible. The mechanism by which a gunshot injures the mandible was dynamically simulated under different shot conditions. First, the residual velocities of the shootings using different projectiles at varying entry angles and impact velocities were calculated. Second, the energy losses of the projectiles and the rates of energy loss after exiting the mandible were calculated. Finally, the data were compared and analysed., RESULTS: The dynamic processes involved in gunshot wounds to the human mandible were successfully simulated using two projectiles, three impact velocities, and three entry angles. The stress distributions in different parts of mandible after injury were also simulated. Based on the computation and analysis of the modelling data, we found that the injury severity of the mandible and the injury efficiency of the projectiles differ under different injury conditions., CONCLUSIONS: The finite element model has many advantages for the analysis of ballistic wounds, and is expected to become an improved model for studying maxillofacial gunshot wounds.

5358. Tani, P. M., et al. (1977). "An unusual knife injury to the orbit: a case report." Ophthalmic surgery **8**(4): 43-46.

A perforation of the left orbit by a five-inch knife blade was sustained by a 30-year-old woman. In spite of the knife's course through a myriad of vital structures, the only significant injury was a laceration of the lateral canthal tendon. Following surgical repair the patient recovered with no residual problems.

5359. Taniura, S., et al. (2004). "Transoral penetration of a half-split chopstick between the basion and the dens." AJNR. American journal of neuroradiology **25**(5): 871-872.

A 6-year-old girl was admitted for transoral penetrating injury by a half-split chopstick. Subsequent CT imaging examinations showed that the chopstick had passed between the basion and the dens and reached the subarachnoid space just at the medulla oblongata. A sagittal reconstructed CT scan was useful for the evaluation of the injury. Imaging findings and their clinical relevance are discussed.

5360. Tanmit, P., et al. (2021). "A life saving emergent temporary external carotid artery controlled in extensive craniofacial injury." International medical case reports journal **14**: 199-204.

Introduction: Craniofacial trauma may potentially have significant blood loss which may lead to death in some trauma patients. Case Report: We report a case of a 43-year-old male who had a lethal noncompressible arterial hemorrhage from a penetrating wound on his left frontotemporal and preauricular region. Extensive bleeding was successfully temporarily controlled by external carotid artery (ECA) occlusion. The definitive operation was completed in a staged fashion following a computed tomography angiography assessment extension of the injury. Conclusion: Temporarily controlling the bleeding from the carotid artery should be considered as a life saving procedure in a lethal craniofacial injury.

5361. Tanriover, N., et al. (2015). "Endoscopic Endonasal Transethmoidal Approach for the Management of a Traumatic Brain Abscess and Reconstruction of the Accompanying Anterior Skull Base Defect." The Journal of craniofacial surgery **26**(6): 1957-1959.

Skull base endoscopy in the treatment of brain abscesses has been rarely published. Moreover, endoscopic endonasal transethmoidal approach (EETA) for the treatment of brain abscess following a head trauma has been reported only in a few case reports. We report the management of a patient of intracerebral abscess and reconstruction of the accompanying anterior skull base defect through an EETA.Thirty-year-old male with a frontal lobe abscess due to a penetrating skull base trauma was operated via EETA. After drainage of the abscess, dural and bony defects were repaired to prevent any recurrence. Postoperative radiological imaging revealed prominent decrease in abscess size. The patient did not need any further surgical intervention, and antibiotherapy was adequate.EETA is safe and effective in the management of brain abscesses. Skull base endoscopy provides direct visualization of the abscess cavity through a minimal invasive route, facilitates wide exposure of surrounding neurovascular structures within the operative field, and enables concurrent closure of the skull base defect.

5362. Tarasidis, G. S., et al. (2017). "Hearing Preservation After Penetrating Cochlear Injury." The Annals of otology, rhinology, and laryngology **126**(2): 163-165.

OBJECTIVES: To share results and recommendations for management of penetrating cochlear injury., METHODS: A patient underwent repair of a penetrating cochlear injury after a projectile led to a traumatic cochleostomy with a narrow miss of the facial nerve and intracranial carotid artery., RESULTS: Postoperatively, the patient's audiogram demonstrated a pure tone average of 47.5 dB for air conduction and 35 dB for bone conduction, worse in the high frequencies, with a Word Recognition Score of 76%., CONCLUSIONS: Hearing loss from a penetrating cochlear injury can be mitigated with early repair, minimizing inner ear trauma, and steroid use to treat posttraumatic labyrinthitis.

5363. Tarbet, C., et al. (2021). "White-eyed blowout fracture with muscle entrapment misdiagnosed as increased intracranial pressure: An important clinical lesson." The American journal of emergency medicine **48**: 375.e371-375.e373.

Patients with white-eyed blowout fracture with muscle entrapment in the pediatric population may be misdiagnosed as increased intracranial pressure (ICP) due to the similarity in presenting symptoms. A delay in the correct diagnosis can lead to permanent sequelae including diplopia, permanent loss of vision, and death. In this case report we discuss the treatment of a male pediatric patient who presented in the ED with nausea, confusion, and restricted eye gaze. He was misdiagnosed with increased intracranial pressure and was admitted to the PICU. Subsequent consultation by ophthalmology allowed for the correct diagnosis of a trapdoor fracture. The patient was taken to the OR for emergent orbitotomy with reduction of the fracture and release of the entrapped muscle. Symptoms of white-eyed orbital blowout fractures with muscle entrapment easily mimic symptoms of head trauma with increased ICP. Misdiagnosis of trapdoor orbital fractures with entrapment can be avoided by ordering and critically reviewing an orbital CT and requesting an ophthalmologic consultation in the ED to evaluate extraocular movement. This report should help to increase awareness of symptoms of white-eyed orbital blowout fractures with muscle entrapment, prevent confusion with elevated ICP, and assist accurate and timely diagnosis in the ED to arrange appropriate management and surgical intervention to ensure best outcomes.

5364. Tartaglione, T., et al. (2012). "Importance of 3D-CT imaging in single-bullet cranioencephalic gunshot wounds." La Radiologia medica **117**(3): 461-470.

PURPOSE: The aim of this paper is to demonstrate that computed tomography (CT) and three-dimensional (3D) CT imaging techniques can be useful tools for evaluating gunshot wounds of the skull in forensic medicine. Three purposes can be achieved: (1) identifying and recognising the bullet entrance wound - and exit wound, if present; (2) recognising the bullet's intracranial course by studying damage to bone and brain tissue; (3) suggesting hypotheses as to the dynamics of the event., MATERIALS AND METHODS: Ten cadavers of people who died of a fatal head injury caused by a single gunshot were imaged with total-body CT prior to conventional autoptic examination. Three-dimensional-CT reconstructions were obtained with the volume-rendering technique, and data were analysed by two independent observers and compared with autopsy results., RESULTS: In our experience, CT analysis and volumetric reconstruction techniques allowed the identification of the bullet entrance and exit wounds and intracranial trajectory, as well as helping to formulate a hypothesis on the extracranial trajectory to corroborate circumstantial evidence., CONCLUSIONS: CT imaging techniques are excellent tools for addressing the most important questions of forensic medicine in the case of gunshot wounds of the skull, with results as good as (or sometimes better than) traditional autoptic methods.

5365. Tatar, S., et al. (2016). "Clinical analysis of facial fractures: A ten years study of 300 cases." Journal of Experimental and Clinical Medicine (Turkey) **33**(4): 221-224.

The reasons and types of facial fractures and their treatment approaches are different, depending on the age group, and these fractures constitute an important part of the practice of plastic surgery. Demographic characteristics, etiologies of fractures, fracture types, and treatment approaches were evaluated in patients who underwent an operation due to facial fractures between 2006 and 2016. A total of 300 patients were operated on at our clinic over a period of ten years. The reason for the fracture was often motor vehicle collisions in the adult patient group, while the reason was falls and accidents in the pediatric age group. Mandibular fractures ranked first among other types of fracture and orthopedic injuries ranked first among systemic injuries. The preferred treatment approach was open surgery in adult patients and conservative therapies in the pediatric age group. The present study carried out a retrospective review of 300 cases and demographic characteristics, etiologies, fracture types, accompanying injuries, and treatment approaches were presented in consideration of the current literature.

5366. Tatiya Harish, S., et al. (2018). "Five-year retrospective analysis of profile of firearm deaths in pune region." Medico-Legal Update **18**(2): 25-28.

A firearm is any weapon which discharges a missile by the expansive force of the gases produced by burning of an explosive substances. According to the World Health Organization, firearms are used in two thirds of all homicide cases and one fifth of suicide cases. India’s rates of violence vary greatly and in majority of firearm related injuries illegal, unlicensed weapons are used. The objective of the study is to outline the pattern of firearm injuries and deaths in this area and compare it with the pattern seen in other parts of the world. In the present study, the medicolegal autopsies conducted between January 2012 to December 2016 at B.J. Government Medical College and Sassoon General Hospital, Pune, Maharashtra were analyzed retrospectively. Males were more commonly affected than females; while highest number of deceased belonged to age group of 21 to 40 years. Majority of firearm deaths were homicidal in nature; while Revenge for personal enmity and Land Dispute, Business/political rivalry were the leading circumstances leading to firearm deaths. Firearm injuries were solely present without any other injuries in majority of the cases and lung, heart and brain were common internal organs affected.

5367. Tatli, M., et al. (2006). "Anesthesia dolorosa caused by penetrating cranial injury." European neurology **56**(3): 162-165.

Anesthesia dolorosa (AD) is an uncommon complication of surgical treatments for trigeminal neuralgia. Its incidence is around 0.8%. To our best knowledge, AD caused by a penetrating cranial injury has not been reported previously. We report the case of a 31-year-old male patient with left-sided neuropathic keratitis and AD that began 18 years earlier, following a penetrating cranial injury with a knife to the left postauricular area. The patient was successfully treated by a carbamazepine and gabapentin combination. In conclusion, penetrating cranial injury is

uncommon but may cause a serious neurologic disturbance. In the differential diagnosis of AD, a penetrating injury should be kept in mind. In these cases, treatments should be effective and immediate; otherwise, this may result in catastrophic consequences such as neurotrophic keratitis and blindness. Ophthalmologists should be aware of these potential problems. Copyright (c) 2006 S. Karger AG, Basel.

5368. Tattoli, L., et al. (2019). "An unusual work-related fatality: the importance of scene investigation combined with autopsy findings." Forensic science, medicine, and pathology **15**(3): 513-515.

Transorbital penetrating intracranial injuries are uncommon amongst the civilian population, but they can be found in fatal work-related accidents. An unusual case of accidental fatal penetrating intracranial injury in a 44-year-old man at work is reported. He was working in a building site driving a tractor with a rear- mounted flail mower. While he was mowing grass close to a crane, he became unconscious and then comatose. A cranium X-Ray and a brain CAT scan taken before he died revealed the presence of a metallic foreign body in the left occipital area that had penetrated the left eyelid and orbital bone. At autopsy, a fragment of a frayed electrical copper cable was found stuck in the brain. Investigation at the scene found a cable with the same characteristics of the fragment recovered from the victim's brain protruding from the ground just beneath the tractor. It was concluded that the mower blades had severed the cable and propelled a fragment of it upwards, striking the man in the head.

5369. Tattoli, L., et al. (2014). "Three rounds as "tandem bullets": unusual findings in a case of a suicidal gunshot to the head." Forensic science, medicine, and pathology **10**(4): 613-618.

We report an unusual case of suicide in which three 7.65 caliber projectiles were found in the single gunshot wound to the head of a 53-year-old man. Based on data collected at the death scene, CT scan, autopsy findings, and ballistics analysis, the events were reconstructed as follows: two 7.65 mm rounds had already been fired from the 9 mm Makarov pistol the subject was using but, being a smaller caliber, the cartridges had slipped forward and lodged within the barrel. When a third 7.65 mm cartridge was chambered and the gun fired for the third time, the nose of the last bullet hit the lodged bullets and all three rounds were propelled out of the muzzle in tandem as a single shot. Ballistic investigations confirmed that the kinetic energy of the three tandem bullets would have been sufficient to perforate the skull. In cases of gunshot wounds where the manner of death is unclear, a number of well-described circumstantial parameters, such as an atypical anatomical location of the gunshot, unusual firearm, or ammunition, as well as ambiguous autopsy findings, can raise doubts about the manner of death. In very rare cases, despite a single entrance wound, two or more bullets are recovered from the body, fired by the same weapon at the same time (the so-called "tandem bullet" phenomenon). Injuries by "tandem bullets" have crucial implications in gunshot deaths because of the mismatch between the number of entrance and exit wounds and the number of bullets found in or near the body.

5370. Taupin, A., et al. (2013). "Dental implant rehabilitation supported by distracted bone: A 10 years experience." European Surgical Research **50**(2): 90.

Introduction: The dental implant rehabilitation is one of the ultimate challenge of the management of patients who have experienced ballistic trauma of the face. Distraction osteogenesis is a surgical technic proven to be efficient in the reconstruction of multi tissular defects that are characteristics of this type of injury. The authors present the results of their experience in terms of dental implant rehabilitation supported by distracted bone over 10 years. Objectives: The objective of this study is to clarify the elements concurring to the success of dental implant rehabilitation after distraction osteogenesis of the jaw. Materiel/Patients and Methods: 3 patients treated in the department of maxillofacial and plastic surgery of the Universatory Hospital of Caen (France) have undergone such surgery and received an denatl implant rehabilitation after mandibular distraction osteogenesis. Results: Results: Several well known undesirable events occured during distraction osteogenesis leading to improved distraction procedure and devices. Among all implants placed in distracted bone, only one has to be removed because of infection. Implant stability in distracted bone is comparable to the stability of those placed in healthy bone. Every patient are satisfy by their implant dental rehabilitation and have recovered their masticatory function. Conclusion: Distraction osteogenesis is a unique surgical technic that allows a three-dimensional and especially multitissular reconstruction that allows dental implant rehabilitation in safe and quality conditions.

5371. Tavlasoglu, M., et al. (2012). "Bleeding control of vertebral artery transection in its second part due to gunshot injury." Heart Surgery Forum **15**: S123.

OBJECTIVE:The vertebral arteries arise from the subclavian arteries, one on each side of the body, and then enter deep to the transverse process of the level of the 6th cervical vertebrae (C6). Or occasionally (in 7.5% of cases) at the level of C7. They then proceed superiorly, in the transverse foramen of each cervical vertebra until C1. This path is largely parallel to, but distinct from, the route of the carotid artery ascending through the neck. At the C1 level the vertebral arteries travel across the posterior arch of the atlas through the suboccipital triangle before entering the foramen magnum. Therefor the vertebral artery may be divided into four parts. The first part runs upward and backward between the Longus colli and the Scalenus anterior muscles, the second part runs upward through the foramina in the transverse processes of the C6 to C2 vertebrae, third part of the artery is covered by the Semispinalis capitis and is contained in the suboccipital triangle, a triangular space bounded by the Rectus capitis posterior major, the Obliquus superior, and the Obliquus inferior muscles, and the fourth part pierces the dura mater and inclines medialward to the front of the medulla oblongata. Because of the sheltered course of vertebral artery, its injuries only emerge as a result of gunshots. The spread of tissue damage is regarding to the mass of the bullet and its kinetic energy. In this article we present bleeding control method of vertebral artery transection in the second part of its course. METHODS:34 year-old male patient due to gunshot injury of the left vertebral artery were delivered to our clinic. We could not control bleeding in the first attempt; however we decided to find the proximal end of the vertebral artery in the departure point from subclavian artery. Subsequently the patient was turned on right lateral decubitus position to be dissected the suboccipital triangle (third part of vertebral artery). Afterwards vertebral artery had ben ligated before it entered the cranial cavity. RESULTS:As a result, the bleeding of vertebral artery transection in the second part can be controlled by ligating proximal end just close to departure point and distal end just before entering the cranial cavity. CONCLUSIONS:It should be kept in mind that patient had to be placed in lateral decubitus position to be reached to the first and third part of vetebral artery to control its bleeding.

5372. Taware, A. A., et al. (2015). "Kronlein shot-evisceration of brain: A case report." Journal of Forensic Medicine and Toxicology **32**(2): 42-45.

Close range shot gun wounds of head produce a very devastating injury leading to evisceration of brain. Many a times it is misinterpreted as explosion injury. The current case discusses autopsy features and mechanism of this injury caused to a 12 year old boy who while playing misfired the shotgun accidentally and succumbed to death.

5373. Tawfilis, A. R., et al. (2002). "Alloplastic reconstruction of a temporal bone and glenoid fossa defect." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **60**(9): 1079-1082.

5374. Tay, J. S. and J. S. Garland (1987). "Serious head injuries from lawn darts." Pediatrics **79**(2): 261-263.

Serious injuries secondary to lawn darts have not been reported. In this article two cases of penetrating skull injuries are reported. One patient developed a polymicrobial brain abscess necessitating surgical drainage and a prolonged hospitalization. Psychologic function was diminished at discharge. The second child required surgical repair of a depressed skull fracture. Thirteen lawn dart head injuries have been reported to the Consumer Product Safety Commission between 1983 and 1985. These injuries are summarized along with the reported cases to point out the seriousness (neurologic impairment in 5/10 head injuries) of such injuries and warn parents and physicians of the potential dangers of this game.

5375. Taylor, A. G. and J. C. Peter (1997). "Patients with retained transcranial knife blades: a high-risk group." Journal of neurosurgery **87**(4): 512-515.

Sixty-six patients with transcranial stab wounds presenting to Groote Schuur Hospital over a 2-year period are reviewed. Two groups were identified, those with retained knife blades at presentation (Group A, 13 patients) and those without (Group B, 53 patients). An increased incidence of vascular complications was observed in Group A, (eight of 13 patients) compared with 11 of 53 patients in Group B ($p < 0.01$, chi-square test). The mortality rate was also higher in Group A, with deaths in three of 13 patients compared with four of 53 in Group B. Increased mortality was a result of

vascular injury, and in two patients neurological deterioration occurred only after knife blade removal. Possible reasons for these findings are that retained blades tend to be deeply penetrating with a potential for more cerebral and vascular injury, and there is a higher incidence of petrous bone penetration that results in carotid artery injury.

5376. Taylor, C. and A. J. Macnab (2001). "Pediatric eye injury due to Avena fatua (wild oats)." Pediatric emergency care **17**(5): 358-360.

OBJECTIVE: We report on florid and unusual ophthalmic physical signs in three children where the trauma was caused by seeds from Avena fatua, a grass common in western North America., DESIGN: Case series and literature review., SETTING: Three local emergency departments (ED) during the fall of 1998., PATIENTS OR PARTICIPANTS: Three children reporting to an ED with an acutely painful eye from which the foreign body was identified botanically as Avena fatua., INTERVENTIONS: None., MAIN OUTCOME MEASURES: Symptoms, interventions, duration of problem., RESULTS: Three male children (6, 10, 14 years) presented separately following incidents in which they had sustained direct eye injury. Each child immediately experienced severe pain and profuse watering of the eye. Severe localized edema of the conjunctiva and inflammation was evident with conjunctival vessel injection leading to bleeding, reminiscent of a chemical "burn." Initially, two children appeared to have an eyelash caught behind the lower lid. In both instances, the emergency physicians initially dismissed the possibility of there being a significant foreign body, but because of the severity of the pain, conjunctival vessel injection, and edema, they attempted to remove the "lash." Removal of the foreign body proved difficult in all three cases, requiring far greater traction than anticipated. Intact seedpods had become embedded in the subconjunctival space. Ophthalmic analgesia relieved the pain immediately, but in one child who was treated with topical antibiotic alone, significant pain was experienced for 18 hours, until steroid-antibiotic therapy was instituted. All injuries occurred in late summer when the grass propagates., CONCLUSIONS: The physical signs of scleral vasculitis and conjunctival edema can be mistaken for chemical injury or allergic chemosis, but where a foreign body resembling a hair or eyelash is visible, the presence of a seed-pod retained in the subconjunctival space must be considered, particularly if the patient reports exposure to wild grass. Application of local analgesia, foreign body removal, and steroid-antibiotic treatment is recommended.

5377. Taylor, D. M., et al. (2002). "An analysis of marine animal injuries presenting to emergency departments in Victoria, Australia." Wilderness & environmental medicine **13**(2): 106-112.

OBJECTIVE: To describe the epidemiology of marine animal injury in Victoria, Australia, in order to identify risk factors and recommend prevention strategies., METHODS: Retrospective, descriptive study of patients with marine animal injuries who presented to Victorian emergency departments between October 1995 and June 2000. Data were obtained from the Victorian Emergency Minimum Dataset. The main outcome measures were the marine animal involved; the nature, time, and place of injury; and subject demographics and activity., RESULTS: Two hundred five injuries were identified, and males predominated (71.7%, P < .01). Injuries were most frequent during summer and when jellyfish were most prevalent. Various fish species, stingrays, jellyfish, and sharks were incriminated in 83 (40.5%), 46 (22.4%), 42 (20.5%), and 5 (2.4%) injuries, respectively. Most (65.9%) injuries occurred during leisure or sport, and 72 (35.1%) occurred in a place of recreation. Spikes, spines, and barbs caused 82 (40.0%) injuries, and stings caused 54 (26.3%) injuries. Bites were uncommon. Most injuries were to the limbs, with the hands or feet injured in 127 (62.0%) patients. Forty (19.5%) injuries were associated with a retained foreign body. Only 17 (8.3%) patients required admission to the hospital., CONCLUSIONS: Marine animal injury is seasonal but rarely serious. Vigilance is required when handling fish, and protective gloves, footwear, and clothing are recommended where appropriate. Clinicians should consider retained foreign bodies in penetrating injuries. Warnings are recommended when jellyfish are most prevalent.

5378. Teddy, P. J., et al. (1984). "Traumatic cerebral flaccid paraplegia." Paraplegia **22**(5): 320-324.

Two cases of paraplegia caused by head injuries sustained in recent military conflicts are presented. The underlying pathological disturbances could be related to the CT scan appearances and are discussed in the light of previously reported series. Both cases were remarkable for an early and prolonged paraplegia which was flaccid, rather than spastic, and for the sensory impairment produced.

5379. Teeter, W., et al. (2016). "REBOA improves mean blood pressure (MBP) and shock index (SI) as measured by Continuous Vital Signs (CVS) even in patients arriving in arrest." Shock **45**(6): 58.

Introduction: Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) has been shown in both translational research and several case series to be a potentially life-saving procedure. Methods: We recorded systolic (SBP) & diastolic (DBP) blood pressure, heart rate (HR), and end-tidal CO2 (EtCO2) values every 2 seconds before (Pre), and after (Post) aortic occlusion (AO). Mean arterial blood pressure (MBP), shock index (SI), and pulse pressure (PP) were calculated from these values. Patients were included if they arrived without or lost a pulse prior to undergoing to REBOA at the diaphragm (Zone 1) and at least 15 minutes of continuous vital sign (CVS) monitoring. AO time was recorded in the medical record or determined by real-time video monitoring. Results: 14 patients met inclusion criteria, arriving to the trauma center in arrest or arresting shortly after arrival. Mean age (± SD) was 41 (± 18 years), mean injury severity score (ISS) was 35 (+15), 79% were male, 10 sustained blunt injuries, and 4 sustained penetrating injuries. Seven patients experienced return of spontaneous circulation (ROSC) following AO by REBOA. Early deaths included 11 patients who expired in the ED and 1 in the OR, all within 2 hours. Of these, 10 patients died from hemorrhagic shock and one from severe TBI. Two patients died in the ICU, both from multisystem organ failure. None of the patients surviving to the ICU died from hemorrhagic shock, with two patients surviving around 12 hours, and one patient surviving almost 9 days. Significant improvements in CVS pre- vs. post-AO were detected at 5 minutes for MBP (55.7 ± 36.3-87.7 ± 51.4 mmHg; $p < 0.005$), SI (1.4 ± 0.8-1.1 ± 0.6; $p < 0.004$), and EtCO2 (14.0 ± 11.2- 18.4 ± 12.1 mmHg; $p < 0.004$). Improvement in SI was significant at 10 minutes (1.4 ± 0.9-1.1 ± 0.7; $p < 0.004$), and EtCO2 was significantly improved at all intervals ($p < 0.004$). Improvements approaching significance were seen in mean SI, SBP, MBP and EtCO2 over all intervals. Conclusion: Improvements in SI, MBP, and EtCO2 occur after REBOA, even in patients without signs of life on arrival. CVS monitoring, along with video recording of the procedure to accurately record time of AO, provides reliable data in order to study the technique and physiologic consequences of REBOA (Table Presented).

5380. Teff, R. J. (2010). "Use of neurosurgical decision-making and damage-control neurosurgery courses in the Iraq and Afghanistan conflicts: a surgeon's experience." Neurosurgical focus **28**(5): E9.

A shortage of Coalition neurological surgeons in the Iraq conflict prompted a creative approach to standardized neurosurgical care in 2007. After formulation of theater-wide clinical pathway guidelines, a need for standardized triage and neurological resuscitation was identified. The object was to establish a simple, reproducible course for medics, forward surgical and emergency room personnel, and other critical care providers to quickly standardize the ability of all deployed health care personnel to provide state-of-the-art neurosurgical triage and damage-control interventions. The methods applied were Microsoft PowerPoint presentations and hands-on learning. The year-long project resulted in more than 100 individuals being trained in neurosurgical decision making and in more than 15 surgeons being trained in damage-control neurosurgery. At the year's conclusion, hundreds of individuals received exceptional neurosurgical care from nonneurosurgical providers and a legacy course was left for future deployed providers to receive ongoing education at their own pace.

5381. Teige, K. and J. Wolff (1977). "[Repeated gunshot injury of the head with only a single penetration channel]." Zweimaliger Kopfschuss bei nur einem Schusskanal. **160**(3-4): 105-114.

5382. Teitelbaum, G. P., et al. (1998). "Endovascular coil occlusion of a traumatic basilar-cavernous fistula: technical report." Neurosurgery **42**(6): 1394-1398.

OBJECTIVE AND IMPORTANCE: We describe an unusual case of an 8-year-old male patient presenting with a traumatic basilar artery aneurysm associated with a basilar-cavernous fistula., CLINICAL PRESENTATION: The fistula occurred as the result of an accident involving a vehicle and a pedestrian. The patient originally presented in a coma and with a dense left hemiparesis., INTERVENTION: The traumatic basilar aneurysm and basilar-cavernous fistula were successfully occluded by endovascular coil embolization in two sessions. By 6 months after injury, the patient had made an excellent neurological recovery, requiring only a left leg brace for walking., CONCLUSION: Endovascular coil embolization provided an effective treatment option in the case of this complex and unusual arteriovenous fistula. We discuss the radiological and clinical features of related traumatic neurovascular lesions.

5383. Teixeira, R. R., et al. (2016). "Mild Traumatic Brain Injury: A Brief Review." Brazilian Neurosurgery.

Considered to be the main cause of invalidity and death, besides being extremely costly to the health care system, cranioencephalic trauma can be defined as an alteration of the normal brain function that can be caused by collisions, abrupt head movements or even penetrating injuries. Traumatic brain injuries (TBI) can be classified as mild, moderate or severe. In the case of mild TBI, there is a great variability in its classification, which can be based on the Glasgow coma scale (between 13 and 15), alterations in consciousness, amnesia, the International Classification of Diseases, Ninth Revision (ICD-9), and even on the abbreviated injury scale (AIS). Due to the importance of mild TBI (it corresponds to 75% of all TBIs and, according to the Centers for Disease Control and Prevention [CDC], there are ~ 500 new cases per every 100,000 persons per year), the present report consists of a brief review of the epidemiology, diagnosis and possible prognosis of this type of injury. Further understanding is paramount, since mild TBI is one of the few disorders in medicine in which the benign classification can be misleading and still be associated to further complications.

5384. Teja, J. L., et al. (1991). "Organ donor management: review of 68 consecutive cases." Transplantation proceedings **23**(5): 2490.

5385. Tejirian, T., et al. (2009). "Pneumocephalus after penetrating thoracic trauma: case report and review of literature." The Journal of trauma **67**(5): E156-158.

5386. Tekavcic, I. and V. A. Smrkolj (1996). "The path of a wounding missile along the spinal canal: a case report." Spine **21**(5): 639-641.

STUDY DESIGN: The authors report a penetrating gunshot injury to the cervical spine at the C6 level, with retention of the missile within the spinal canal at the T10 level., OBJECTIVES: The treatment of this patient involved debridement of entrance wound on the day of admission and laminectomies in the cervical and thoracic levels 3 days after the incident., SUMMARY OF BACKGROUND DATA: The migration of a foreign body along the intracranial part of the central nervous system has been reported in the literature, but we have found no report of an intercanal gunshot wound measuring 30 cm with complete liquefaction of the cord., METHODS: On admission, a 21-year-old man had an entrance wound on the right side of neck. He had complete paraplegia and could not flex the wrist. The cervical spine radiograph revealed a fracture of the C5 arch and metallic fragments in the spinal canal. A radiograph of the thoracic and lumbar spine disclosed a bullet trapped at the T10 level. Laminectomies at C6-C7 and T9-T10 were performed and the bullet and its fragments were removed. The ruptured dura was replaced by lyophilized dura., RESULTS: The wounds healed without infection. On discharges the patient's neurologic status was unchanged., CONCLUSIONS: Laminectomies and removal of metallic foreign bodies were performed to reduce the risk of infection in the spinal canal and to prevent toxic effects of dissolved metals on uninjured parts of the central nervous system.

5387. Tekkok, I. H., et al. (1996). "Posttraumatic gas-containing brain abscess caused by Clostridium perfringens with unique simultaneous fungal suppuration by Myceliophthora thermophila: case report." Neurosurgery **39**(6): 1247-1251.

OBJECTIVE AND IMPORTANCE: Gas-containing brain abscesses are rare, and the vast majority are caused by Clostridium perfringens. Significant simultaneous fungal infection in a bacterial abscess is even rarer. We present such a case and review the literature., CLINICAL PRESENTATION: A 21-month-old male patient sustained a penetrating head injury in a barnyard, developed a gas-containing left parietal brain abscess, and presented with high fever, galeal swelling, and seizure., INTERVENTION: The patient initially underwent debridement of his wound and then repeated aspirations. The initial cultures revealed pure growth of Clostridium perfringens. Despite appropriate antibiotic therapy, serial neuroimaging did not demonstrate a decrease in the size of the cavity. An excision had to be undertaken 6 weeks after the injury. The culture from the excised specimen revealed an unexpected growth of a saprophytic and opportunistic fungus, Myceliophthora thermophila. Antifungal treatment consisting of the administration of liposomal amphotericin B and itraconazole was then performed. The child was well and neurologically intact 6 months after the excision., CONCLUSION: Our review revealed 38 cases of clostridial brain abscess in the literature. Despite the reputation of the organism, the outcome with clostridial brain abscesses was relatively benign. The main characteristics of clostridial brain abscesses are highlighted, with reference to their optimal treatment. Our review also revealed that

fungal infection after a penetrating head injury is extremely rare and often fatal. Our case seems to be the first in the medical literature with growth of M. thermophila as a causative agent for intracranial suppuration.

5388. Tellier, A., et al. (1990). "Long-term effects of severe penetrating head injury on psychosocial adjustment." Journal of consulting and clinical psychology **58**(5): 531-537.

The long-term effects of severe penetrating head injury on adjustment levels were studied. Forty-one World War II veterans who suffered penetrating injury to the brain were interviewed 40 years after their initial injury using the Washington Psycho-Social Seizure Inventory (WPSI). The results support a comparable behavioral impact of right and left hemispheric lesions. Similarly, no significant relations were found between anterior and posterior locus of damage and psychosocial difficulties, although the results pertaining to the right-anterior group could be interpreted as suggestive of much greater maladjustment in all life dimensions assessed by the WPSI. Findings are discussed in terms of theoretical positions on hemispheric specialization and long-term expectancies that hold implications for planning rehabilitation programs for such patients.

5389. Temiz, C., et al. (2005). "Penetrating injury of cranium: a case report." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES **11**(4): 352-355.

A 38 year-old male patient treated for paranoid schizophrenia for five years was found on a chain saw table at his workplace with a great parasagittal, linear active bleeding wound from left occiput to medial portion of left orbita. He was unconscious.with a Glascow coma score of 5 points as 1-3-1. Cranial radiographies revealed a bone defect from left occipital region to left medial border of orbita. CT scan showed also a great linear tissue damage involving left lateral ventricle, and an intracerebral hematoma located mainly at left frontoparietal region. An emergent left frontoparietal craniotomy was performed. Four centimetres laterally midline, there was a linear, vertical tissue wound. Hemostasis was achieved at first and intracerebral haematoma evacuated. At one week postoperatively, his eyes started to react to verbal commands. At 7 months postoperatively he was attempting to cooperate with eye movements and writing. He was right hemiplegic, aphasic and on the right side deep tendon reflexes were hyperactive. His Karnofsky score was almost 40 points. Cranial injuries due to chain saw accidents are very rare. Early surgical procedures (incl. decompression) combined with aggressive antibiotherapy seem to have a great survival benefits. However best long-term results show that this type of injuries have a great rate of mortality and morbidity despite all surgical and medical treatment procedures.

5390. Temiz, O. M. and G. K. Lang (2007). "[Acutely impaired visual acuity following injury with an airgun pellet]." Akute Visusminderung nach Luftgewehrkugelverletzung. **224**(10): 804-805.

5391. Temkar, S., et al. (2017). "Pseudo retinitis pigmentosa in a case of missed intraocular foreign body." BMJ case reports **2017**.

A 35-year-old man presented with history of painless, progressive loss of vision in the left eye for the past 7 years. There was history of trauma to the same eye with an iron object 7 years prior. Fundus examination revealed pigmentary retinopathy (unilateral advanced retinitis pigmentosa (RP)-like picture). X-ray orbits were suspicious of retained intraocular foreign body (IOFB). CT orbits confirmed the presence of IOFB. Electroretinogram revealed depressed responses. Right eye examination was within normal limits. A diagnosis of siderosis bulbi with unilateral pseudo RP-like fundus was made. No surgical intervention was planned for IOFB in view of poor visual prognosis.

5392. Temkin, N., et al. (2011). "Latin American pilot traumatic coma data bank: Baseline characteristics." Journal of neurotrauma **28**(6): A113.

PURPOSE: The South American and Caribbean region has one of the highest rates of traumatic brain injuries (TBIs) in the world. Despite this, there is little data about the characteristics of these injuries and the people injured. METHODS: The Latin American Pilot Traumatic Coma Data Bank (LAPTCDB) prospectively collected information on 748

non-penetrating TBIs in teenagers and adults at 8 centers in 5 low- and middleincome countries (LMICs) in South America. To be included, patients had to arrive at the study hospital within 24 hours of injury and have a Glasgow Coma Scale score (GCS) of 3-8 at admission or deteriorate to that level within 48 hours. GCS motor had to be 5 or less if the patient was intubated. RESULTS: Patients were entered between 2008 and 2010. Half of the participants were in their teens or 20s; beyond the 20s, the number of cases decreased with each decade. Less than 10% were over 60. Unlike in high income countries, motorcycle crashes were the most common cause of injury; assaults were rare. For patients arriving directly, half arrived at the study hospital within an hour; 2/3 arrived by ambulance. Information about pre-hospital treatment was rarely available. Most patients arrived without intubation or sedation. Hypotension on admission was documented in only about 25% of cases, although this underestimates the overall occurrence of this secondary insult as pre-hospital blood pressure was rarely reported and blood pressure was recorded hourly or less in the emergency department (ED). About one third of subjects had no assessment of hypoxia through the time of resuscitation. Over 1/3 of participants had CT with Marshall classification DI-III. CONLUSIONS: TBI in LMICs has many different characteristics from that in high income countries and deserves further study.

5393. Temkin, N., et al. (2012). "Latin American pilot traumatic coma data bank: Baseline characteristics." Brain injury **26**(4-5): 762.

Objectives: The South American and Caribbean region has one of the highest rates of traumatic brain injuries (TBIs) in the world. Despite this, there is little data about the characteristics of these injuries and the people injured. Methods: The Latin American Pilot Traumatic Coma Data Bank (LAPTCDB) prospectively collected information on 552 non-penetrating TBIs in teenagers and adults at 9 centers in 5 low- and middle-income countries (LMICs) in South America. To be included, patients had to arrive at the study hospital within 24 hours of injury and have a Glasgow Coma Scale score (GCS) of 3-8 at admission or deteriorate to that level within 48 hours. GCS motor had to be 5 or less if the patient was intubated. Results: Patients were entered between 2008 and 2011. Half of the participants were in their teens or 20 s; beyond the 20 s, the number of cases decreased with each decade. Less than 10% were over 60. Unlike in high income countries, motorcycle crashes were the most common cause of injury; assaults were rare. Half arrived at the study hospital within two hour; 3/5 arrived by ambulance. Information about pre-hospital treatment was rarely available. Most patients arrived without intubation or sedation. Hypotension on admission was documented in only about 12% of cases, although this underestimates the overall occurrence of this secondary insult as pre-hospital blood pressure was rarely reported and blood pressure was recorded hourly or less in the emergency department (ED). About one third of subjects had no assessment of hypoxia through the time of resuscitation. Over 1/3 of participants had CT with Marshall classification DI-III. Conclusions: TBI in LMICs has many different characteristics from that in high income countries and deserves further study.

5394. Temkin, N. R. (2003). "Risk factors for posttraumatic seizures in adults." Epilepsia **44**(s10): 18-20.

PURPOSE: Traumatic brain injury has long been known to be a cause of epilepsy. Most information on risk factors for developing posttraumatic seizures is from before computed tomography (CT) scanning became universal. This article looks at factors about the injury or individual that put people at especially high risk of developing posttraumatic seizures., METHODS: We considered 783 cases at high risk of developing seizures, followed up for 2 years as part of seizure prophylaxis studies. Cumulative incidence of seizures in subgroups and standardized incidence ratios were used to identify factors related to unprovoked seizure risk., RESULTS: Subgroups with significantly elevated risk include those with evacuation of a subdural hematoma; surgery for an intracerebral hematoma; Glasgow Coma Scale in the severe range of 3 to 8; early seizures, especially delayed early seizures; time to following commands of a week or more; depressed skull fracture that was not surgically elevated; dural penetration by injury; at least one nonreactive pupil; and parietal lesions on CT scan., CONCLUSIONS: Both the risk factors and the time course of the risk are important for designing seizure-prophylaxis studies and, if an effective prophylactic regimen is identified, for deciding on appropriate candidates for prophylaxis.

5395. Temkin, N. R. (2009). "Preventing and treating posttraumatic seizures: the human experience." Epilepsia **50 Suppl 2**: 10-13.

Posttraumatic epilepsy presents an ideal target for prevention efforts. Traumatic brain injury (TBI) is common, characteristics that put people at high risk such as penetrating injury or subdural hematoma or provoked seizures are

easily identified, and the latency between the injury and the onset of epileptic seizures is frequently short. Several drugs have been tested for their ability to prevent provoked seizures and epilepsy after TBI. We describe the design of those studies and their results. Phenytoin and carbamazepine significantly reduce the incidence of provoked seizures. Phenobarbital and the combination of phenobarbital and phenytoin also look promising for reducing provoked seizures, but small sample sizes in the studies evaluating these drugs do not allow definitive conclusions. None of the drugs studied (phenytoin, phenobarbital, their combination, carbamazepine, valproate, or magnesium) have shown reliable evidence that they prevent, or even suppress, epileptic seizures after TBI. For most of the regimens tested (the phenytoin/phenobarbital combination being the exception), the best estimate of effect is under a 25% reduction in posttraumatic seizures, well less than the 50% reduction most studies were designed to detect. The evaluation of the tested drugs has serious limitations, however, and antiepileptic drugs (AEDs) developed since 1980 and other compounds have barely been tested at all. Better understanding the process of epileptogenesis, testing treatments that demonstrate antiepileptogenic effects in the laboratory, and performing thorough preclinical and phase II evaluations before attempting definitive trials should greatly improve the chance of identifying ways to prevent posttraumatic epilepsy, providing the ultimate cure for this condition.

5396. Temkin, N. R., et al. (1991). "Management of head injury. Posttraumatic seizures." Neurosurgery clinics of North America **2**(2): 425-435.

Posttraumatic seizures are relatively common among patients with severe head injuries, with major risk factors being penetrating head wound, hematoma, depressed skull fracture, and, for late seizures, early seizures. Management of late posttraumatic seizures, if they do develop, follows the treatment of patients with epilepsy. Their treatment should be determined by the type of seizure (i.e., partial or generalized) and the individual responsiveness of the patient to drug therapy. Prophylactic administration of antiepileptic drugs to prevent posttraumatic epilepsy has been frequently tried. The data supports a short-term but not a long-term effect of the most commonly used drug, phenytoin. A decision of whether to use prophylaxis, with what, and for how long needs to consider the likely benefit (i.e., the chance of seizures if untreated and the likelihood that the proposed treatment will substantially reduce that chance) and risk (i.e., medical or behavioral adverse effects) of this treatment strategy.

5397. Temkin, N. R., et al. (1995). "Causes, prevention, and treatment of post-traumatic epilepsy." New horizons (Baltimore, Md.) **3**(3): 518-522.

Post-traumatic seizures often occur after severe head injury. Acutely, these seizures complicate management of the head-injured patient by increasing intracranial pressure and causing postictal decreases in level of consciousness. In the long term, epilepsy can have a negative effect on the patient's functioning and integration into society. The more severe the head injury, the more likely that post-traumatic seizures will occur. The risk of late seizures exceeds 30% for patients with penetrating head injury, intracerebral hematoma, subdural hematoma, depressed skull fracture, or seizure within the first week after injury. Late post-traumatic seizures are treated the same as any epileptic seizures of the same type. Phenytoin and carbamazepine are effective in preventing seizures in the first week after head injury, but are not effective in preventing late seizures. Both additional antiepileptic drugs and neuroprotective agents that may lessen the damage that leads to seizures are being investigated to determine if they are effective in preventing the occurrence of post-traumatic epilepsy.

5398. Temple, N., et al. (2015). "Neuroimaging in adult penetrating brain injury: a guide for radiographers." Journal of medical radiation sciences **62**(2): 122-131.

Penetrating brain injuries (PBI) are a medical emergency, often resulting in complex damage and high mortality rates. Neuroimaging is essential to evaluate the location and extent of injuries, and to manage them accordingly. Currently, a myriad of imaging modalities are included in the diagnostic workup for adult PBI, including skull radiography, computed tomography (CT), magnetic resonance imaging (MRI) and angiography, with each modality providing their own particular benefits. This literature review explores the current modalities available for investigating PBI and aims to assist in decision making for the appropriate use of diagnostic imaging when presented with an adult PBI. Based on the current literature, the authors have developed an imaging pathway for adult penetrating brain injury that functions as both a learning tool and reference guide for radiographers and other health professionals. Currently, CT is recommended as the imaging modality of choice for the initial assessment of PBI patients, while MRI is important

in the sub-acute setting where it aids prognosis prediction and rehabilitation planning, Additional follow-up imaging, such as angiography, should be dependent upon clinical findings.

5399. Tender, G. C. and D. Awasthi (2003). "Risk stratification in mild head injury patients: the head injury predictive index." The Journal of the Louisiana State Medical Society : official organ of the Louisiana State Medical Society **155**(6): 338-342.

BACKGROUND: Mild Head Injury has classically been defined as patients with a Glasgow Coma Scale (GCS) of 13 to 15. While most of these patients do well, some suffer serious outcomes. The objective of this study was to identify the group at high risk for poor outcome., METHOD: Analysis of 255 consecutive patients who presented to the Medical Center of Louisiana at New Orleans with GCS from 13 to 15 was performed. A new Head Injury Predictive Index (HIPI) based on Focal Neurological Signs, the verbal response and eye-opening components of the GCS, and CT findings was used to stratify patients into "high" and "low" risk groups., RESULTS: There were 10 in-hospital decompensations and 7 poor outcomes at discharge. The study shows that the HIPI was predictive of both poor outcomes and in-patient decompensations., CONCLUSION: When compared to GCS, the inclusion of computed tomographic and focal neurological data gives the HIPI more power in predicting poor outcome and in-hospital decompensations in the mild head injury group.

5400. Tenenholz, T., et al. (1999). "Orbital assault with a pencil: evaluating vascular injury." AJR. American journal of roentgenology **173**(1): 144.

5401. Teng, B., et al. (2014). "Removal of infratemporal fossa foreign body under C-arm." The Journal of craniofacial surgery **25**(4): 1313-1314.

A 12-year-old boy presented to our emergency department after being shot in the face. A computed tomographic scan revealed a bullet through the posterolateral wall of the maxillary sinus into the right infratemporal area, just adjacent to the skull base. We elected transantral approach with the help of endoscopy and C-arm. The bullet was successfully removed. Little is known on the best strategy for removing the infratemporal foreign body. Our experience in this case provides a safe and effective way for such injury.

5402. Teng, T. S., et al. (2019). "Traumatic transnasal penetrating injury with cerebral spinal fluid leak." EXCLI journal **18**: 223-228.

CSF leak in penetrating skull base injury is relatively rare compared to close head injury involving skull base fracture. We report a 5-year-old boy presented with epistaxis and impacted pencil into the left nostril. The child was hemodynamically stable without any neurological deficit. Intraoperatively, there was a nasal septal defect posteriorly with anterior skull base fracture associated with CSF leak. The pencil was removed from the left nostril and the CSF leak was repaired using harvested abdominal fat under the same setting. Computed Tomography (CT) of the brain showed right cribriform plate fracture with small pneumocranium. Postoperatively, a prophylactic antibiotic was given for seven days and he was discharged well. Subsequent clinic visits up to one-year postoperative period showed no recurrence of the CSF leak. History taking, physical examination and CT imaging give valuable diagnostic values in managing the penetrating skull base injury. Early intervention for removal of the foreign body and repair of the CSF leak is advocated to prevent catastrophic complication.

5403. Tenn-Lyn, N. A., et al. (2006). "Potential organ donors referred to Ontario neurosurgical centres." Canadian journal of anaesthesia = Journal canadien d'anesthesie **53**(7): 732-736.

PURPOSE: Eleven hospitals in Ontario are adult neurosurgical centres (ONCs). Patients transferred to ONCs from community hospitals with acute intracranial emergencies often have non-survivable injuries, and may be returned to the referring hospital for end-of-life care. These referring hospitals may not be familiar with neurological determination of death, or organ donation. Our objective was to determine the number of patients with severe brain injuries assessed in ONC emergency departments where progression to brain death may be reasonably expected, and to determine their outcome., METHODS: A one-year retrospective cohort study was undertaken using a convenience sample of patients

transferred to eight ONCs for neurosurgical assessment, with evidence of either (a) brain death in the emergency department, or (b) severe brain injury who met criteria of a reasonable likelihood of progression to brain death. The outcome of these patients to disposition from the ONC was determined by chart review., RESULTS: Three thousand four hundred and forty-seven patients were identified of whom 141 met inclusion criteria. Eleven patients (7.8%) were pronounced dead in the emergency department, 96 (68.1%) patients were admitted, and 34 (24.1%) were transferred back to their referring hospital. Fourteen patients (9.9%) became organ donors: two died in the emergency department and 12 died following admission., CONCLUSIONS: A significant number of patients transferred to ONCs have an injury with a likelihood of progressing to brain death, but only a small proportion of these patients become organ donors. Emergency department triage, assessment and admission decisions for patients with intracranial catastrophes should consider diagnostic criteria for brain death and recognition of donor potential as part of end-of-life care.

5404. Tenzin, T., et al. (2011). "Wilhelm Tell's failure: surgical management and follow up of a transcranial compound bow injury in a two year old child." Clinical neurology and neurosurgery **113**(6): 515-517.

5405. Teplyshova, A., et al. (2019). "Predictors of post-traumatic seizures in adults." European Journal of Neurology **26**: 792.

Background and aims: Traumatic brain injury (TBI) is a frequent cause of seizures and epilepsy. The number of prospective follow-up studies in this field is limited. The purpose of the present study was to evaluate incidence and risk factors for posttraumatic seizures (PTS), as well as epilepsy after TBI in a consecutive cohort of patients in Moscow. Methods: It was the prospective study of patients (18 year and older) hospitalized with TBI in two emergency hospitals in Moscow. Patients were evaluated at admissions and followed for 2 years. Results: 237 patients with TBI (178 men, 59 women) were included. Seizures occurred in 49 patients (20.7%). Incidence of early seizures (ES) was 18.1%, late seizures (LS) - 6.3%. Majority (85%) of ES occurred on the first day after trauma. In multivariate analysis, ES were a significant risk factor for LS (OR=8.3 95%, CI 3-25, p=0.0002). The proportion of patients with severe TBI was significantly higher in the ES group (p=0.000033). ES were more frequent in bilateral lesions (p=0.04). Subdural hematoma, depressed skull fracture and alcohol abuse were significant risk factors for ES and LS. Penetrating injury was a significant risk factor only for LS (p=0.03). ES were the important predictor of mortality - 18/43 (41.9%) of patients with ES died vs 8/194 (4.1%) of patients without ES (p=0.0000). Conclusion: ES are a significant predictor of LS and are associated with severe TBI, bilateral lesions, increased risk of mortality. Subdural hematoma, depressed skull fracture, alcohol abuse were reliable predictors of ES and LS.

5406. Tepper, O. M., et al. (2011). "Use of virtual 3-dimensional surgery in post-traumatic craniomaxillofacial reconstruction." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **69**(3): 733-741.

Traumatic craniofacial injuries often present as difficult reconstructive challenges for maxillofacial surgeons. Reconstruction is often complicated by significant soft tissue loss, comminuted bony fragments, a tenuous blood supply, and wound contamination. For panfacial injuries, restoration of normal facial width, facial height, and sagittal projection may be difficult to achieve. Marked swelling may limit the surgeons' ability to palpate and recognize subtle bony defects and malunion. Furthermore, a true 3-dimensional assessment of bony alignment may not be possible with traditional surgical exposures to the craniofacial skeleton. This article builds on previous work that introduced the use of 3-dimensionally guided surgery for microvascular free-flap reconstruction of the craniofacial skeleton. Use of this technology improves the planning, timing, and overall precision of microvascular reconstructive surgery. Based on this experience, a similar approach to reconstructing patients with significant craniofacial trauma has been adopted.

5407. Ter-Asaturov, G. P. and M. V. Lekishvili (2009). "[Experimental study of the efficacy and clinical use of Perfoost in cases of defect substitution and correction of face supporting tissues]." Stomatologiia **88**(4): 17-23.

Positive properties and perspectivity of demineralized osseous allogenic implants were pointed to. Experimental model of primary osseous plasty of mandible defects was described. The comparison of character and pace of reparative osteogenesis in experimental bone defects with Perfoost use and without transplantation was done. Perfoost had

expressed osteoinductive and osteoconductive properties providing quicker reparative osteogenesis. In clinic osseous plasty operations of upper, middle and lower parts of face were done with the use of Perfoost. All in all 14 operations in 13 patients were conducted: in 3 patients - contour plasty of frontal region of head, in 5 patients- deformation correction of zygomatic region, lower edge and bottom of eye-socket; in 5 patients - defect substitution of mandible body and branch of the 8-10 cm length (in combination with titanium plates). In 2-3 months after operation the first signs of transplant rebuilding were detected during X-ray control. The expressed rebuilding of Perfoost with its substitution by newly formed bone was seen in 1-1.5 year. No complications followed, terms of observation - up to 8 years.

5408. Terespolsky, P. S. (1972). "Post-traumatic epilepsy." Forensic science **1**(2): 147-165.

5409. Teruya, J. and E. A. Hussein (2011). "Blood supply operation during egyptian revolution." Transfusion **51**: 249A.

Background/Case Studies: The Egyptian revolution took place following a popular uprising that began January 25, 2011. Millions of protesters demanded the overthrow of Egyptian president Hosni Mubarak's regime. Many people suffered from life threatening injuries, after violent clashes between security forces and protesters. Study Design/Methods: The overall management of Cairo University blood bank operation was described, in an attempt to establish a standard effective plan to manage blood supply during crisis. Results/Findings: The Blood Center of Cairo University is a nonprofit independent blood bank. It is about 1 mile away from Tahrir square, where the revolution took place. An average of 140 units were collected daily, before the revolution. Three days after the uprising, thousands of Egyptians rushed to the hospital, even during curfew, to alleviate blood shortage. 81% of donors were first time donors. 3,425 units were collected in only 3 days and thousands of donors were turned away because of the limited storage capacity of the Blood Bank. A strategy was established to handle sudden influx of donors. Approximately 20-30 donors were handled at a time. The Blood Bank is used to accommodating such large numbers of donors during religious holidays. However, a barcode error caused a delay in processing of 1,000 units into components and they were used as stored whole blood. Apheresis platelets were donated during the first 2 weeks by protesters who were particularly motivated to donate for 2 victims with liver injury due to gunshot wound (GSW). The usual positive rate of HCV antibody in Egyptian donors is 3.8%. However, the positive rate of HCV markers in the collected units was only 1.6%. The frequency of positive HBs antigen, HIV antibody and syphilis antibody was 1.23%, 0.058% and 0.029%, respectively. An average of 25 elective operations were cancelled daily for 10 days. Operating theatres were used only for emergency operations. Total 183 victims received 557 units of blood and 228 units of FFP and cryoprecipitate in 8 days. Most injuries were due to GSW (55 patients), stab wound (39 patients) and cerebral hemorrhage (35 patients). Twenty patients underwent vascular surgery due to femoral and popliteal artery injury, 23 patients had orthopedic surgery and 11 patients had internal bleeding. A blood surplus developed which met the hospital needs for 1 month. Other areas in the country also had too much blood at this point. Blood collection returned to near normal operation three weeks after the end of the revolution. Conclusion: Revolution resulted in an influx of first time donors with a relatively low positive rate of HCV antibody. It is important to educate first time donors about the benefit of regular donation and plan for a potential shortage by scheduling those who were turned away. For future crisis like this situation, systematic approach to spread donors evenly on a daily basis is needed.

5410. Testerman, G. M. and L. M. Dacks (2007). "Multiple self-inflicted nail gun head injury." Southern medical journal **100**(6): 608-610.

Penetrating brain injury resulting from nail-gun use is a well-characterized entity, one that is increasing in frequency as nail guns become more powerful and more readily available to the public. We present a case and offer management strategies for a 50-year-old male with two intracranial penetrating nail gun injuries. Nail gun brain injuries are commonly intentionally self-inflicted. Suicide should be considered when straight nails cause wounds to the chest, head, or abdomen. The primary preoperative concern is formation of a traumatic pseudoaneurism, which prompts both preoperative and follow-up cerebral angiography. Surgery for combined intracranial and extracranial injury may require the collaborative expertise of colleagues from the fields of ophthalmology, otolaryngology, and oral maxillofacial surgery. A rational management strategy should permit these patients to be discharged with no additional injury.

5411. Teuber, H. L. (1968). "Disorders of memory following penetrating missile wounds of the brain." Neurology **18**(3): 287-288.

5412. Teubner, E., et al. (2007). "[The prosthetic rehabilitation of a patient after gunshot wound and initial maxillofacial surgical reconstruction. A case report]." Die defektprothetische Versorgung eines Patienten mit Status nach einer Schussverletzung und chirurgischer Rekonstruktion. Ein Fallbericht. **117**(6): 612-632.

An improvement of prognosis after tumour therapy as well as a rather high number of multiple traumas in the craniofacial area imply a high treatment need for craniofacial tissue defects. For a successful rehabilitation of these individuals, reconstructive oral and maxillofacial surgery and prosthodontics must collaborate closely and synergistically. Besides medical and psychological findings, functional and esthetical aspects need to be taken into account. In this case report the prosthetic reconstruction of a patient with a tooth-supported telescopic defect prosthesis in the maxilla and with a multiple-unit implant-supported fixed prosthesis plus two full ceramic crowns in the mandible is shown. The prosthetic solution was indicated after maxillofacial reconstruction due to the consequence of a suicide attempt.

5413. Teulières, M., et al. (2021). "Bone lengthening with a motorized intramedullary nail in 34 patients with posttraumatic limb length discrepancies." Journal of Clinical Medicine **10**(11).

The Fitbone® motorized nail system has been used to correct limb length discrepancies (LLD) for several years. This study focuses on its application in posttraumatic limb lengthening surgery, its outcome and challenges. Materials and methods: A prospective, single center study was conducted between 2010 and 2019 in patients treated with motorized lengthening nails. The inclusion criteria were symptomatic LLD of 20 mm or more. An imaging analysis was done using TraumaCad® software (Brainlab AG, Munich, Germany) to compare frontal alignment angles and limb length discrepancy (LLD) on preoperative and latest follow-up radiographs of the lower limbs. Results: Thirty-four patients were included with a mean age of 28.8 ± 9.7 years, a mean follow-up of 27.8 ± 13 months and a mean hospital stay of 4.4 ± 1.7 days. The mean LLD was 44 ± 18 mm in 29 femoral and 32 ± 8 mm in 4 tibial cases, which was reduced to less than 10 mm in 25/34 (74%) patients. The mean healing index was 84.6 ± 62.5 days/cm for femurs and 92 ± 38.6 days/cm for tibias. The mean time to resume full weight-bearing without walking aids was 226 days ± 133. There was no significant difference between preoperative and final follow-up alignment angles and range of motion. The mechanical lateral distal femoral angle (mLDFA) was corrected in the subgroup of 10 LLD patients with varus deformity of the femur (preoperative 95.7° (±5.0) vs. postoperative 91.5° (±3.4), p = 0.008). According to Paley's classification, there were 14 problems, 10 obstacles and 2 complications. Discussion: Six instances of locking screw pull out, often requiring reoperation, raise the question of whether a more systematic use of blocking screws that provide greater stability might be indicated. Lack of compliance can lead to poor outcomes, patient selection in posttraumatic LLD patients is therefore important. Conclusion: Limb lengthening with a motorized lengthening nail for posttraumatic LLD is a relatively safe and reliable procedure. Full patient compliance is crucial. In-depth knowledge of lengthening and deformity correction techniques is essential to prevent and manage complications.

5414. Texier, J. J., et al. (1984). "[Cerebral perfusion pressure: limits of its value apropos of a case of cranio-cerebral gunshot wound]." Pression de perfusion cerebrale: limite de son interet a propos d'une observation de plaie cranio-cerebrale par arme a feu. **25**(7): 789-792.

5415. Teymoorian, S., et al. (2012). "Nonblinding, penetrating orbital injury with pontine and cerebellar involvement secondary to antenna trauma." Journal of neuroimaging : official journal of the American Society of Neuroimaging **22**(2): 201-203.

BACKGROUND AND PURPOSE: Traumatic pontine and cerebellar damage originating from ocular injury has been documented in the past; however, no report has been made about an orbital trauma causing injury to the pons and cerebellum with associated neurological symptoms while leaving the globe, visual pathway, and ocular controls intact., METHODS: Chart review of a single case of a traumatic antenna injury., RESULTS: A traumatic antenna injury that penetrated the orbit and injured the pons and cerebellum without involving the visual pathway and its controls., CONCLUSIONS: Pontine and cerebellar injury can occur from trauma that originated in the orbit and traveled posteriorly

through the cranium without causing any overt damage to ocular structures but still causing other associated neurological problems. Copyright © 2011 by the American Society of Neuroimaging.

5416. Thakker, M. M. and K. R. Usha (2006). "Orbital foreign body and ruptured globe from needlefish impalement." Archives of ophthalmology (Chicago, Ill. : 1960) **124**(2): 284.

5417. Thal, E. R., et al. (1974). "Management of carotid artery injuries." Surgery **76**(6): 955-962.

5418. Thalava, R. and R. Puttha (2005). "Toys and potentially lethal games." Archives of disease in childhood **90**(4): 372.

5419. Thali, M. J., et al. (2002). "The dynamic development of the muzzle imprint by contact gunshot: high-speed documentation utilizing the "skin-skull-brain model"." Forensic science international **127**(3): 168-173.

Many contact gunshots produce a muzzle imprint in the skin of the victim. Different mechanisms have been discussed in literature as being responsible for the creation of the muzzle imprint. Experimenting upon the synthetic non biological skin-skull-brain model, our goal was to document and study the creation of the muzzle imprint with the aid of high-speed photography. In our experiments, we could document with our high-speed photography (at exposure rates in the range of nanoseconds) the bulging, the pressing against the muzzle, and the splitting of the artificial skin. Furthermore, it was possible to photographically record the back pattern of synthetic tissue particles. And, the soot and gunpowder cavity could be reproduced experimentally. In conclusion the experiments completed with the skin-skull-brain model, using high-speed photography for documentation, show the promising possibilities of experimental ballistics with body models.

5420. Thali, M. J., et al. (2002). "High-speed documented experimental gunshot to a skull-brain model and radiologic virtual autopsy." The American journal of forensic medicine and pathology **23**(3): 223-228.

The authors documented and evaluated experimental gunshots to a skull-brain model with high-speed photography and subsequent radiographic examination for comparison of the morphologic findings in the model. The artificial skull was a polyurethane ball constructed in layers, with a porous diploe sandwiched between a tabula externa and a tabula interna. The brain itself was simulated with gelatin 10% at 4 degrees C, a material well known in wound ballistics. Gunshots were fired at the model from a distance of 10 m and documented with high-speed photography (up to 50 million frames/sec). Subsequently, a complete examination of the artificial skull was performed, including spiral computed tomography (with two-dimensional and three-dimensional reconstructions) and classic skull autopsy. The high-speed photographs clearly showed the dynamic development of the skull fracture system from an external perspective. The subsequent radiographic examination of the entire head volume created two-dimensional reformations in any plane and three-dimensional reconstructions of the gunshot injury of the polyurethane skull-brain model, especially the wound channel and the fracture system. Thanks to the model and high-speed photographs, the dynamic development of the morphology of a gunshot wound could be documented and studied. The data from computed tomography, using two-dimensional and three-dimensional postprocessing with a perspective view, were very similar to those from classic head autopsy, but derived in a hands-off and nondestructive manner. This examination method leads the way to radiographic digital autopsy or virtual autopsy.

5421. Thali, M. J., et al. (2002). "A study of the morphology of gunshot entrance wounds, in connection with their dynamic creation, utilizing the "skin-skull-brain model"." Forensic science international **125**(2-3): 190-194.

The goal of this study was to document the dynamic effects created within, and the developing mechanisms of a gunshot entrance wound to the skin utilizing high-speed photography and the "skin-skull-brain model". The high-speed photography was taken with an Imacon 468/Hadland-Photonics camera. Full metal jacketed, 9 mm Luger projectiles were fired at the target model from a distance of 10 m. During the evaluation of the "skin-skull-brain model", it was possible to show that injuries inflicted to this model are fully comparable to the morphology of equivalent real gunshot entrance wounds. It has been possible to document and study the dynamic process of the "bullet-skin-interaction" in the

gunshot entrance wound. The development of the morphologic terms of the entrance wound are discussed. In combination with high-speed photography, this "skin-skull-brain model" is a perfect tool for the documentation and the study of the dynamic development of gunshot entrance wounds in the skin.

5422. Thali, M. J., et al. (2003). "A high-speed study of the dynamic bullet-body interactions produced by grazing gunshots with full metal jacketed and lead projectiles." Forensic science international **132**(2): 93-98.

Experimenting upon a synthetic, non-biological Skull-Brain Model, our goal was to document and study the bullet-body interaction of grazing (glancing, tangential) gunshots. Thanks to the high-speed study of the dynamic bullet-body interaction it was possible to document the glancing behavior of projectiles with a resolution of 50 million pictures per second. It was possible to demonstrate the differing deformation and fragmentation patterns between the 9mm Luger full metal jacketed projectile and the 38 Smith & Wesson (S & W) lead round nose projectile. In a true-to-life manner the morphologic fracture systems could be documented by utilization of the model in dependence of the projectile's behavior, deformation, and fragmentation. Based on these experimental studies with body models, conclusions could be drawn for surgical and reconstructive forensic questions in real cases. In summary, model substitutes offer a suitable basis for the study of the bullet-body interaction because the experiments are reproducible, totally independent of the biological variances of corpse and animal experiments, and are harmless from the ethical perspective.

5423. Thali, M. J., et al. (2003). "New horizons in forensic radiology: the 60-second digital autopsy-full-body examination of a gunshot victim by multislice computed tomography." The American journal of forensic medicine and pathology **24**(1): 22-27.

The goal of this study was the full-body documentation of a gunshot wound victim with multislice helical computed tomography for subsequent comparison with the findings of the standard forensic autopsy. Complete volume data of the head, neck, and trunk were acquired by use of two acquisitions of less than 1 minute of total scanning time. Subsequent two-dimensional multiplanar reformations and three-dimensional shaded surface display reconstructions helped document the gunshot-created skull fractures and brain injuries, including the wound track, and the intracerebral bone fragments. Computed tomography also demonstrated intracardiac air embolism and pulmonary aspiration of blood resulting from bullet wound-related trauma. The "digital autopsy," even when postprocessing time was added, was more rapid than the classic forensic autopsy and, based on the nondestructive approach, offered certain advantages in comparison with the forensic autopsy.

5424. Thali, M. J., et al. (2003). "Image-guided virtual autopsy findings of gunshot victims performed with multi-slice computed tomography and magnetic resonance imaging and subsequent correlation between radiology and autopsy findings." Forensic science international **138**(1-3): 8-16.

Because the use of radiology in modern forensic medicine has been, until today, mostly restricted to conventional X-rays, which reduces a 3D body to a 2D projection, a detailed 3D documentation of a gunshot's wound ballistic effects was not possible. The aim of our study was to evaluate whether the progress in imaging techniques over the last years has made it possible to establish an observer-independent and reproducible forensic assessment using multi-slice computed tomography (MSCT) and magnetic resonance imaging (MRI) technologies for the documentation and analysis of gunshot wounds. The bodies of eight gunshot victims were scanned by MSCT and by MRI; the data of these imaging techniques were post-processed on a workstation, interpreted and subsequently correlated with the findings of classical autopsy. With the spiral CT and MRI examinations and the subsequent 2D multi-planar reformation (MPR) and 3D shaded surface display (SSD) reconstruction, the entire gunshot-created complex skull fractures and brain injuries (such as wound channels and deeply-driven bone splinters) could be documented in complete and graphic detail. CT and MRI also documented vital reaction to the gunshot by demonstrating air emboli in the heart and blood vessels and the classic pattern of blood aspiration to the lung. Gunshot residues deposited within and under the skin were visible. In conclusion, we think that the radiological methods of MSCT and MRI have the potential to become a routine "virtual autopsy" tool in the future. Bullets and relevant histological samples from specific sites then might be won in image-guided minimally invasive fashion via percutaneous biopsy. The rapid application of developing radiological methods may lead to new horizons in forensic documentation and intravital as well as postmortem examination.

5425. Thawani, J. P. and T. H. Lucas (2016). "Open traumatic brain injury by nail gun resulting in a persistent vegetative state." Neurology **86**(14): 1358-1359.

5426. Thelin, E. P., et al. (2015). "Biochemical response to hyperbaric oxygen treatment of a transhemispheric penetrating cerebral gunshot injury." Frontiers in neurology **6**(MAR).

Hyperbaric oxygen (HBO) therapy has been suggested a treatment option in order to reduce the development of secondary insults succeeding traumatic brain injury. This case report studied the course of a 23-year-old gentleman with a close range transhemispheric gunshot wound. The biochemical parameters, using a multi-modal monitoring in the neuro-intensive care unit, improved following HBO treatment.

5427. Theunissen, C. M. M. C., et al. (2015). "[Oculocardiac reflex associated with orbital floor fracture; the value of a reliable patient history]." Oculo-cardiale reflex bij een orbitabodemfractuur; het belang van een betrouwbare anamneses. **160**: A9641.

BACKGROUND: The oculocardiac reflex presents when traction is applied to ocular muscles or on compression of the eyeball in the orbit. It is a vasovagal reaction that may be accompanied by bradycardia, nausea and vomiting., CASE DESCRIPTION: A 6-year-old boy presented with vomiting and acute pain in his right eye, but no history of trauma. On physical examination we found no abnormalities other than bradycardia. Ocular examination showed an elevation restriction and slight depression restriction as well as ptosis of the affected eye. A cerebral MRI scan showed a blow-out fracture of the orbital floor with herniation of the inferior rectus muscle. The oculocardiac reflex explained the bradycardia and vomiting. Later, the boy told us that he had in fact hit his eye with his own knee., CONCLUSION: When patients present with acute pain in the eye and vasovagal symptoms, the oculocardiac reflex that can accompany a fracture of the orbital floor should be considered. The early recognition and treatment of this fracture are necessary to prevent permanent motility restrictions of the eye. A patient's history is not always reliable and should not limit a differential diagnosis.

5428. Thierauf-Emberger, A. and S. Pollak (2014). "Penetrating head injury by a nail screw: Reflections about the cause of the accident." Rechtsmedizin **24**(6): 508-512.

Penetrating injuries to the skull are mainly seen in gunshot injuries but can also be caused by powder-actuated tools and nail guns used in the construction industry. They fire screws and nails which reach a high kinetic energy and can even perforate bony structures if they have a free flight. The presented case deals with a 22-month-old boy who was taken to an emergency department with a penetrating injury to the head. According to the parents the child sustained the injury in a fall from a tricycle. The head of a nail which had penetrated the skull to a depth of 4.5 cm was found in the skin of the forehead. The circumstances of the incident and the medical findings suggested that the boy had been accidentally hit by a free flying nail from an industrial nail gun. The intracranial foreign body was removed and the postoperative clinical course was uneventful.

5429. Thiex, R., et al. (2004). "Delayed oedema in the pyramidal tracts remote from intracerebral missile path following gunshot injury." Neuroradiology **46**(2): 140-143.

A 60-year-old man developed a severe left hemiparesis and central facial palsy, accompanied by somnolence and dysarthria 9 days after a gunshot wound to the right temporal region, from which he slowly recovered over 3 months. MRI disclosed bilateral oedema of the pyramidal tracts. This was interpreted as a consequence of the impact of the pressure wave caused by the bullet, after excluding an infectious or vascular cause.

5430. Thoeny, A. L., et al. (2017). "Hitting the Nail on the Head: A Case Report Demonstrating the Importance of a Multidisciplinary Approach to an Unusual Penetrating Intracranial Injury." A & A case reports **9**(7): 212-215.

A 28-year-old man presented with a penetrating injury by a nail gun to the head. Imaging revealed a nail abutting the superior sagittal sinus without active extravasation. An anesthesia-led multidisciplinary team devised a

detailed perioperative plan including conception of a complex decision tree, coordination of care, and resource utilization. In the operating room, the nail was removed under general anesthesia, with blood products and equipment for craniotomy readily available, and imaging modalities reserved for immediate use. This case highlights the importance of a multidisciplinary approach to challenging penetrating head injuries and the crucial role anesthesiologists have as leaders in perioperative care.

5431. Tholpady, S. S., et al. (2014). "Epidemiology, demographics, and outcomes of craniomaxillofacial gunshot wounds in a level I trauma center." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **42**(5): 403-411.

BACKGROUND: Gunshot injuries to the craniomaxillofacial region are a challenge to the trauma and reconstructive surgeon. Although management of these injuries has been standardized and early rather than late intervention is advocated, the patient characteristics before, during, and after have been poorly elucidated., METHODS: A prospectively maintained Level I trauma center database was queried as to gunshot wounds of the craniomaxillofacial skeleton. Over a five-year period (2007-2011), 168 patients were identified with these injuries. Charts were reviewed as to demographics, presentations, and outcomes and these were tested for significant relationships with hospital length of stay, numbers and types of procedures, morbidity, and mortality., RESULTS: Gunshot wounds to the craniofacial skeleton resulted in 71 deaths in this patient population. Those that died were significantly older, presented with a lower GCS, had a shorter LOS, and a higher INR than those that lived. Subgroup analysis of mechanism demonstrated mortality was more likely to occur as a result of self-inflicted injury in whites and due to assault in the African-American population., CONCLUSIONS: Data gathered from this study disputes some commonly held beliefs regarding the epidemiology of gunshot injuries and should allow for better characterization of which outcomes are consistent with which presentations. Copyright Published by Elsevier Ltd.

5432. Thomas, A. and B. George (2016). "An audit of moderate-to-severe acute head injury patients in Chris Hani Baragwanath Academic Hospital." Brain injury **30**(5-6): 742-743.

Objectives: Head injury is a devastating condition in developing countries like South Africa, contributing significantly to mortality and morbidity. The factors affecting outcome like age, gender, mechanism of injury, clinical, radiological findings and treatment are reported. Their relation to outcome (Glasgow Outcome Score) of treatment is analysed. Methods: This is a retrospective, descriptive and demographic profile study. The sample group consists of moderate-to-severe head injury patients admitted in the neurosurgical unit of Chris Hani Baragwanath Hospital from January 2011 to June 2012. The data includes age, gender, nature of head injury (scalp, skull, intracranial), mode of injury (fall from height, road traffic accident, fire arm injury, assault, blast injury), condition at presentation [Glasgow Coma Scale (GCS)], pupillary reaction, Computed Tomography (CT) scan findings, treatment received and outcome [Glasgow Outcome Score (GOS)] of treatment. Results: A total of 292 patients was enrolled in the study, 258 males (88.3%) and 34 females (11.6%). In the age distribution 50 patients were below 19 years, 161 patients were between 20-39 years, 60 patients 40-59 years and 21 patients above 60 years. The various mechanisms of injury noted were assault in 127 patients, pedestrian vehicular accident in 50 patients, motor vehicular accident in 33 patients, motor bike accidents in four patients, train accidents in two patients, gunshot injury in six patients, fall from height in 35 patients and struck by heavy object in five patients. One hundred and twenty-three patients had a GCS between 3-5, 72 patients GCS between 6-8 and 97 patients GCS 8-12. One hundred and ninety-two patients had equal and reacting pupils after the head injury, 52 patients unilateral fixed pupils and 10 patients bilateral fixed pupils. The Computed tomography (CT) of the brain showed 287 patients with focal intracranial findings, 107 with diffuse brain injury and 168 patients with features of raised intracranial pressure. One hundred and twenty-nine patients (44.1%) were surgically treated and 163 patients (55.8%) treated conservatively with medical treatment. The variables age, mechanism of injury, GCS, pupillary reaction, raised intracranial pressure and type of management was compared to GOS and found to be statistically significant. Conclusions: The outcome of patients with moderate-to-severe head injury has no effect on gender, but has a significant relationship between age and mortality. The mechanism of head injury has a direct effect on the prognosis with gunshot head having the worst outcome. The important prognostic factors affecting the outcome include: age of patients, severity of head injury (GCS), pupillary reactivity to light and the pathology of the brain CT scan. The unfavourable prognostic factors are: old age, non-reacting pupils to light, severe head injury (low GCS) and raised ICP after head injury. Medical or surgical management have similar mortality rate.

5433. Thomas, D. G. and J. E. Wright (1968). "Ruptured liver." The Australian and New Zealand journal of surgery **37**(4): 338-344.

5434. Thomas, J., et al. (2017). "Case report: Household chores: Hazardous to health?" British Journal of Oral and Maxillofacial Surgery **55**(10): e144.

Introduction: To some housework and more specifically ironing is a tedious task. Any link to trauma in the literature is sparse. Case Report:A44 year old female attended Accident and Emergency department at James Cook University Hospital after tripping whilst ironing and falling onto a nearby fish tank. She presented with a single 3 cm laceration in the submental region which contained what appeared to be a small shard of glass. Clinical review demonstrated a rapidly expanding haematoma in the submental space. The airway was secured with an ET tube as a matter of urgency. CT angiogram revealed this laceration was an entry wound for a large shard of glass retained within the tissues: extending from the laceration beneath the chin to the base of tongue then through the pharynx and soft palate extending to the pituitary fossa passing within 1mm of the ICA. The neckwas explored to gain control of the major vessels. Multiple varied sized pieces of glass were removed, followed by debridement and lavage. GentafleeceTM foam was packed into the wounds and a tracheostomy placed. Recovery was complicated by an aspiration pneumonia presenting a challenge to the microbiologists to cover common microflora found in tropical fish tanks. Discussion: The management of this case demonstrate the need to follow a safe, military style approach to penetrating head and neck trauma: expecting the unexpected from a simple penetrating wound. This poster and imaging also provide anecdotal evidence for the avoidance of household chores by Oral and Maxillofacial surgeons.

5435. Thomas, M. and H. Whittet (1991). "Atypical meningitis complicating a penetrating head injury." Journal of neurology, neurosurgery, and psychiatry **54**(1): 92-93.

5436. Thomas, M. D. and K. Siu (1987). "An unusual cranial injury caused by an industrial nail-gun." The Medical journal of Australia **147**(11-12): 602-603.

An unusual case of an industrial nail-gun injury is presented. A 36-year-old man was struck in the back of his neck by a nail, which was fired from a high velocity Ramset nail-gun. The nail passed through the foramen magnum to lodge in front of the brainstem. In spite of the close proximity of the nail's trajectory to the upper cervical spinal cord and the brain stem, no major neurological damage resulted. The nail was removed successfully the following day. This case illustrates the potential for serious injury from nail-guns.

5437. Thomas, S., et al. (2007). "Endoscopic removal of foreign body from the anterior cranial fossa." The Journal of laryngology and otology **121**(8): 794-795.

Intracranial foreign bodies are typically removed via a craniotomy, which carries significant peri-operative risks. Nasal endoscopy for removal of intracranial foreign bodies is rare and has been attempted only a few times. Here, we describe a case in which nasal endoscopy was employed to successfully remove an air rifle pellet from the anterior cranial fossa, with subsequent repair of the associated cerebrospinal fistula. We thus advocate nasal endoscopy as an alternate line of management for the removal of foreign bodies from the anterior cranial fossa when possible, due to its significantly lower associated morbidity, provided adequate neurosurgical backup is available if required.

5438. Thomas, S. G., et al. (2009). "Brain abscess in a non-penetrating traumatic intracerebral hematoma: case report and review of literature." Neurology India **57**(1): 73-75.

We report a 57-year-old man who presented one month after sustaining a traumatic right temporal intracerebral hematoma with history of headache, left hemiparesis and altered sensorium of two days duration. A diagnosis of right temporal resolving hematoma was made on computed tomography scan. However, his sensorium progressively deteriorated and he underwent craniotomy and partial excision of an abscess. He was treated with appropriate antibiotics for six weeks despite of which he did not improve and died nine months later. We conclude that

there should be a high index of suspicion for brain abscess in patients with traumatic intracerebral hemorrhage if the clinical and radiological picture is different from the expected course of a resolving hematoma.

5439. Thompson, J. T., et al. (1993). "Infectious endophthalmitis after penetrating injuries with retained intraocular foreign bodies. National Eye Trauma System." Ophthalmology **100**(10): 1468-1474.

PURPOSE: To determine the risk factors and prognostic indicators of infectious endophthalmitis in eyes with penetrating injury and retained intraocular foreign body., METHODS: From the National Eye Trauma System (NETS) Registry, 492 eyes with intraocular foreign bodies were reviewed for signs of infectious endophthalmitis., RESULTS: Thirty-four eyes (6.9%) with intraocular foreign bodies had evidence of infectious endophthalmitis, and 31 (91.2%) of those eyes had signs of infection at the time of removal of the intraocular foreign body. The majority of eyes with an intraocular foreign body with or without endophthalmitis were in patients between 10 and 39 years of age, but the risk of endophthalmitis developing increased with age, especially in patients 50 years of age or older with delayed primary repair (P = 0.005). Endophthalmitis was more likely to develop in eyes with home or occupational injuries (33/358, 9.2%) than in those with injuries from other settings (1/128, 0.8%; P = 0.001). Infectious endophthalmitis was much less likely to develop in eyes with primary repair within 24 hours of the injury (10/287 = 3.5%) than in eyes with primary repair more than 24 hours after the injury (22/164, 13.4%; P < 0.0001). Bacilli or staphylococci were isolated in 21 (95%) of 22 eyes with positive cultures. Visual prognosis was reasonably good with 15 (58%) of 26 eyes attaining a visual acuity of 20/200 or better., CONCLUSIONS: Removal of a retained intraocular foreign body within 24 hours of injury markedly reduces the risk of infectious endophthalmitis developing. Older persons are at high risk for endophthalmitis developing after retaining an intraocular foreign body when there is delayed surgical repair.

5440. Thompson, K., et al. "Pharmacological treatments for preventing epilepsy following traumatic head injury." (8).

Background, Head injury is a common event and can cause a spectrum of motor and cognition disabilities. A frequent complication is seizures. Antiepileptic drugs (AED) such as phenytoin are often used in clinical practice with the hopes of preventing post-traumatic epilepsy. Whether immediate medical intervention following head trauma with either AEDs or neuroprotective drugs can alter the process of epileptogenesis and lead to a more favorable outcome is currently unknown. This review attempted to address the effectiveness of these treatment interventions. This review updates and expands on the earlier Cochrane review., Objectives, To compare the efficacy of antiepileptic drugs and neuroprotective agents with placebo, usual care or other pharmacologic agents for the prevention of post-traumatic epilepsy in people diagnosed with any severity of traumatic brain injury., Search methods, We searched The Cochrane Epilepsy Group's specialized register, CENTRAL, MEDLINE, ClinicalTrials.gov and World Health Organization International Clinical Trials Registry Platform (ICTRP) in January 2015. We searched EMBASE, Biological Abstracts and National Research Register in September 2014 and SCOPUS in December 2013. The Cochrane Epilepsy Group performed handsearches of relevant journals., Selection criteria, We included randomized controlled trials (RCTs) that include AEDs or neuroprotective agents compared with placebo, another pharmacologic agent or a usual care group. The outcomes measured included a seizure occurring within one week of trauma (early seizure), seizure occurring later than one week post-trauma (late seizure), mortality and any adverse events., Data collection and analysis, Two review authors independently assessed study quality and extracted the data. We calculated risk ratios (RR) and 95% confidence intervals (CI) for each outcome. We used random-effects models in the meta-analyses and performed pre-defined subgroup and sensitivity analyses., Main results, This review included 10 RCTs (reported in 12 articles) consisting of 2326 participants The methodological quality of the studies varied. The type of intervention was separated into three categories; AED versus placebo or standard care, alternative neuroprotective agent versus placebo or standard care and AED versus other AED. Treatment with an AED (phenytoin or carbamazepine) decreased the risk of early seizure compared with placebo or standard care (RR 0.42, 95% CI 0.23 to 0.73; very low quality evidence). There was no evidence of a difference in the risk of late seizure occurrence between AEDs and placebo or standard care (RR 0.91, 95% CI 0.57 to 1.46; very low quality evidence). There was no evidence of a significant difference in all-cause mortality between AEDs and placebo or standard care (RR 1.08 95% CI 0.79 to 1.46,very low quality of evidence). Only one study looked at other potentially neuroprotective agents (magnesium sulfate) compared with placebo. The risk ratios were: late seizure 1.07 (95% CI 0.53 to 2.17) and all-cause mortality 1.20 (95% CI 0.80 to 1.81). The risk ratio for occurrence of early seizure was not estimable., Two studies looked at comparison of two AEDs (levetiracetam, valproate) with phenytoin used as the main comparator in each study. The risk ratio for all-cause mortality was 0.53 (95% CI 0.30 to 0.94). There was no evidence of treatment benefit of phenytoin compared with another AED for early seizures (RR 0.66,

95% 0.20 to 2.12) or late seizures(RR 0.77, 95% CI 0.46 to 1.30)., Only two studies reported adverse events. The RR of any adverse event with AED compared with placebo was 1.65 (95% CI 0.73 to 3.66; low quality evidence). There were insufficient data on adverse events in the other treatment comparisons., Authors' conclusions, This review found low-quality evidence that early treatment with an AED compared with placebo or standard care reduced the risk of early post-traumatic seizures. There was no evidence to support a reduction in the risk of late seizures or mortality. There was insufficient evidence to make any concl sions regarding the effectiveness or safety of other neuroprotective agents compared with placebo or for the comparison of phenytoin, a traditional AED, with another AED.

5441. Thomson, D. U., et al. (2013). "Computed tomographic evaluation to determine efficacy of euthanasia of yearling feedlot cattle by use of various firearm-ammunition combinations." American journal of veterinary research **74**(11): 1385-1391.

OBJECTIVE: To evaluate with CT the efficacy of various combinations of firearms and ammunitions to penetrate and disrupt the brain tissue of cadaveric heads of feedlot steers., SAMPLE: 42 fresh cadaveric heads of 12- to 18-month-old Bos taurus steers., PROCEDURES: For each of 7 combinations of firearms and ammunitions (.22-caliber rifle firing a long rifle 30-grain plated lead solid- or hollow-point round, .223-caliber carbine firing a 50-grain ballistic-tip round, 9-mm pistol firing a 124-grain total metal jacket round, .45-caliber automatic Colt pistol [ACP] firing a 230-grain full metal jacket round, and 12-gauge shotgun firing a 2.75-inch 1.25-ounce No. 4 birdshot shell or a 1-ounce rifled slug), 6 cadaveric heads were shot at an identical distance (3 m), angle, and anatomic location. Heads were scanned with third-generation CT, and images were evaluated to determine extent of penetration, projectile fragmentation, cranial fracture, and likelihood of instantaneous death (>= 30% destruction of brain tissue or a brainstem lesion). RESULTS -41 of 42 skulls were penetrated by the projectile. Instantaneous death was considered a likely consequence for 83% (25/30) of heads shot with a rifle-fired .22-caliber solid-point round, pistol-fired .45-caliber ACP round, carbine-fired .223-caliber round, and shotgun-fired birdshot and slug. Of the 18 heads shot with pistol-fired 9-mm and .45-caliber ACP rounds and rifle-fired .22-caliber hollow-point rounds, only 6 had brainstem lesions. CONCLUSIONS AND CLINICAL RELEVANCE- Results suggested that gunshots delivered by all firearm-ammunition combinations except rifle-fired .22-caliber hollow-point rounds and pistol-fired 9-mm rounds were viable options for euthanasia of feedlot cattle.

5442. Thumbikat, P., et al. (2009). "Acute spinal cord injury." Surgery **27**(7): 280-286.

Acute spinal cord injuries may arise due to blunt injuries or to penetrating trauma, such as stab or gunshot injuries. The severity of injury varies both in terms of neurological segmental level, and the sensorimotor pattern of neurological deficit (ASIA category). The initial ATLS assessment of all trauma patients includes a thorough neurological examination to identify acute spinal cord injury. Their management requires discussion with a dedicated spinal injuries unit, and, if appropriate, transfer for specialist care. Spinal injuries units have multidisciplinary teams that can manage the medical and surgical aspects of patient care together with nursing expertise to avoid decubitus ulceration and other complications of spinal cord injury, and a full rehabilitation team to manage the physical, social, financial, and emotional aspects of rehabilitation.

5443. Tian, D., et al. (2006). "The clinical classification, diagnosis and treatment of penetrating craniofacial injuries." Chinese Journal of Emergency Medicine **15**(3): 206-208.

Objective: To study the clinical classification, diagnosis and treatment of penetrating craniofacial injuries. Methods: Thirty-six patients with penetrating craniofacial injuries and treated in our hospital between Janurary 1994 to Janurary 2005 were retrospectively studied. The patients' age ranged from 1.5 to 50.0 years old, with a mean age of 24.5 years old. The penetrating location: via orbital portion in 18, via ethmoid in 8 patients, via middle cranial fossa in 5 patients, via posterior cranial fossa in 3 patients and via sphenoid sinus in 2 patients. Results: Twenty-two patients recovered well, 4 had slight disability, 3 patients had middle disability, 7 died. The aesthetic and functional results were good in 25 patients, facial cicatricial contracture was in 3 patients, maxillofacial skeleton collapsed in 1 patient. Among the patients with cerebrospinal fluid (CSF) leak, 20 were cured after operation, 2 needed another revision. There were no epilepsy, intracranial infection, wound infection in the follow-up period. Conclusion: Transorbital penetrating craniocerebral injuries is the most common type of penetrating craniofacial. injuries. It is difficult to treat the patients with penetrating craniofacial injuries, with high mortality and disability rate. Medical record and the change of vital signs should be payed attention to. It is important to treat brain injuries and debride thoroughly as early as possible.

5444. Tian, S. and M. J. Middleton (2012). "Onobotulinum toxin type a injections for refractory chronic daily and migraine headaches in a combat veteran with history of traumatic brain injury and a gun shot wound to face: A case report." PM and R **4**(10): S332.

Case Description: A 48-year-old male combat veteran from Persian Gulf War (PGW). The patient suffered a left facial gunshot wound (GSW) in 2005 during active combat. The patient developed severe chronic daily (CD) and migraine (M) headaches that were debilitating and refractory to multiple treatments. He has a complex medical history including traumatic brain injury. Setting: Tertiary care Veteran Affairs medical center. Results or Clinical Course: After clinical assessment, onobotulinum toxin type A (Botox) 100 U was injected to the following muscles: corrugator, frontalis, temporalis, occipital region, cervical paraspinals, trapezius, and levator scapulae. The onset of relief for CD/M headache was approximately 5 days after injection. He was headache-free (no CD or M) for 1 month with decrease in CD pain from 10/10 to a 7/10 on visual analogue scale (VAS) for the 2nd and 3rd months after initial Botox injection. The headache further improved after the second series of Botox 200 U: CD from constant daily to 2 days a week, and only lasting seconds;Mfrom every other day, to once a week (VAS 5/10), and lasting 30 minutes on average. Patient continues to receive Botox injections in varied doses based on clinical assessments every 3 months. Continued improvement in CD/ M headaches has been observed. Discussion: Recent literature suggests combat veterans have higher incidence of migraine, which is often associated with other psychosocial disorders such as PTSD, anxiety and adjustment disorders that make migraine often refractory to conventional treatments. This is a rare case of debilitating migraine headache associated with facial GSW during the PGW. The injection of Botox over the head and neck substantially improved the symptoms without side effects. Conclusions: The refractory CD/M headache from combat veterans can be effectively treated with repetitive Botox injections.

5445. Ticho, U. and I. Ben-Sira (1973). "Total keratoplasty." Archives of ophthalmology (Chicago, Ill. : 1960) **90**(2): 104-106.

5446. Tiffany, K. K. and M. W. Kline (1988). "Mixed flora brain abscess with Pseudomonas paucimobilis after a penetrating lawn dart injury." The Pediatric infectious disease journal **7**(9): 667-669.

5447. Tighe, S. Q., et al. (1992). "Resuscitation in northern Iraq." Injury **23**(7): 448-450.

The principles of Advanced Trauma Life Support (ATLS) were adopted by a Royal Navy surgical team deployed to northern Iraq. Over a 6-week period, 18 casualties of both military and civil trauma required active resuscitation, 10 being under the age of 16 years. Triage of multiple casualties was necessary on three occasions. Two patients died. It was difficult to exclude cervical spine injury. Venous cut-down was frequently unsuccessful, so that internal jugular vein cannulation was life-saving. Crystalloid was used as the primary infusion without apparent disadvantage. Cross-matched blood was unavailable and one patient died with haemolysis after massive transfusion. Hypothermia was a problem despite the high environmental temperature. Laboratory and radiological facilities were extremely limited. Non-medical staff were trained most effectively to assess vital signs, although sophisticated monitors became available. These problems are discussed and compared with previous experience. Recommendations are made to improve future outcome.

5448. Till, J. S. and J. R. Marion (1987). "Cerebrospinal fluid masquerading as tears." Southern medical journal **80**(5): 639-640.

We have described a 14-month-old white boy with a laceration of the right upper eyelid draining CSF. Careful evaluation, including computerized tomography, revealed a penetrating injury of the right frontal fossa. Determination of the glucose level in fluid draining from upper eyelid lacerations aids in the diagnosis of CSF fistulas.

5449. Tillman, N., et al. (2011). "Severe TBI outcomes associated with implementation of comprehensive guidelines in a children's hospital." Critical care medicine **39**: 221.

Introduction: Pediatric traumatic brain injury (pTBI) is a major cause of morbidity and mortality in children. In adults, using guidelines to manage TBI patients is well established, resulting in improved outcomes. Since the 2003 publication of national guidelines for the acute management of severe pTBI, data is lacking on the impact of the guidelines on physician compliance and effect on patient outcomes. Hypothesis: A hospital-specific severe pTBI guideline based on the 2003 guidelines along with a guideline-specific computerized order set will decrease practice variation, and be associated with positive patient outcomes in a pediatric institution. Methods: In 2008, a pTBI guideline at Children's Healthcare of Atlanta was initiated by a multidisciplinary team; however, there was noticeable practice variation and the guideline was not consistently utilized. The guideline was further refined in 2010. The patient population was defined and data collection standardized. Electronic medical record tools were developed to «hardwire» the guideline usage and report outcome measures. Specific guideline improvements included defined ranges & response for ICP/CPP, panic values & time for response, ranges for temp and CO2 control, documentation of GCS, and monitoring parameters for hyperosmolar therapy and EEG use. Education efforts included combined physician and nursing quality meetings. The updated guideline was implemented in March 2011 along with a guideline-specific order set. Scorecard measures from the first quarter of implementation (Apr-Jun 2011) were compared to the same time period one year prior (Apr-Jun 2010), as a historical control. Results: Patients < 18 years old that suffered a TBI with GCS <9 and admitted to the PICU were retrospectively identified for each quarter (n = 28, 2010, n = 24,2011). Compliance with ordering the guideline increased from 7.1% to 54.0% (100% for patients with an ICP monitor). Average LOS (non-rehab) decreased from 9.5 to 7.4 days. Avg ICU LOS decreased from 7.9 to 6.7 days. Conclusions: A multidisciplinary effort to develop, educate and implement a comprehensive severe TBI guideline led to increased compliance and was associated with improved outcome measures.

5450. Timmons, T., et al. (2011). "Catastrophic brain injury: Less doom and gloom than expected." Neurocritical care **15**(1): S245.

Introduction The aim of this study was to determine the mortality rate in patients who present with a Glasgow Coma Score (GCS) less than 6 and identify risk factors for death. Methods A retrospective analysis of patients with an admission GCS <6 and Head AIS >2 admitted to a single Level I trauma center over an 18-month period was performed. Mortality, baseline demographics, and injury characteristics were recorded. Pupil exam, the neurosurgical consultants' GCS, and the need for craniotomy were collected. In order to control for pre-hospital therapies that may artificially lower the admission GCS, the subset of patients with a GCS less than 6 at the time of neurosurgical evaluation was also evaluated. Univariate and multivariate analyses were performed to identify variables associated with mortality. Results 116 (45.3%) of 256 identified patients survived. In univariate analysis, older age, penetrating injury, lower motor GCS, and increased ISS were associated with mortality ($p<0.05$). 19 patients (15.6%) who presented with bilaterally nonreactive pupils survived vs. 68 (75.6%) who presented with equal reactive pupils ($p<0.0001$). Surprisingly, 77(39.7%) patients with a GCS 3 at admission survived, including four in arrest on arrival. Patients who underwent craniotomy had a higher survival rate (64.8 vs. 35.2%, $p=0.001$). Of 162 patients with a persistently low GCS at the time of neurosurgical evaluation, there were 45 (27.8%) survivors. Factors associated with survival in this subset were the same. In multivariate analysis, age (OR=1.04, $p<0.0001$), ISS (1.04, $p=0.002$), nonreactive pupils (OR=12.8, $p<0.0001$), and penetrating injury (OR=4.6, $p=0.009$) were associated with mortality while GCS motor score on admission was not. Conclusions Younger age, lower ISS, blunt injury and pupil reactivity were all prognostic factors for survival. In light of the higher than expected survival in this group of severely brain injured patients, aggressive treatment of these patients is warranted.

5451. Timpone, V. M., et al. (2009). "Answer to last month's radiology case (#40) and images: IED fragment embolism to left posterior cerebral artery." Military medicine **174**(10): iv-v.

5452. Tinker, D., et al. (2018). "A lance through the orbit." Canadian journal of ophthalmology. Journal canadien d'ophtalmologie **53**(5): e196-e198.

5453. Tirard, P., et al. (2015). "Fatal tiger shark, Galeocerdo cuvier attack in New Caledonia erroneously ascribed to great white shark, Carcharodon carcharias." Journal of forensic and legal medicine **33**: 68-70.

To understand the causes and patterns of shark attacks on humans, accurate identification of the shark species involved is necessary. Often, the only reliable evidence for this comes from the characteristics of the wounds exhibited by the victim. The present case report is intended as a reappraisal of the Luengoni, 2007 case (International Shark Attack File no. 4299) where a single shark bite provoked the death of a swimmer by haemorrhagic shock. Our examination of the wounds on the body of the victim, here documented by so-far unpublished photographic evidence, determined that the shark possessed large and homodontous jaws. This demonstrates that the attacker was a tiger shark, not a great white shark as previously published.

5454. Tisherman, S. A., et al. (2007). "Comment on article by Ahmed and Cheng-Robles." The Journal of trauma **63**(2): 455.

5455. Tite, D. J., et al. (2002). "Penetrating orbital injury with wooden foreign body initially diagnosed as an orbital floor blowout fracture." ANZ journal of surgery **72**(7): 529-530.

5456. Tkachenko, S. S. and V. V. Rutskii (1969). "[Osteosynthesis with polymethylmethacrylate and cyanocrylate adhesives (a review of domestic and foreign literature)]." Soedinenie kostei adgezivami iz polimetilmetarkrilatov i tsianokrilatov (obzor otechenstvennoi i zarubezhnoi literatury) **103**(10): 135-140.

5457. Tobin, G. R., et al. (1981). "The split latissimus dorsi myocutaneous flap." Annals of plastic surgery **7**(4): 272-280.

Consistent proximal branching of the latissimus dorsi neurovascular anatomy permits surgical splitting of the myocutaneous unit into two flaps. Either or both branches of the split flap can be independently transferred. Experimental and clinical applications of this flap, which illustrate several of its uses and advantages, are presented. Applications include simultaneous provision of cover and lining flaps for head and neck reconstruction, motor transfers with split muscle branches, preservation of motor function in the flap donor site with one split muscle branch, and microvascular free tissue transfer of the branched flap or of individual branches.

5458. Tokdemir, M., et al. (2007). "Forensic value of gunpowder tattooing in identification of multiple entrance wounds from one bullet." Legal medicine (Tokyo, Japan) **9**(3): 147-150.

Multiple entrance gunshot wounds can give useful information in forensic evaluation of deaths from homicide and suicide. Although the presence of multiple entrance gunshot wounds does not absolutely exclude the possibility of suicide, they are important to the forensic investigators and pathologists in cases of assault, attempted homicide and suicide as they provide important clues for determination of number of shots fired and direction of firing. We present a case of 16 years of young woman who was shot to death by her husband. External examination revealed an entrance wound with semi-lunar shot residue at the dorsal side of her left hand at 5th metacarpus, and exit wound on the hypothenar muscle. There was also a second wound entrance located on her left zygoma. Direction of the bullet was downward traveling from left-to-right. Initially it was thought that there were two close shots, but when her left hand was placed over the malar area her face, it was determined that the gunshot powder tattoos were completing the nature of a single shot from a close distance. Crime scene investigation revealed only one cartridge casing. The autopsy and radiography findings showed that the bullet was entered from dorsal site of the left hand exiting from the palm and re-entering from the zygomatic region, hit the base of the skull, and remained in the soft tissue of the right mandible after passing the soft palate. The bullet was caused an incomplete laceration of the right internal arteria carotid and she died of internal and external bleeding. Detailed investigation of gunshot residues can provide important information for clarification of close distance gunshot wounding. We present this case due to its interesting nature, and to highlight the importance of detailed investigation of the gun powder residues in cases with multiple entry wounds.

5459. Tokita, Y., et al. (2001). "Regulation of neuregulin expression in the injured rat brain and cultured astrocytes." The Journal of neuroscience : the official journal of the Society for Neuroscience **21**(4): 1257-1264.

In this report, we investigated whether reactive astrocytes produce neuregulins (glial growth factor 2/heregulin/acetylcholine receptor-inducing activity or neu differentiation factor) and its putative receptors, ErbB2 and ErbB3 tyrosine kinases, in the injured CNS in vivo. Significant immunoreactivities with anti-neuregulin, anti-ErbB2, and anti-ErbB3 antibodies were detected on astrocytes at the injured site 4 d after injury to the adult rat cerebral cortex. To elucidate the mechanisms for the upregulation of neuregulin expression in astrocytes, primary cultured astrocytes were treated with certain reagents, including forskolin, that are known to elevate the intracellular level of cAMP and induce marked morphological changes in astrocytes. Western blot analysis showed that the expression of a 52 kDa membrane-spanning form of a neuregulin protein was enhanced in cultured astrocytes after administration of forskolin. The upregulation of glial fibrillary acidic protein was also observed in astrocytes treated with forskolin. In contrast, inactivation of protein kinase C because of chronic treatment with phorbol ester 12-O-tetradecanoyl phorbol 13-acetate downregulated the expression of the 52 kDa isoform, although other splice variants with apparent molecular sizes of 65 and 60 kDa were upregulated. These results suggest that the enhancement of neuregulin expression at injured sites is induced, at least in part, by elevation in intracellular cAMP levels and/or a protein kinase C signaling pathway. The neuregulin expressed on reactive astrocytes may stimulate their proliferation and support the survival of neurons surrounding cortical brain wounds in vivo.

5460. Tokitsu, M., et al. (1990). "[Skullbase-penetrating injuries caused by umbrella tips: case reports]." No shinkei geka. Neurological surgery **18**(2): 189-192.

Two cases of skullbase-penetrating injuries caused by umbrella tips are reported. Case 1: 24-year-old male. Admitted with disturbance of consciousness, left hemiparesis, nasal bleeding, and laceration of left lower eyelid because of having been stabbed by an umbrella tip. Pupils and fundi revealed no definite findings. Plain skull X-ray showed turbid ethmoid sinus and fracture of planum sphenoidale. Cranial CT showed right putaminal hematoma with intraventricular hemorrhage and pneumocephalus. Increased ICP necessitated surgery two days after the injury. Dural laceration of planum sphnoidale, laceration of left optic nerve, right rectal gyrus contusion and rebleeding from the right lenticulostriate branch were observed. Dural plasty and removal of hematoma with external decompression were carried out. He had a good postoperative course, but left visual loss and left hemiparesis remained. Case 2: 29-year-old male. Admitted with excoriation of his right nostril because of having been stabbed by an umbrella tip, severe headache, and nasal discharge. Oculomotor palsy was observed as well as CSF rhinorrhea and meningeal irritability. Plain skull X-ray showed niveau in sphenoidal sinus, pneumocephalus, and fracture of sella turcica. His complaint disappeared after conservative therapy. We reviewed the literature and found only 4 similar cases. The skullbase, because of its anatomical character, is likely to be penetrated in orbital and periorbital injury caused by umbrella tips. Cases which include disturbance of consciousness have a poor prognosis. We hope the fact that umbrella tips can easily become life-threatening objects will come to the attention of the general public so that similar cases may be avoided.

5461. Tolias, C. and J. Wasserberg (2002). "Critical decision making in severe head injury management." Trauma **4**(4): 211-221.

The management of severe head injury (SHI) remains a major challenge not only for neurosurgeons but also for all other health professionals involved in the care of trauma patients. Any trauma patient with SHI is at risk of further neurological deterioration if appropriate measures are not instituted from the start of his or her treatment. Secondary insults due to ischaemic, hypotensive, and metabolic or other causes are still common, even in the most advanced neurocritical care settings. Management controversies are widespread and few decision options can be supported by Class I evidence. This article attempts to provide an up-to-date review of the published recommendations that could help health professionals in their management of SHI.

5462. Toman, E., et al. (2015). "Craniectomy and cranioplasty: The UK military experience." British journal of neurosurgery **29**(4): 453.

Objectives. To describe the indications, complications and outcomes in UK military personnel requiring craniectomy in recent conflicts. Design. Retrospective audit Subjects. 21 UK military personnel Methods. JTTR search: UK survivors who underwent craniectomy and cranioplasty from mechanisms of explosion, blunt trauma and gunshot wound from 2004 to 2014 Notes from Role 3 and 4 hospitals. Results. All male, mean age 24 years. 18 had open cranial injuries and 17 had penetrating fragments. Explosive blast was the most common mechanism (52%). 13 patients had an

ISS of 75. Median time to cranioplasty was 9 months. Overall infective complication rate was 33%. No patients remained in a vegetative state - the GOS ranged from 3 to 5. Conclusions. This is the largest study to date evaluating the UK military population that have undergone decompressive craniectomy. Nevertheless the numbers are small compared to published US data. Craniectomies were most commonly performed for personnel with open blast injuries with associated penetrating fragments. The infective complication rate is likely related to the initial injury pattern, predisposing these patients to infection. This cohort of patients is young and fit, undoubtedly contributing to unexpected survival in those with ISS of 75. It is clear that access to neurosurgical intervention in theatre remains imperative for good long-term outcomes in this cohort of patients.

5463. Tomazic, P. V., et al. (2010). "Ethmoid roof CSF-leak following frontal sinus balloon sinuplasty." Rhinology **48**(2): 247-250.

INTRODUCTION: Though clear indications for its clinical application are not established yet, balloon sinuplasty technology per se is considered safe and very few severe complications have been mentioned in literature as of today., CASE REPORT: We report the case of a 36-year-old female patient who presented with right sided rhinorrhea from a CSF-leak in the ethmoidal roof after balloon sinuplasty, aimed at her right frontal sinus. Apparently, the surgeon was unaware of having penetrated the skull base through the lateral lamella of the cribriform plate intraoperatively. CSF rhinorrhea became evident 3 weeks postoperatively only when fever, headaches and moderate nausea developed. Upon revision, diameter, size and shape of the bony defect exactly matched with the tip of a standard sinus balloon catheter device, as could be demonstrated and documented. A small posttraumatic encephalocele had intermittently blocked the leak. Endoscopic surgery and duraplasty were performed under intrathecal fluorescein control, applying CT image-guided navigation. Since two-layer fascia lata closure of the defect, the patient has remained free of symptoms without any evidence of CSF leakage., CONCLUSION: Balloon sinuplasty per se is considered a safe technique, though in inexperienced hands or wrongly applied, complications may occur, as with any surgical tool rigid enough to breach through skull base.

5464. Tominaga, G. T., et al. (1993). "Emergency thoracotomy with lung resection following trauma." The American surgeon **59**(12): 834-837.

Over a 7-year period, 9443 trauma patients were evaluated with 2934 (31%) sustaining chest trauma. Of these, 347 (12%) patients required thoracotomy, with 12 patients undergoing emergency lung resection. Mean age was 23.1 years with mean Injury Severity Score of 32. Mechanism of injury was blunt in three (25%), gunshot wound in seven (58%), and stab wound in two (17%). Associated injuries included head injury in two (17%), intra-abdominal injury requiring laparotomy in four (33%), cardiac injury in three (25%), and great vessel injury in one (8%). Indications for operation included persistent hemorrhage in 11 and suspected tracheobronchial disruption in one. Non-anatomic lung resection was performed in five patients, lobectomy in three patients, and pneumonectomy in four patients. Overall mortality was 33 per cent: 20 per cent for non-anatomical lung resection, 33 per cent for lobectomy, and 50 per cent for pneumonectomy. All survivors fully recovered except for one patient with an associated head injury. Our experience supports the selective use of lung resection, including pneumonectomy, to immediately control hemorrhage and to impact survival in severe chest trauma.

5465. Tommasino, N., et al. (2014). "A model to predict progression in brain-injured patients." Transplantation proceedings **46**(9): 2950-2952.

INTRODUCTION: The study of brain death (BD) epidemiology and the acute brain injury (ABI) progression profile is important to improve public health programs, organ procurement strategies, and intensive care unit (ICU) protocols. The purpose of this study was to analyze the ABI progression profile among patients admitted to ICUs with a Glasgow Coma Score (GCS) <=8, as well as establishing a prediction model of probability of death and BD., MATERIALS AND METHODS: This was a retrospective analysis of prospective data that included all brain-injured patients with GCS <=8 admitted to a total of four public and private ICUs in Uruguay (N = 1447). The independent predictor factors of death and BD were studied using logistic regression analysis. A hierarchical model consisting of 2 nested logit regression models was then created. With these models, the probabilities of death, BD, and death by cardiorespiratory arrest were analyzed., RESULTS: In the first regression, we observed that as the GCS decreased and age increased, the probability of death rose. Each additional year of age increased the probability of death by 0.014. In the second model, however, BD

risk decreased with each year of age. The presence of swelling, mass effect, and/or space-occupying lesion increased BD risk for the same given GCS. In the presence of injuries compatible with intracranial hypertension, age behaved as a protective factor that reduced the probability of BD., CONCLUSIONS: Based on the analysis of the local epidemiology, a model to predict the probability of death and BD can be developed. The organ potential donation of a country, region, or hospital can be predicted on the basis of this model, customizing it to each specific situation.

5466. Tompkins, P., et al. (2013). "Brain injury: neuro-inflammation, cognitive deficit, and magnetic resonance imaging in a model of blast induced traumatic brain injury." Journal of neurotrauma **30**(22): 1888-1897.

Blast wave-induced traumatic injury from terrorist explosive devices can occur at any time in either military or civilian environments. To date, little work has focused on the central nervous system response to a non-penetrating blast injury. We have evaluated the effect of a single 80-psi blast-overpressure wave in a rat model. Histological and immunochemical studies showed an early inflammatory response, tissue damage and the initiation of apoptosis. With regard to inflammation, polymorphonuclear leukocytes and lymphocytes infiltrated brain parenchyma within 1 h post-blast. Glial-fibrillary protein, cyclo-oxygenase-2ir, interleukin-1beta and tumor necrosis factor were present by 1 h and remained detectable at three weeks post-injury. High mobility group box-1 protein was detectable at three weeks. With regard to tissue damage, S100beta and 4-hydroxynonenal were present at 1 h and remained detectable at three weeks. Amyloid precursor protein was detectable at three weeks. As for apoptosis, Cleaved Caspase-3 was detectable at three weeks. Morris water maze assessment of cognitive function showed that blast injured animals required significantly more time to reach the platform on day 1 of training and traveled a greater distance to get to the platform on days 1 and 2. Blast-injured animals showed a significant increase in swimming speed ($p<0.001$), increased total distance traveled ($p<0.001$) and increased number of entries into the previous quadrant that had contained the escape platform ($p<0.05$). Magnetic resonance imaging showed hyperintense regions in the somatosensory area within 1 h. T2 relaxation times and apparent diffusion coefficients show increasing trends in both somatosensory and cortical regions. These data indicate an early and lasting response of brain tissue to non-penetrating blast over-pressure injury. This early inflammatory response is indicative of a mild traumatic brain injury. There is evidence of early hippocampal dysfunction.

5467. Tong, J. Y., et al. (2021). "Radiological characteristics of mixed composition intraorbital foreign body." BMJ case reports **14**(10).

Orbital trauma is commonly complicated by retention of intraorbital foreign bodies. A 39-year-old man presented following a penetrating injury to the right orbit, with CT evidence of foreign bodies in the right anterior and posterior medial orbit. The foreign bodies were found to be a mixed composition of metal and wood. Characterising wood on CT imaging is difficult due to its radiolucency and low density, which can be mistaken for air in the setting of traumatic orbital emphysema. Increasing the window width on bone window settings can be used to distinguish wood from air, which is crucial for facilitating its complete surgical removal.

5468. Tong, Y., et al. (2004). "Diagnosis and treatment of penetrating craniocerebral injury." Chinese journal of traumatology = Zhonghua chuang shang za zhi **7**(5): 259-265.

OBJECTIVE: To evaluate the clinical characteristics and present the experience in the treatment of patients with penetrating craniocerebral injury (PCCI)., METHODS: The data of 7 cases with PCCI by foreign body were retrospectively studied and compared with associated literatures. The strategies of diagnosis and treatment of PCCI were analyzed. In this series, 3 cases underwent emergency debridements and 4 cases underwent craniotomies. All patients received surgical intervention within 3 hours after admission., RESULTS: Outcomes were good in 3 cases, moderate disability was in 2 cases, severe disability in 1 case and persistent vegetative state in 1 case. One case developed wound and intracranial infection, but made good recovery after treatment. During the follow-up period, one patient died one month after discharge and other six patients (range from 8 months to 3 years) recovered well and no epilepsy, leakage of cerebrospinal fluid (CSF), or traumatic vascular disease occurred., CONCLUSIONS: Early diagnosis and prompt debridement are the fundamental factors affecting the outcome of PCCI. CT scans are the mainstay in evaluating PCCI and three dimensional (3D) images reconstructed from spiral CT scans provide more information. Efficient debridement should be performed as early as possible. Minimizing the degree of surgical management of PCCI is preferred when there is no indication for aggressive operation. It is important to stress the rapid and effective management of CSF

leakage in early stage of PCCI. Use of prophylactic broad-spectrum antibiotics is recommended for patients with PCCI. Traumatic vascular injury should be paid attention to after PCCI.

5469. Topping, T. M., et al. (1982). "Traumatic wound dehiscence following penetrating keratoplasty." The British journal of ophthalmology **66**(3): 174-178.

Four young male patients with keratoconus had traumatic dehiscence of the surgical wound after penetrating keratoplasty. Two were rendered aphakic by the trauma, and in one patient the lens was dislocated posteriorly. In each case the dehiscence was repaired by resuturing the original corneal graft. Despite marked corneal oedema in the immediate postoperative period all four grafts deturgesced and subsequently cleared. The follow-up has been a minimum of 23 months. We recommend therefore primary resuturing of traumatic wound dehiscence after keratoplasty, anterior vitrectomy if the lens dislodged, and prophylactic antibiotics postoperatively. The clearing of the initially oedematous grafts in each case illustrates the resilience of the corneal endothelium.

5470. Torabi, K., et al. (2010). "Prosthodontic rehabilitation of a shotgun injury: a patient report." Journal of prosthodontics : official journal of the American College of Prosthodontists **19**(8): 634-638.

This report describes the prosthodontic rehabilitation of a shotgun patient traumatized in the maxillary, mandibular, and nasal areas resulting in severe problems in her esthetics, phonetics, and mastication. The patient was treated with removable partial prostheses using tooth, soft tissue, and implant support.

5471. Torche Velez, E., et al. (2021). "Transorbital penetrating intracranial injury, with cavernous sinus involvement." Neurocirugia.

Transorbitary intracranial penetrating traumatic injuries are uncommon in the pediatric population, and may occur in the context of domestic, sporting or school accidents. They can extend to skull base and compromise vascular structures such as cavernous sinus and internal carotid. We present a case of 6 years-old girl that suffered an intracranial transorbital penetrating injury with a wooden pencil that crossed from the medial edge of left orbit, transetmoidal and trans-sphenoidal, entering the right sellar region and leaving its end in contact with carotid artery (cavernous segment). After pre-surgical studies, foreign body removal was performed with endoscopic surgery + endovascular control in case of carotid injury. After removing the foreign body, a CSF fistula occurred and was repaired. Patient recovered adequately, without neurological deficit, without postoperative CSF fistula, without CNS infection or oculomotor alteration.

5472. Tosun, F., et al. (2005). "Analysis of different surgical approaches for the treatment of cerebrospinal fluid rhinorrhea." Minimally invasive neurosurgery : MIN **48**(6): 355-360.

The current treatment method for cerebrospinal fluid (CSF) rhinorrhea is surgical repair of the fistula. The aim of this study was to analyse different surgical approaches used for the treatment of CSF rhinorrhea regarding several preoperative and postoperative variables to determine the optimal method in these patients. Patients' charts were retrospectively reviewed to get the required data. Twenty-six patients who underwent different types of surgical approach for the treatment of CSF rhinorrhea were included in the study. Patients who had extensive comminuted fractures of the anterior cranial base and additional brain injury besides CSF rhinorrhea, mostly as a result of gunshot injuries, underwent craniotomy (n = 14). Osteoplastic frontal sinusotomy was used in two patients with a dural defect located at the posterior wall of the frontal sinus. Uncomplicated CSF fistulas in ten patients, located at the anterior and posterior ethmoid roof and in the sphenoid sinus, were closed with an endonasal endoscopic approach. Postoperative success rate was higher (97 % for intracranial approach, 100 % for extracranial external and endonasal endoscopic approach) for all techniques. Anosmia was the most frequent permanent complication (n = 5), seen after craniotomy. In conclusion, endonasal endoscopic approach can be preferred for the closure of uncomplicated CSF fistula, located at the anterior or posterior ethmoid roof and in the sphenoid sinus, due to its minimal postoperative morbidity. Uncomplicated CSF fistula, located at the posterior wall of frontal sinuses can be repaired extradurally with osteoplastic frontal sinusotomy. Intracranial approaches should be reserved for more complicated CSF rhinorrhea which results from extensive comminuted fractures of the anterior cranial base and is accompanied with intracranial complications.

5473. Toth, B. A., et al. (1988). "Computer-designed prostheses for orbitocranial reconstruction." Plastic and reconstructive surgery **81**(3): 315-324.

Three-dimensional imaging is an adjunct to preoperative evaluation and surgical management in some patients with complex anatomic defects of various etiologies. Deformities defined by conventional computerized tomography can be viewed as accurate three-dimensional images calculated from the original scan. The images are viewed on a high-resolution video monitor and can be photographed for a permanent record. A computer-controlled milling device can use these data to fabricate prostheses. The prostheses aid reconstructive surgery through use as an alloplastic implant, as a template to fashion autogenous bone grafts, or as a model for tissue removal. We have utilized three-dimensional imaging in combination with computer-assisted prosthesis manufacture in six patients with complex orbitocranial deformities. Four patients have undergone reconstructive surgery with satisfactory results and no complications thus far. The use of computer-designed prostheses adds a new aspect to orbitocranial reconstructive surgery that facilitates increased accuracy in the correction of anatomic defects.

5474. Toupin, J. M., et al. (1996). "[Selective indications of skull radiography after head injury in children]." Indications selectives de la radiographie du crane apres traumatisme de la voute chez l'enfant. **82**(3): 201-207.

PURPOSE OF THE STUDY: Skull X-rays are systematically performed on children after head injuries in most hospitals. However, the discovery of a skull fracture as an isolated finding rarely warrants intervention. In february 1994, we stopped performing systematical skull X-rays in children after head injuries. We report the results of this experience., MATERIALS AND METHODS: Since February 1994, only children with possible skull penetration, depressed fracture, or presenting signs of basilar fracture had X-ray examination. Facial injuries were excluded in this study. In case of focal neurologic signs, neurosurgical consultation, or emergency CT examination, or both were performed. In case of change of consciousness at the time of injury or subsequently, the child was hospitalised for clinical observation for 48 hours, but no X-ray examination was performed. Children without any neurological signs or change of consciousness were discharged to their homes after they were given a head-injury instruction sheet, and if a second person could observe them for signs indicating that they belong to a higher risk group, but no X-ray examination was performed., RESULTS: An average of 241 children per month were presented at the Children Emergency Unit after head trauma. An average of twenty-one X-ray examinations per month were performed instead of 194/month before february 1994. This represented a decrease of 2000 X-ray examinations per year. There was no undiagnosed neurological complication, and the number of children staying in the hospital for clinical supervision did not increase., DISCUSSION: Skull radiographies only show fractures and do not afford visibility of either brain or blood to demonstrate an intracranial injury. The presence of a skull fracture without neurological abnormalities is of little significance. Harwood-Nash reported that 60 per cent of the children with extradural hematoma, 85 per cent of the children with subdural hematoma and 35 per cent of the children with brain damage did not have any associated skull fracture. Clinical examination is essential, and it would be a mistake to be reassured about the severity of a head trauma because skull X-rays are normal., CONCLUSION: Routine skull X-rays after head trauma are not justified either for financial or radioprotection reasons. In this study, more than half of the children were less than five years old and ran a higher risk of irradiation.

5475. Tourigny, J., et al. (2020). "Efficacy of the Brain Injury Guidelines for complicated mild traumatic brain injuries." Canadian Journal of Emergency Medicine **22**: S69-S70.

Introduction: The Brain Injury Guidelines (BIG) stratifies complicated mild traumatic brain injury (mTBI) patients into 3 groups to guide hospitalization, neurosurgical consultation and repeat head-CT. BIG-1 patients could be managed safely without neurosur-gical consultation or transfer. Systematic transfer to neurotrauma centers provide few benefits to this subgroup leading to overtriage. Similarly, unnecessary clinical and radiological follow-ups utilize significant health-care resources. Objective: to validate the safety and efficacyof the BIG for complicated mTBIs. Methods: We performed a multicenter historical cohort study in 3 level-1 trauma centers in Quebec. Patients ≥16 years old assessed in the Emergency Department (ED) with complicated mTBI between 2014 and 2017 were included. Patients with penetrating trauma, cerebral aneurysm or tumor were excluded. Clinical, demographic and radiological data, BIG variables, TBI-related death and neurosurgical intervention were collected using a standardized form. A second reviewer assessed all ambiguous files. Descriptive statistics, over- and under-triage were calculated. Results: A total of 342 patients' records were assessed. Mean age was 63 ± 20, 7 and 236 (69 %) were male. Thirty-five patients were classified

under BIG-1 (10.2%), 110 under BIG-2 (32.2%) and 197 under BIG-3 (57.6%). Twenty-six patients (7%) required neurosurgical intervention, all were BIG-3. 90% of TBI-related deaths occurred in BIG-3 and none were classified BIG-1. Among the 192 transfers (51%), 14 were classified under BIG-1 (7.3%) and should not have been transferred according to the guidelines and 50 under BIG-2 (26%). In addition, 40% of BIG-1 received a repeat head computed tomography, although not indicated. Similarly, 7 % of all patients had a neurosurgical consult even if not required. Projected implementation of BIG would lead to 47% of overtriage and 0.3% of undertriage. Conclusion: Our results suggest that the Brain Injury Guidelines could safely identify patients with negative outcomes and could lead to a safe and effective management of complicated mTBI. Applying these guidelines to our cohort could have resulted in significantly fewer repeat head CTs, neurosurgical consults and transfers to level 1 neurotrauma centers.

5476. Toussaint-Thorin, M., et al. (2013). "Incidence and risk factors of post-traumatic epilepsy in children: A rench prospective cohort (TGE cohort)." Annals of Physical and Rehabilitation Medicine **56**: e300.

Acquired brain injury in children often result in severe cognitive and behavioral impairments. They are significantly worsened by associated epilepsy. In the literature, the incidence rates of post-traumatic epilepsy in children and adults with traumatic brain injury (TBI) vary between 8 and 30% [1]. Objective.- To explore incidence and risk factors of post traumatic epilepsy in a prospective cohort of children with severe accidental TBI. Methods.- Mono-centric prospective cohort study. Children, aged 0 to 15 years, consecutively admitted in the intensive care unit of the paediatric neurosurgery department-Necker Hospital for severe accidental TBI were included. Data on TBI severity, initial intensive care monitoring, and the onset of post-traumatic epilepsy were prospectively collected over two years. The following risk factors were taken into account in the analysis: Glasgow coma scale, length of coma, presence of a penetrating skull fracture, hypo-perfusion brain, early seizures. Results.- Eighty-one children were included. There were 65 survivors [66% males: mean age 8.12 years (DS=4,6)]. Five children developed a posttraumatic epilepsy, the incidence was 7.7% [95% CI 0.9%-14.4%]. They developed epilepsy within the first 12 months post-injury. Only one of those five children had presented early seizures. Among the risk factors studied only the duration of coma was significantly associated with the onset of post-traumatic epilepsy (p = 0.02). Mean coma duration was 11 days (range: 5-16) in the subgroup with post-traumatic epilepsy versus 5 days (range: 1-23) in children without epilepsy. Discussion.- Post-traumatic epilepsy occurred after severe pediatric TBI, but the incidence is low. To our knowledge, this is the first study reporting data from a prospective cohort of children with severe accidental TBI. Our findings about the risk factors of post-traumatic epilepsy onset are consistent with data from the literature, as TBI severity is the most frequently reported factor.

5477. Traiger, J. (1968). "Asymptomatic multiple foreign bodies." Oral surgery, oral medicine, and oral pathology **26**(2): 190.

5478. Trainor, R. (1989). "Should the newly dead be used to help the living? An issue in our time." The Linacre quarterly **56**(3): 51-63.

5479. Tran, T. H. C., et al. (2005). "Traumatic globe rupture following penetrating keratoplasty." Graefe's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle Ophthalmologie **243**(6): 525-530.

PURPOSE: To evaluate the mechanism, clinical characteristics, management and visual outcome of ocular trauma following penetrating keratoplasty (PK)., METHODS: Twenty-six patients (13 men, 13 women) who suffered surgical wound dehiscence after PK because of ocular blunt trauma between 1994 and 2001 were included in this retrospective study. Graft dehiscence was managed with primary wound closure in all patients. Visual acuity, intraocular pressure, and funduscopy were evaluated in the follow-up., RESULTS: The mean age at trauma was 50+/-24 years (range 9-88 years). Mean interval between transplantation and trauma was 45.5+/-64 months (range 1 month to 20 years). Globe rupture occurred at the graft-host junction in all patients. Nine of 13 phakic eyes (69.2%) presented lens expulsion. Eight of nine pseudophakic eyes (88.9%) had lost their implants. Retinal detachment occurred in seven eyes (27%) within 3 months following the trauma. Five patients (19.2%) underwent vitreous surgery for posterior segment damage. Two eyes (7.7%) were regrafted. At the last examination, only seven eyes (27%) had visual acuity of 20/200 or better., CONCLUSIONS: Traumatic wound dehiscence may occur, and the prognosis is poor after the injury. Globe

rupture at the graft-host junction showed persistence of wound weakness even a long time after PK. Prevention of ocular trauma should be performed following PK.

5480. Travkin, A. G. and V. P. Derevianko (1997). "[Chemiluminescence of peripheral blood T and B lymphocytes in patients with burn leukoma after lamellar keratoplasty]." Khemiliuminestsentsiia T- i B-limfotsitov periphericheskoi krovi bol'nykh s ozhogovymi bel'mami posle posloinoi keratoplastiki. **113**(1): 25-27.

Lamellar keratoplasty was carried out in 50 patients after eye burns. The following methods were used in the study: assessment of the intensity of chemiluminescence, electron microscopy, and assessment of T-lymphocyte subpopulations by cytofluorograph (USA) and OCT monoclonal antibodies (USA). Free-radical activation was detected by chemiluminescence during the first hours of keratoplasty in the recipient's peripheral blood leukolymphocytic suspension, whereas immunocorrecting lymphocytes did not change during this period. On days 1-2 statistically reliable changes occurred in the immune system. By day 5 electron microscopy of the leukolymphocytic suspension showed cooperation of immunocompetent cells. The course of the corneal transplant taking in was for 2 years associated with the T-helper to T-suppressor imbalance, increase of chemiluminescence level, and detection of immune lymphocytes and their cooperation under electron microscope. The authors claim that primary formed peroxides act as nonspecific participants of metabolism by altering the functional activity of immunocompetent cells; hence, a new trend in the study of cell-mediated immunity appears: immunobiophysical.

5481. Treib, J., et al. (1996). "High-velocity bullet causing indirect trauma to the brain and symptomatic epilepsy." Military medicine **161**(1): 61-64.

Epilepsy is a frequent consequence after missile wounds of the brain. So far, no epilepsy cases with missile injury have been described in which epilepsy ensued without direct missile injury of the brain. During World War II, in 1941, our patient, then a soldier in the German army, suffered a bullet injury to the head; the bullet entered the cranium at the base of the nose. The bullet penetrated the head below the base of the cranium and remained stuck subcutaneously left of the second cervical vertebra. In the field hospital the patient suffered from focal seizures. The fits ceased within a few years under medication. In 1990 the seizures returned, this time with secondary generalization. In our case, a 7.62-mm bullet from the Russian Tokarev military pistol was used, which is known to have the highest muzzle velocity of all handguns available (> 500 m per second). We suspect that the so-called hydrodynamic effect of this high-velocity bullet caused an indirect trauma to the brain. This case shows that symptomatic epilepsy can occur after a penetrating head injury, without direct injury to brain tissue by a missile. High-velocity missiles are increasingly used in armed conflicts around the world. In light of the case reported here, in which the initial epilepsy was exacerbated more than 50 years after the wounding event, physicians must consider this possibility when dealing with veterans presenting with seizures. This case also has implications for the payment of benefits and pensions.

5482. Trikha, V., et al. (2018). "Midterm results of trochanteric flip osteotomy technique for management of fractures around the hip." Hip international : the journal of clinical and experimental research on hip pathology and therapy **28**(2): 148-155.

INTRODUCTION: In this study, we aimed to investigate safety and efficacy of the trochanteric flip osteotomy with surgical hip dislocation technique in selected displaced acetabular and femoral head fractures with clinico-radiological outcome and potential complications., MATERIALS AND METHODS: We retrospectively reviewed 32 patients from January 2009 to June 2014. Selected displaced acetabular fractures with comminution and/or cranial extension of posterior wall, marginal impaction, intraarticular fragment, femoral head fractures and hip fracture-dislocations were operated by this modified approach of trochanteric flip osteotomy and surgical hip dislocation. Patients were evaluated for fracture reduction, femoral head viability, trochanteric union, abduction power, and functional evaluation was done by Merle d'Aubigne-Postel scoring system. Minimum follow-up was 24 months., RESULTS: Reduction was judged to be anatomical in 84.38% of cases, and within 1-3 millimetres in 9.38% of cases. All osteotomies healed in an anatomical position. Heterotopic ossification was found in 2 patients limited to Brooker class I. Osteonecrosis developed in 1 patient. 2 patients developed arthritis of the hip as sequelae of poor reduction. Abduction power was MRC 5/5 in all except in 1 patient (4/5). Mean Merle d'Aubigne-Postel score was 16.18; overall good to excellent result was achieved in 87.5% of cases., CONCLUSIONS: Trochanteric flip osteotomy with surgical dislocation allows better intraarticular assessment, control of intraarticular fragments, assists accurate reduction and the fixation of complex acetabular and

femoral head fractures, without compromising femoral head vascularity and abductor strength. This technique has provided excellent midterm results in the management of complex injuries around the hip.

5483. Tripathi, M., et al. (2018). "Eye in the brain." Neurology India **66**(3): 883-884.

5484. Trivelato, F. P., et al. (2017). "Pipeline embolization device for the treatment of a traumatic intracranial aneurysm in a child." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **33**(5): 869-872.

INTRODUCTION: Traumatic intracranial aneurysms in children are rare and may occur as the result of closed or penetrating head trauma. Their natural history seems to be more aggressive. Most traumatic aneurysms have complex shape, tending to have a large neck or even a fusiform morphology., CASE REPORT: We present a case of a traumatic carotid artery aneurysm in a 9-year-old girl that was successfully treated with pipeline embolization device., DISCUSSION: Due to its dissecting nature, wall friability and lack of a substantial neck can make surgical clipping and selective coiling difficult and risky. Although endovascular parent artery occlusion is the best approach in the acute phase, in some situations it is not possible or very risky. In such scenario the use of flow diverter devices would be an alternative approach. Additionally, we discuss the potential advantages and risks of flow diverter deployment inside a developing vessel.

5485. Trnka, J. and W. P. Golema (2017). "Example of suicidal gunshot wound to the head with a blank actuated projectile shot from Keseru-type revolver as an example of danger connected with use of firearms replicas that can be bought without license." Przypadek samobojczego postrzalu glowy z rewolweru hukowo-kinetycznego typu Keseru" jako przyklad niebezpieczenstw zwiazanych z uzywaniem replik broni dostepnych bez zezwolenia. **67**(4): 275-280.

In January 2011 a body of 56-year old man was sent to Wroclaw Forensic Medicine Department. He was supposed to shoot himself with a noisemaker revolver. During the forensic autopsy a wound to the right temporal area was found, furthermore a hole in right temporal bone and a gunshot wound canal leading from right to left, slightly to the back and up. A deformed, metallic, 5.5 mm BB shot was found in the canal. The revolver found alongside the body was also examined. It was capable of projecting rubber or metal BB shots actuated by a blank cartridge discharge. Test shots were measured in the chronograph (5.5 mm metal BB shots). Peak initial velocity of the projectile reached around 120 m/s. This revolver does not require any license to buy and own. It is also not necessary to register it. Authors highlight the dangers connected with the use of such firearms as well as not sufficient legal regulations concerning this type of weapons.

5486. Trofimov, A. O., et al. (2013). "The characteristics of management of concomitant craniofacial injury complicated by cerebrospinal fluid rhinorrhea." Sovremennye Tehnologii v Medicine **5**(3): 74-77.

The aim of the investigation was to reveal the characteristics of the management of penetrating craniofacial injury against the background of polytrauma, and develop the algorithm of preoperative examination and treatment of concomitant craniofacial trauma complicated by cerebrospinal fluid rhinorrhea based on the use of modern neuroimaging techniques. Materials and Methods. 637 sufferers with major concomitant injuries underwent treatment in Nizhny Novgorod Regional Traumatology Centre from 2010 to 2012. 85 patients (13.34%) had concomitant cerebral and facial skeleton injuries, among them there were 62 (9.7%) cases with cerebrospinal fluid rhinorrhea revealed on admission. Mean age of those suffered from craniofacial injury was 31.2±13.9 years (min - 16; max - 88). The severity of injuries according to ISS (Injury Severity Score) was 35.15±17.40 scores (min - 9; max - 77). Results. Concomitant injury of brain and bones of the facial skeleton in polytrauma was found in 13.3% of patients with polytrauma. 9.7% cases were found to have penetrating craniofacial injuries. Relying on the experience obtained, we suggested the algorithm of preoperative assessment and planning of surgical management of craniofacial injury complicated by cerebrospinal fluid rhinorrhea using modern neuroimaging techniques based on the assessment of a patient's condition. The use of the algorithm in everyday practice in patients with penetrating craniofacial injury and polytrauma enables to improve the diagnosis and objectify the time optimal for surgical management of cerebrospinal fluid rhinorrhea, reduce the lethality up to 8%, and the morbidity of pyoinflammatory complications - up to 4.8%.

5487. Trokel, M., et al. (2006). "Variation in the diagnosis of child abuse in severely injured infants." Pediatrics **117**(3): 722-728.

OBJECTIVE: Diagnosis of child abuse is difficult and may reflect patient, practitioner, and system factors. Previous studies have demonstrated potential lethal consequences if cases of abuse are missed and suggested a role for continuing medical education in improving the accuracy of diagnosis of suspected abuse. Although the majority of injured American children are treated at general hospitals, most published studies of severe injury resulting from child abuse have been conducted at children's hospitals. The objective of this study was to evaluate the role of hospital type in observed variations in the frequency of diagnosis of child physical abuse among children with high-risk injuries., METHODS: Hospital discharge data were evaluated, and adjusted rates of abuse diagnosis were reported according to hospital type. A regression model estimated the number of cases of abuse that would have been diagnosed if all hospitals identified abuse as frequently as observed at pediatric specialty hospitals. This study consisted of children who were <1 year old and admitted to US hospitals in 1997 for treatment of traumatic brain injury or femur fracture, excluding penetrating trauma or motor-vehicle-related injury. A total of 2253 weighted cases were analyzed., RESULTS: The proportion of patients with a medical diagnosis of child abuse varied widely between hospital types: 29% of the cases were diagnosed as abuse at children's hospitals compared with 13% at general hospitals. An estimated 178 infants (39% of total) with these specific injuries would have been identified as abused had they been treated at children's rather than general hospitals., CONCLUSIONS: Hospital type was associated with large variations in the frequency of diagnosis of child abuse. This variation was not related to observed differences in the patients or their injuries and may result from systematic underdiagnosis in general hospitals. This result has implications for quality-improvement programs at general hospitals, where the majority of injured children in the United States receive emergent medical care.

5488. Trost, O., et al. (2008). "Re: Reconstruction of bony mandibular and maxillary defects with one single transfer of a free fibula osteocutaneous flap." Journal of plastic, reconstructive & aesthetic surgery : JPRAS **61**(11): 1385-1387.

5489. Trubner, K., et al. (2010). "[Suicidal extraneurocranial shot into the mouth]." Samobojczy postrzal w glowe poprzez otwarte usta z pozaczaszkowym przebiegiem kanalu postrzalowego. **60**(2-3): 127-131.

A case of a 51-year-old man who killed himself with a pistol-shot into his mouth is reported. The track of the bullet passed exactly in the median level completely extraneurocranially; the cause of death was a subtotal destruction of the cervical spinal cord (C2/C3). The synoptic assessment of the scene of death, the autopsy findings, the results of the securing of evidence and the criminological investigations allowed for drawing the only conclusion that the man had committed suicide.

5490. Truog, R. D., et al. (2006). "Sudden traumatic death in children: "we did everything, but your child didn't survive"." JAMA **295**(22): 2646-2654.

When caring for children who become suddenly and catastrophically ill, clinicians must simultaneously attend to a complex and rapidly evolving medical situation, as well as to the equally challenging demands of establishing compassionate relationships with family members and communicating well with colleagues. An 18-month-old toddler was brought to the hospital with severe head injury after being struck by a car. Over a period of hours, her condition evolved from prognostic uncertainty to the diagnosis of brain death and considerations of organ donation. Against this medical backdrop, the clinicians successfully established a trusting relationship with family members by careful attention to their emotional, informational, and care needs as they absorbed the devastating prognosis, took in the results of the brain death examination, and considered the option of organ donation. This case illustrates the importance of interdisciplinary communication, the vital role of social workers and other psychosocial providers with expertise in working with families, and the critical significance of mutual care and support for the clinicians who accompany families through these tragic life events.

5491. Truog, R. D. and F. G. Miller (2014). "Changing the conversation about brain death." The American journal of bioethics : AJOB **14**(8): 9-14.

We seek to change the conversation about brain death by highlighting the distinction between brain death as a biological concept versus brain death as a legal status. The fact that brain death does not cohere with any biologically plausible definition of death has been known for decades. Nevertheless, this fact has not threatened the acceptance of brain death as a legal status that permits individuals to be treated as if they are dead. The similarities between "legally dead" and "legally blind" demonstrate how we may legitimately choose bright-line legal definitions that do not cohere with biological reality. Not only does this distinction bring conceptual coherence to the conversation about brain death, but it has practical implications as well. Once brain death is recognized as a social construction not grounded in biological reality, we create the possibility of changing the social construction in ways that may better serve both organ donors and recipients alike.

5492. Tsai, S. H., et al. (2006). "The great fortune of misfortune." Emergency medicine journal : EMJ **23**(12): 958.

5493. Tsai, W.-C., et al. (2004). "Pediatric traumatic brain injuries in Taiwan: an 8-year study." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **11**(2): 126-129.

Background. This study is intended to determine the causes of pediatric traumatic brain injuries (PTBI) in children aged 14 years or less, and to identify various types of craniocerebral damage resulting from different mechanisms of injury. Methods . From July 1, 1993 to June 30, 2001, a survey on PTBI was conducted in Taiwan. The data of patients used in this study were collected from 56 major hospitals among the age group of 0-14 years. The items in the traumatic brain injury survey included sex, age, causes of injuries, severity, and the eventual outcome. Results . A total of 5349 cases were identified. The male-to-female ratio was 1.69: 1. The incidence rate was higher in the age groups of 4-9 years and 10-14 years. The main cause of PTBI was traffic injury, which accounted for 2537 of the cases (47.3%), followed by falls, 2160 (40.3%). Of all traffic injuries, motorcycle-related injury had the highest incidence, followed by the pedestrian and bicycle-related injury. This study also showed that 83.2% of the patients had mild injury, 9.8% had moderate injury, and 7.0%, severe injury. Conclusions . The results of this study suggest that it is important to decrease all the risk factors in the environment of homes and public areas as much as possible. Helmet wearing and the development of public transportation are essential for the prevention of head injury.

5494. Tsaloumas, M. D., et al. (1998). "Two cases of retention of wooden foreign bodies in orbit of eye." BMJ (Clinical research ed.) **316**(7141): 1363-1364.

5495. Tseng, S. H. and W. W. Cheng (1997). "Intracranial non-ballistic penetrating foreign body." Journal of Surgical Association Republic of China **30**(5): 372-376.

The management of four patients with non-ballistic penetrating intracranial foreign body injuries is presented. Craniotomy or craniectomy to remove the foreign body was done in all four patients, and an associated intracerebral hematoma was evacuated in one. In each case, the injured area was debrided and the dura was repaired. Prophylactic antibiotics were used to prevent infection. All four patients regained clear consciousness and full ambulation after surgery, although one lost his vision because the foreign body had injured his eyes.

5496. Tsilimbaris, M. K., et al. (1998). "Needle entrance into the maxillary sinus during retrobulbar anesthesia." Ophthalmic surgery and lasers **29**(7): 602-605.

Three patients are presented to whom an accidental needle entrance into the maxillary sinus occurred during retrobulbar anesthesia. In all cases air was aspirated during the aspiration check at the end of needle advancement, and the patients reported a bitter taste after the injection of a small quantity of anesthetic. After withdrawal and careful reinsertion of the needle, maxillary sinus entrance was avoided and a successful retrobulbar block was achieved. Two of the patients had no history of previous facial trauma or surgery, whereas the third had suffered a recent blowout fracture of the orbital floor. The authors suggest that air aspiration or anesthetic passage into the pharynx during retrobulbar anesthesia should raise the suspicion of maxillary sinus entrance, even in patients without any history of facial trauma or surgery. The early recognition of sinus entrance can prevent retrobulbar block failure and reinjection of a second anesthetic dose.

5497. Tsokos, M. (2011). "Heat-induced post-mortem defect of the skull simulating an exit gunshot wound of the calvarium." Forensic science, medicine, and pathology **7**(2): 227-228.

5498. Tsokos, M. and S. Schroder (2006). "Black thyroid: report of an autopsy case." International journal of legal medicine **120**(3): 157-159.

A distinctive but very rare side effect of exposure to minocycline is black pigmentation of the thyroid gland. Until 2002, not more than 30 cases of black thyroid had been reported in the English literature. We report on a 24-year-old woman with known antemortem ingestion of minocycline. The woman suffered from a depressive disorder with repeated suicide attempts and committed suicide by a gunshot to the head. At autopsy, the thyroid gland showed coal-black coloration. Upon histology, clumps of black-brown pigment were seen in the colloid, and a granular precipitate of this pigment was noted in the apical portions of the follicular epithelial cells. The diagnosis of minocycline-associated black thyroid was established. Forensic pathological significance of black thyroid may arise from the fact that hypothyroidism has been occasionally associated with minocycline-related black thyroid and that hypothyroidism may contribute to the development of depressive disorders (and thus, in given cases, may be responsible for suicide attempts). Under this assumption, the presence of black thyroid would represent more than just a morphological curiosity in specific cases.

5499. Tsranchev, I., et al. (2021). "Penetrating Brain Trauma due to Air Gun Shot - a Case Report." Folia medica **63**(6): 977-980.

Cases of severe injuries caused by air guns are really uncommon, but they can lead to a fatal outcome. Usually, these injuries occur in children due to their not fully developed skull bones or in adults through less resistant and thin regions of the cranium. Most of them are accidental events, followed by low percentage of suicidal attempts. In this paper, we present the case of a 68-year-old man suffering from severe depression, with self-inflicted air gun injury to the head. The patient was admitted to the hospital in a coma with a Glasgow Coma Scale (GCS) score of 8, with severe penetrating head injury manifested with brain contusion and intraventricular bleeding seen at the CT examination. Metal particles from the projectile were seen inside the brain. The entry wound had inverted margins, abraded collar and skin defect. The additional neurological examination of the patient showed symptoms of increased intracranial pressure. The treatment started with the air gun wound care. Craniotomy surgery was also done and bone fragments around the entry wound were successfully extracted with subsequent debridement and duraplasty. The patient was treated with new-generation combined antibiotics for preventing inflammatory complications. On the nineteenth day, the patient was discharged with mild hemiparesis on the left side and with GCS score of 15.Air-gun traumatic cases with head injury or with injury to other parts of the body are often mistaken for firearm accidents, because air guns are seriously underestimated devices. Nevertheless, they could lead to severe health consequences and severe disability. This case highlights the necessity of strict monitoring of air guns by the responsible government institutions which should apply the same regulations in controlling these weapons as they implement in controlling the firearm guns. Presence of severe depression, mental illnesses, and neoplasms are risk factors for committing suicide with this type of weapons and the control over the air weapons in this group of people should be stricter.

5500. Tsuei, Y.-S., et al. (2005). "Civilian gunshot wounds to the brain." Journal of the Chinese Medical Association : JCMA **68**(3): 126-130.

BACKGROUND: Civilian gunshot wounds to the brain are relatively rare, and a much-neglected subject in Taiwan. We present our experience with 16 patients who sustained gunshot wounds to the brain, and then identify factors determining the respective outcomes., METHODS: From 1988-2002, data from 16 patients with civilian gunshot wounds to the brain, who were treated at Taichung Veterans General Hospital, were retrospectively reviewed. Historical information, clinical manifestations, and imaging findings were described. Based on Glasgow Outcome Score (GOS), patients were divided into a poor-outcome group (GOS, 1-2) and satisfactory-outcome group (GOS, 3-5) for further analysis., RESULTS: The overall mortality rate was 31.3% (5 of 16 patients). Thirteen patients underwent surgery, and the

surgical mortality rate was 15.4% (2 of 13 patients). Of the 7 patients with a Glasgow Coma Scale (GCS) score of more than 8, all survived with satisfactory outcomes; of the 9 patients with a GCS score of less than 8, 8 had poor outcomes (5 died, and 3 were in a persistent vegetative state); $p < 0.005$ between the 2 GCS groups. In addition, the rate of satisfactory outcome was significantly higher in 7 patients with limited brain injury, as determined by computed tomography (CT) scan, than in 8 patients with extensive brain injury (86% vs 25%; $p < 0.05$)., CONCLUSION: GCS score on admission, and the extent of brain injury as visualized by CT scan, seem to be the 2 most significant predictors of outcome in cranio-cerebral gunshot wounds. Patients with a GCS score of more than 8, or brain lesions limited to a single lobe of the brain, may benefit from aggressive management.

5501. Tsutsumi, S., et al. (2011). "The Virchow-Robin spaces: delineation by magnetic resonance imaging with considerations on anatomofunctional implications." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **27**(12): 2057-2066.

INTRODUCTION: The Virchow-Robin spaces (V-R spaces) are well-known, but not systematically understood fluid-filled perivascular spaces that allow the convexity and basal perforating vessels to penetrate deep into the cerebral parenchyma., OBJECTIVE: This study aims to delineate anatomical characteristics of the normal V-R spaces by MR imaging with considerations on clinical and anatomofunctional implications of the V-R spaces., METHODS: In this prospective study with 3T magnetic resonance (MR) imaging, the whole extent of the intracranial V-R spaces was classified into basal, cortical, subcortical, paraventricular, and brainstem segments, on the basis of the topological difference in 105 control subjects. Morphological characteristics in each segment of the V-R spaces are described. For comparison with the neuroimaging appearance, V-R spaces were histologically examined in cadaveric human brains. The physiological functions of the V-R spaces and pathognomonic implications of unusually dilated, but asymptomatic, V-R spaces encountered in five subjects are discussed., RESULTS: The V-R spaces were found to form a complicated, while anatomically highly consistent, intraparenchymal canal network distributed over the whole cerebral hemispheres and connect the cerebral convexity, basal cistern, and ventricular system., CONCLUSION: The V-R spaces may be essential for drainage routes of cerebral metabolites, additional buoyancy for the brain, and maintenance of homogenous intracranial pressure. MR imaging may be more advantageous in depicting the V-R spaces than histological examination.

5502. Tucker, D. I., et al. (2013). "Characterization and management of mandibular fractures: lessons learned from Iraq and Afghanistan." Atlas of the oral and maxillofacial surgery clinics of North America **21**(1): 61-68.

Fractures of the mandible are among the most common facial injuries. Invasiveness of treatment should be determined by the extent of injury: degree of displacement, number of fractures, the patient's health status, and concomitant injuries. Complex, comminuted, and avulsive injuries frequently seen in combat will require coordination with multiple specialties to provide the best treatment. Stabilization treatment with arch bars or external fixators and splints is often desirable when fractures are highly comminuted or the soft tissue envelope is compromised by tissue loss or burns. In severe injuries, many times reconstruction will take several surgeries. Debridement of necrotic tissue and devascularized bone and skin grafting often are necessary before reconstruction. Microvascular or myocutaneous flaps should be considered with significant tissue loss and osteocutaneous flaps when large continuity defects are present. Most mandible fractures are repaired in a single operation. Those caused by explosives and high-velocity projectiles are more complex. Research should continue to focus on improving outcomes for these patients. Advances in tissue engineering, bone regeneration, and composite tissue allografting will have to continue if we hope to restore facial form and function for our combat wounded.

5503. Tucker, L. B., et al. (2012). "Behavioral consequences of traumatic brain injury: A comparison of multiple injury models in the laboratory mouse." Journal of neurotrauma **29**(10): A113.

Introduction Basic laboratory research on traumatic brain injury (TBI) employs a wide variety of injury models to study the molecular, cellular, and behavioral consequences of TBI in an attempt to identify recovery mechanisms and therapeutic targets. Behavioral recovery after TBI is a critical determining factor in evaluating the efficacy of potential therapies, and the usefulness of a specific behavioral test depends on the nature, severity, and location of the injury; time after injury at which the test is performed; and specific protocol or procedure of testing. Methods Mice (male C57Bl/6J) sustained a TBI by controlled cortical impact (CCI; a penetrating injury) at a parietal or frontal location, weight-drop (a concussive injury), or high-intensity-focused ultrasound (HIFU; a novel blast-like paradigm), and post-injury

behaviors on multiple measures of motor activity, cognition, and anxiety were compared. Sham-operated (craniectomy) and non-operated mice were used as controls. Results Mice that received a CCI brain injury showed greater differences or deficits on all behavioral measures than mice that received concussive or blast-like injuries, although the functional differences were location- dependent, with greater differences observed in animals that sustained hippocampal damage. Motor deficits after injury, if present, typically resolved within a few days whereas cognitive deficits persisted for several weeks. Conclusions The results from this direct comparison of brain injury models in the laboratory mouse emphasize the importance of carefully considering the nature of the TBI when choosing the specific tests, protocols, and timing of behavioral assessments after injury.

5504. Tudor, M. (1998). "Prediction of outcome in patients with missile craniocerebral injuries during the Croatian War." Military medicine **163**(7): 486-489.

The factors assumed to exert an influence on the outcomes of 176 patients who sustained head injuries through projectiles during the Croatian War were evaluated. The type of projectile, wound age, retained foreign bodies, and patient sex and age had no significant influence on outcome. Patients with a Glasgow Coma Scale score of 3 to 5 had 7.3 times higher relative risk of poor outcome than those with a score of 6 to 15. Patients with penetrating injuries (47%), with a projectile's path traversing both hemispheres (45.5%), and with intracranial hematomas (49%) had significantly poorer outcomes than patients without such lesions. Infections were more common in patients with retained foreign bodies in wounds that were older than 48 hours (43%) and in patients with cerebrospinal fluid fistulas (50%). In assessing the outcomes of missile head injuries in wartime, the Glasgow Coma Scale score, type of head wound, site of skull penetration, endocranial projectile path, intracranial hematomas, and complications, especially infectious, represent reliable predictors of outcome.

5505. Tudor, M., et al. (2005). "Complications of missile craniocerebral injuries during the Croatian Homeland War." Military medicine **170**(5): 422-426.

OBJECTIVE: Complications of penetrating craniocerebral injuries in war can be early (during the first week after wounding) or late (after that period). Postoperative hematomas, infections, seizures, and cerebrospinal fluid fistulas (CSFFs) are counted among the early complications, whereas foreign bodies migrating intracranially, seizures, infections, and posttraumatic hydrocephalus represent late complications. A total of 176 patients with well-defined head injuries from missiles, sustained during the Croatian Homeland War (1991-1995), developed a total of 61 (34.5%) complications., METHODS: A retrospective statistical analysis of the medical records of the patients in our series was performed to determine the risk factors for the onset of complications, which have unfavorable effects on outcomes., RESULTS: There were a total of 28 (15.9%) infections (deep or superficial), 21 (11.9%) cases of CSFFs, 9 (5.11%) cases of early epilepsy, and 3 cases of post-traumatic hydrocephalus. A total of 47.6% of patients with CSFFs developed intracranial infections. Of eight patients with meningoencephalitis, five had CSFFs and four had intracranially retained foreign bodies. Only one patient developed a cerebral abscess. Two patients died because of infectious complications (13.3%). Post-traumatic hydrocephalus (1.7%) required shunt placement. For 60% of patients with deep-seated intracranial infectious complications and 76% of patients with CSFFs, reoperations had to be performed, whereas this was the case for only 8% of patients without infections (chi2 = 43.6, p = 0.00001)., CONCLUSIONS: Intracranially retained foreign bodies, wound age, wound site, and operations performed outside the neurosurgical services were the main risk factors for the development of complications. Complications themselves exerted a very unfavorable influence on outcomes. The development of complications reflects very reliably the neurosurgical technique applied.

5506. Tudor, M., et al. (2008). "[Unusual open craniocerebral injury caused by sickle's tip]." Neobicna otvorena kraniocerebralna ozljeda zetelackim srpom. **62**(1): 85-88.

A nine years old girl suffered an unusual penetrating injury to the head caused by a sickle's tip sticked into the skull bones during a lavender harvest on island of Hvar. GCS score was 15. A sickle's blade and its handle were clearly seen coming out of the frontal bone, hanging free, while its tip was firmly sitting in the skull bones! After a neuroradiological diagnostical work up (skull x rays and CT scans) that confirmed intracranial penetration she was operated as an emergency. An osteoclastic craniotomy was done, a and a sickle thereafter easily extracted. Lacerated and contused brain and the penetrating canal were debrided and dura defect covered with a patch. Broad spectrum

antibiotics were administered after antitetanic prophylaxis. Postoperative course was uneventful especially regarding infection. One year after the accident she goes normaly to school.

5507. Tuft, S. J. and A. J. Shortt (2009). "Surgical rehabilitation following severe ocular burns." Eye (London, England) **23**(10): 1966-1971.

Chemical and thermal burns can cause devastating injuries to the anterior segment. The consequences of alkali injuries are notoriously severe due to the rapid penetration of these agents into the ocular tissues. Denaturation of tissue, inflammation, and scarring leads to loss of function. An understanding of the pathogenesis of tissue damage has lead to a rational approach to treatment. Emergency irrigation of the eye is essential and there is a 'window of opportunity' during the first 7-10 days after injury when medical treatment can significantly limit the potentially blinding consequences. The acute injury is followed by early and late reparative phases during which the prognosis can be further improved by surgical intervention. Early surgical intervention is targeted at protecting the ocular surface and encouraging re-epithelisation. Later, surgical treatments are directed at ocular surface reconstruction and restoration of vision. However, before any attempt is made at surface reconstruction, the ocular surface environment must be optimised by division of symblepharon, and correction of lid deformity and trichiasis. If there is conjunctivalisation of the corneal surface, limbal stem cell transplantation can restore a corneal epithelial cell phenotype, and transplantation of in vitroamplified corneal epithelial stem cells has been developed as an alternative to keratolimbal transfer techniques. Keratoplasty and cataract surgery may then be necessary to clear the visual axis. Finally, keratoprosthesis is an option for the most severely damaged eyes.

5508. Tumialan, L. M., et al. (2009). "CT venography used for preoperative planning of foreign body extraction in penetrating craniocerebral trauma: technical case report." The Journal of trauma **66**(2): 567-569.

5509. Tumialan, L. M. and N. Theodore (2012). "Basilar artery thrombosis after reduction of cervical spondyloptosis: a cautionary report." Journal of neurosurgery. Spine **16**(5): 492-496.

Traumatic cervical spondyloptosis is a rare clinical entity typically associated with complete neurological deficit. The inherent mechanics of this fracture-dislocation pattern contorts the vertebral arteries in such a way that it may result in dissection or compromised flow through those vessels. Thus, intimal injury or thrombus from stasis of flow may result. Reduction of the spondyloptosis restores flow to the vertebral arteries, but it also may mobilize thrombus or propagate an intimal dissection within the previously contorted vessel. The authors review their experience in the care of a 43-year-old man who sustained C4-5 spondyloptosis while riding an all-terrain vehicle. On arrival, the patient demonstrated no motor function below C-4 but had sensation to the nipple line (American Spinal Injury Association Spinal Cord Injury Classification B). The patient's cranial nerve examination was unremarkable. Computed tomography of the cervical spine demonstrated complete spondyloptosis at C4-5. The patient was immediately placed in cervical traction and taken to the operating room for open reduction of the fracture dislocation, decompression of the spinal cord, and stabilization with an interbody graft and cervical plate. Preoperative cervical traction was successful in only partial reduction of the fracture dislocation. Open reduction was achieved with exposure of the C-4 and C-5 bodies and sequential distraction. After anatomical alignment was achieved, an interbody graft was placed and a cervical plate secured. A subsequent decline in the patient's level of consciousness prompted CT of the head, which showed evidence of a basilar artery thrombosis. A CT angiographic study demonstrated patency of the vertebral arteries, but a mid-basilar artery thrombosis. The patient progressed to brain death 24 hours after reduction of the fracture dislocation. The degree of contortion of the vertebral arteries in cervical spondyloptosis in the upper cervical spine may result in stasis of flow with subsequent formation of thrombus or intimal injury. After anatomical reduction, restoration of flow within the vertebral arteries may mobilize the thrombus or propagate an intimal dissection and result in subsequent embolic events. Endovascular evaluation may be warranted immediately after anatomical reduction of a high cervical spondyloptosis for evaluation of the vertebral arteries and possible thrombus dissolution or retrieval.

5510. Tuncer, N., et al. (2007). "Intracranial sewing needle in a man with seizure: a case of child abuse?" Forensic science international **168**(2-3): 212-214.

Physical abuse in infancy can cause persistent neurological deficits. Although intracranial foreign bodies are generally secondary to penetrating trauma or surgical procedures, rarely they also occur as a result of child abuse. A 32-year-old man presented with the complaint of generalized tonic clonic seizures to the Neurology Department of Marmara, University Hospital. Computerized tomography (CT) scan revealed a sewing needle located within the temporal lobe. The location and the position of the needle suggested that it must have been introduced in infancy through the lamdoid suture before the closure of it, as an unsuccessful deliberate homicide attempt or accidental injury.

5511. Tung, J.-N., et al. (2010). "Presence of secretory cellular apoptosis susceptibility protein in cerebrospinal fluids of patients with intracerebral hemorrhage caused by stroke and neurotrauma." Neuro endocrinology letters **31**(3): 390-398.

OBJECTIVE: The blood-brain barrier (BBB) is a specialized structure that separates blood vessels from the central nervous system (CNS) and restricts the entry of biomolecules and cells into the brain. Matrix metalloproteinase-2 (MMP-2) produced by interferon-gamma-activated microglia (brain macrophages) is essential for disrupting the glia limitans of BBB, which is critical for lymphocytes penetration into brain capillaries in various CNS disorders. The cellular apoptosis susceptibility (CSE1L/CAS) protein has been shown to regulate MMP-2 secretion., METHODS: We examined if CSE1L played a role in regulating the progression of intracerebral brain hemorrhage disorders., RESULTS: CSE1L was detected by immunoblotting in cerebrospinal fluids (CSFs) of patients with intracerebral hemorrhage brain disorders, including stroke and neurotrauma. Interferon-gamma treatment induced CSE1L expression and increased the secretions of CSE1L and MMP-2 by U937 macrophages. Moreover, tranfection of U937 macrophages with siRNA that targeted CSE1L inhibited interferon-gamma-induced CSE1L and MMP-2 secretion by U937 macrophages. The numbers of lymphocytes in CSF were correlated with the levels of CSE1L and MMP-2 in patients' CSF., CONCLUSIONS: Our results suggest that CSE1L plays a role in regulating MMP-2-mediated BBB breakdown and it may be a target for control of BBB permeability in intracerebral brain hemorrhage disorders.

5512. Tunthanathip, T., et al. (2020). "Traumatic cerebrovascular injury: Prevalence and risk factors." The American journal of emergency medicine **38**(2): 182-186.

BACKGROUND: Traumatic cerebrovascular injury (TCVI) is uncommon in traumatic brain injury (TBI). Although TCVI is a rare condition, this complication is serious. A missed or delayed diagnosis may lead to an unexpected life-threatening hemorrhagic event or persistent neurological deficit. The object of this study was to determine the prevalence and risk factors associated with TCVI., METHODS: The authors retrospectively reviewed medical records and neuroimaging studies of 5178 patients with TBI. The association of various factors was investigated using time-to-event statistical analysis. A TCVI which resulted in an occlusion, arteriovenous fistula, pseudoaneurysm or cerebral artery transection was defined as an event., RESULTS: Forty-two patients developed a TCVI after injuries with an overall prevalence of 0.8%. The risk factors for an intracranial arterial injury based on univariate analysis using the Cox proportional hazard regression were penetrating injury, severe head injury, orbitofacial injury, basilar skull fracture, subdural hematoma, and cerebral contusion. In multivariable analysis, the two variables that were independently associated with TCVI were basilar skull fracture (odds ratio [OR] 22.1, 95% confidence interval [CI] 11.5-42.2) followed by orbitofacial fracture (OR 13.6, 95% CI 6.8-27.3)., CONCLUSIONS: Although TCVI is a rare complication of TBI, early investigation in high-risk patients may be necessary for early treatment before an unexpected fatal event occurs.

5513. Tunthanathip, T., et al. (2019). "Traumatic cerebrovascular injury: clinical characteristics and illustrative cases." Neurosurgical focus **47**(5): E4.

OBJECTIVE: Traumatic cerebrovascular injury (TCVI) is a rare and serious complication of traumatic brain injury (TBI). Various forms of TCVIs have been reported, including occlusions, arteriovenous fistulas, pseudoaneurysms, and transections. They can present at a variety of intervals after TBI and may manifest as sudden episodes, progressive symptoms, and even delayed fatal events. The purpose of this study was to analyze cases of TCVI identified at a single institution and further explore types and characteristics of these complications of TBI in order to improve recognition and treatment of these injuries., METHODS: The authors performed a retrospective review of cases of TCVI identified at their institution between 2013 and 2016. A total of 5178 patients presented with TBI during this time period, and 42 of these patients qualified for a diagnosis of TCVI and had adequate medical and imaging records for analysis. Data from

their cases were analyzed, and 3 illustrative cases are presented in detail., RESULTS: The most common type of TCVI was arteriovenous fistula (86.4%), followed by pseudoaneurysm (11.9%), occlusion (2.4%), and transection (2.4%). The mortality rate of patients with TCVI was 7.1%., CONCLUSIONS: The authors describe the clinical characteristics of patients with TCVI and provide data from a series of 42 cases. It is important to recognize TCVI in order to facilitate early diagnosis and treatment.

5514. Tunthanathip, T. and S. Udomwitthayaphiban (2019). "Development and Validation of a Nomogram for Predicting the Mortality after Penetrating Traumatic Brain Injury." Bulletin of emergency and trauma **7**(4): 347-354.

OBJECTIVE: To determine the factors associated with mortality in penetrating brain injury (PTBI) and proposed the nomogram predicting the risk of death., METHODS: A retrospective cohort study was conducted on all patients who had sustained PTBI between 2009 and 2018. Collected data included clinical characteristics, neuroimaging findings, treatment, and outcomes. Prognostic factors analysis was conducted using a forest plot. Therefore, the nomogram was developed and validated. For the propose of evaluation, the nomogram's sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), Receiver Operating Characteristic (ROC) curve and the area under the receiver operating characteristic (AUC) were determined for validating the optimal cut-off point of the total scores., RESULTS: During the study period, 62 individuals enrolled. In the univariate analysis, factors associated with the morality were normal pupils' reactivity to light (OR 0.04, p < 0.001), hypotension (OR 9.91, p<0.001), hypoxia (OR 10.2, p=0.04), bihemispheric injuries (OR 19.0, p=0.001), multilobar injuries (OR 21.5, p< 0.001), subarachnoid hemorrhage (OR 6.9, p= 0.02), intraventricular hemorrhage (OR 26.6, p= 0.006), basal cistern effacement (OR 28.8, , p<0.001), midline shift >5 mm (OR 0.19, p<0.001) were significantly associated with death. In multivariable analysis, hypotension (OR 8.82, p=0.03), normal pupils' reactivity to light (OR 0.07, p =0.01), midline shift >5 mm (OR 18.23, p<0.007) were significantly associated with death. The nomogram's sensitivity, specificity, PPV, NPV, and AUC for predicting mortality (total score >= 100) were 80%, 92.6%, 72.7%, 95.0%, and, 0.86 respectively., CONCLUSIONS: PTBI is the fatal injury depend on both clinical and neuroimaging parameters. The nomogram is the alternative method providing prognostic parameters toward implication for clinical decision making.

5515. Tuppurainen, K., et al. (1997). "Wooden foreign particles in the orbit--spontaneous recovery." Acta ophthalmologica Scandinavica **75**(1): 109-111.

A six-year-old boy consulted an ophthalmologist, because another boy had hit his right eye with a tree branch. There were slight corneal erosions, and a superficial small wound in the oedematous upper lid. The erosions healed in 2 days, but the lid showed progressive ptosis and oedema. Computed tomography revealed a hyperdense, tight structure, which was suspected to be a foreign particle. An orbital exploration was made three times, but the foreign body was not found. After prolonged suppuration, two wooden particles appeared spontaneously 4 and 5.5 months after the trauma. After that, the suppuration subsided and the wound healed.

5516. Turan Suslu, H., et al. (2005). "[A statistical analysis for the identification of factors effecting prognosis of civilian patients with cranial gunshot wounds]." Atesli silahla basindan yaralanmis sivil hastalarda prognozu etkileyen faktorlerin ayrimi icin istatistiksel bir calisma. **11**(3): 206-211.

BACKGROUND: Patients with civil cranial gunshot injuries who were treated in our hospital were statistically analyzed for the factors acting on 7 days survival and prognosis without regarding treatment modalities., MATERIAL AND METHOD: Patients were divided into two groups according to the mortality rates in 7 days following the trauma without regarding treatment modalities. Initial GCS score, pupillary response to light, coagulopathy, ventricular penetration and number of hemispheres affected are 5 differentials evaluated separately and in combination for their effects on mortality rates within 7 days posttraumatically and their statistical significance., RESULTS: Thirty six male (75%) and 12 female (25%) patients included in the study. Total and 7 day- survival rates were 27% (13/48), and 31% (15/48) respectively. Among GCS scores, pupillary defects, coagulopathy, intraventricular penetration, the number of hemispheres affected, the most important prognostic factors of the patients living less than 7 days were found to be primarily coagulopathy and then pupillary defects. The other variables were not significantly effective and the results were in accordance with the literature., CONCLUSION: In civilian patients with cranial gunshot injuries pupillary defect

and coagulopathy were statistically significant prognostic factors. We think that aggressive medical and surgical treatment will be beneficial even if the patients' neurological status is deteriorating.

5517. Turbin, R. E., et al. (2006). "Patterns of transorbital intracranial injury: a review and comparison of occult and non-occult cases." Survey of ophthalmology **51**(5): 449-460.

The authors present an illustrative case of occult transorbital penetrating intracranial injury in a child, and review the literature concerning patterns of low-velocity, non-projectile injury during the era of modern CT and MRI study. Review of the mechanism of injury and analysis of surface entry site of penetration in 38 cases suggests recurring patterns of injury in occult and non-occult cases. A classification system based on surface entry zone site is applied to these injuries. Knowledge of the classification system should increase clinical suspicion for this type of often occult, penetrating orbito-cranial injury and direct appropriate investigation to provide earlier detection and diagnosis of the transorbital, intracranial penetration.

5518. Turco, L., et al. (2017). "Penetrating Bihemispheric Traumatic Brain Injury: A Collective Review of Gunshot Wounds to the Head." World neurosurgery **104**: 653-659.

BACKGROUND: Head injuries that cross midline structures of the brain are bihemispheric. Other terms have been used to describe such injuries, but bihemispheric is the most accurate and should be standard nomenclature. Bihemispheric head injuries are associated with greater mortality and morbidity than other penetrating traumatic brain injuries (TBIs). Currently, there is a tendency to manage severe gunshot wounds (GSWs) to the head nonoperatively, despite reports of improved outcome in military patients treated aggressively. Thus, controversy exists in the management of civilian TBI., METHODS: PubMed was searched for query terms, and PRISMA guidelines were used. Studies were selected by relevance and inclusion of data regarding etiology, diagnosis, and management of bihemispheric TBI. Case reports, studies not in English, and records lacking information on mechanism or bihemispheric injuries were excluded., RESULTS: Thirteen studies were included and most contained level IV evidence. The mean mortality rate of all head GSWs was 62% in adults and 32% in children. Bihemispheric GSWs had greater mortality rates of 82% in adults and 60% in children. There was a larger proportion of self-inflicted injury in studies with greater rates of bihemispheric injuries., CONCLUSIONS: Bihemispheric injuries have greater mortality rates than other penetrating TBI. Violation of midline brain structures such as the diencephalon and mesencephalon, increased rate of self-inflicted wounds, and lack of a standard management algorithm may increase the lethality of these injuries. Although bihemispheric injuries historically have been considered nonsalvageable, an aggressive surgical approach has been shown to improve outcomes, particularly in the military population.

5519. Turco, L. M., et al. (2019). "Hormone replacement therapy in brain-dead organ donors: a comprehensive review with an emphasis on traumatic brain injury." The journal of trauma and acute care surgery **86**(4): 702-709.

BACKGROUND: Organ shortage is an ongoing problem in the United States. Most donor organs are procured following brain death and a significant portion of brain-dead donors result from devastating brain injury. Without a standard practice for hormone replacement therapy (HRT) in the setting of brain death, a comprehensive review of the literature was deemed necessary., METHODS: A search of published literature was conducted with terms "TBI" or "brain injury" or "head injury" AND "hormone" or "management" AND "organ" AND "donor" or "donation." Abstracts and full texts were screened for relevance and inclusion of information on HRT. Additional studies were selected from references cited within these. Excluded studies were non-English, nonhuman based, or had small sample size, (i.e., case reports or series with fewer than five subjects)., RESULTS: Fifteen studies were selected for inclusion and contained Level III or Level IV evidence. Combinations of thyroid hormone, insulin, and corticosteroids were the most commonly cited HRT. Ninety-three percent of studies found a significant increase in organ procurement rate among donors who received HRT. Hormone replacement therapy was administered after brain death declaration in eight studies. Only two studies specifically explored the effects of starting HRT earlier and identified even greater procurement rates. Four studies were specific to traumatic brain injury (TBI); the remaining 11 studies involved TBI in 22% to 89% of the sample., CONCLUSION: Organ shortage remains a growing problem in the United States. Donor management including HRT has been proposed to combat the endocrine derangement associated with brain death and, in particular, TBI. While the existing literature reported compelling outcomes using HRT, there remains a need for further Level I and Level II evidence studies to define optimal practice., LEVEL OF EVIDENCE: Review article, level IV.

5520. Tureyen, K. (2001). "Traumatic intracranial aneurysm after blunt trauma." British journal of neurosurgery **15**(5): 429-431.

Traumatic intracranial aneurysms are rare and represent less than 1% of all cerebral aneurysms. This type of aneurysm develops after blunt or penetrating head trauma. Surgical clipping and/or endovascular occlusion are the definitive treatments. This report describes the very unusual case of a patient who has survived for 2 years with conservative management alone.

5521. Turgeon, A., et al. (2009). "Mortality and incidence of withdrawal of life support measures in ICU patients with severe TBI: A canadian multicenter retrospective study." Critical care medicine **37**(12): A389.

Introduction: Mortality following severe traumatic brain injury (TBI) ranges from 30 to 50%. However, very little is known about the process of dying in this specific patient population, including the incidence of withdrawal of life support measures (WLSM) and how prognosisis determined. In order to evaluate in-hospital mortality, incidence of WLSM among TBI deaths and the rationale for WLSM in patients with severe TBI in Canada, we conducted a multicenter retrospective cohort study in 6 Canadian Level I trauma centers. Hypothesis: Important variation exists in hospital mortality and the incidence of WLSM in patients with severe TBI in trauma centers across Canada. Methods: We identified mechanically ventilated patients admitted in participating ICUs between January 2005 and December 2006 suffering severe TBI (Glasgow Coma Scale (GCS) ≤ 8) by ICD-10 codes. We excluded patients younger than 16 years-old and those with penetrating TBI. Data from 720 patients was collected using a standardized case report form by trained data abstractors (random selection of 120 patients/center). We compared non-adjusted hospital mortality and WLSM using the Chi-square test. Age and GCS-adjusted odds ratios (OR) for hospital mortality and WLSM were calculated using hierarchical logistic regression analysis (Proc Glimmix, SAS v9.2). Results: Most patients were male (77%) with a mean age of 42 [95%CI: 41-44], a median GCS of 3 [IQ 3-6] with 57% admitted following a motor vehicle collision. The observed hospital mortality was 32% [28-34%] ranging from 11 to 44% among centers ($p<0.01$). Seventy percent of patients died following WLSM (45 to 86% between centers, $p<0.01$). One center had both a lower hospital mortality (OR 0.37 [0.21-0.66]) and a lower proportion of deaths following WLSM (0.30 [0.16-0.56]) compared with the other centres. Except for one center, the most evocated reason to justify WLSM was poor chance of survival. Poor long-term neurological prognosis was the second most common reasonand a long-term neurological prognosis incompatible with patient's wishes was the next most common reason. Non-neurological co-morbidities were rarely documented as reasons justifying WLSM. Intensivists were more involved than neurosurgeons in the documentation of prognosis in most centres. Neurological exams, CT-scans and clinical experience were, in order, the most important tests or reasons to support the documentation of prognosis. Conclusions: We found variation in hospital mortality and mortality following WLSM between centers. The important incidence ofmortality following WLSM in patients with severe TBI and the difference inmortality between centers outline the need to develop clinical prediction models to aid clinicians in assessing neurological prognosis and standardize their approach to end of life care.

5522. Turgeon, A., et al. (2009). "Practice variation in the management and treatment of increased intracranial pressure in severe traumatic brain injury in Canada: A canadian multicentre retrospective cohort study." Critical care medicine **37**(12): A435.

Introduction: Following severe traumatic brain injury (TBI), episodes of elevated intracranial pressure (ICP) are associated with significant morbidity and increased risk of mortality. Recent guidelines recommend ICP monitoring in several situations and suggest treatment strategies to standardize management of severe TBI with increased ICP(1). Hypothesis: That uncertainty in effectiveness results in practice variability in the use of ICP monitoring and in the treatment of raised ICP exists among intensive care units (ICU). Methods: We performed a multicenter retrospective cohort study in 6 level I trauma centers in Canada. We included mechanically ventilated patients admitted to participating ICUs between January 2005 and December 2006 with severe TBI (Glasgow Coma Scale (GCS) ≤ 8) identified by ICD-10 codes. We excluded patients younger than 16 y.o. or suffering from penetrating TBI. We calculated that a random selection of 120 patients per center would be sufficient to detect an absolute difference of 20% in ICP monitoring use and in treatment strategies for raised ICP between centres (type I error of 5% and type II errorof 20%). A pretested and standardized case report form was used by trained data abstractors to collect data on the first 14 days of ICU stay. We used the Chi-square test to compare frequency of use of monitoring and treatment strategies between

centers. Results: A total of 720 patients were included inthis study. 77% of patients were male with a mean age of 42 [95%CI: 41-44] anda median GCS of 3 [IQ: 3-6] admitted following motor vehicle collision (57%).The use of any ICP monitoring ranged from 14% to 54% across centers and 3% to 33% of patients had extraventricular drains inserted (p<.01). When increased ICP occurred, mannitol was used in 5 to 68% of patients, hypertonic saline in 1 to 33%, therapeutic hypothermia in 0 to 21%, paralytics in 2 to 22%, barbiturates in 0 to 3%, and vasopressors (to target a specific cerebral perfusion pressure) in 24 to 52% (all p <.01). The use of decompressive craniectomy ranged from 0 to 22% of patients (p<.01). Jugular venous oxygen saturation (SjO2) monitoring ranged from 0% to 12% between centers (p<.01) and hospital mortality was 32% [95%CI: 28-34]. Conclusions: We found wide practice variation in monitoring and treatment of increased ICP across centers. The low frequency of use of ICP monitoring in all participating centers is not consistent with current recommendations (1).

5523. Turina, D., et al. (2001). "War head injury score: an outcome prediction model in War casualties with acute penetrating head injury." Military medicine **166**(4): 331-334.

OBJECTIVE: To evaluate in war casualties with acute penetrating head injury whether the summed War Head Injury Score (WHIS) is a better predictor of mortality than either the Glasgow Coma Scale (GCS) score or the Injury Severity Score (ISS) alone and to establish its specific applicability., METHODS: Sensitivity, specificity, correct outcome prediction, and discrimination were assessed in 43 patients in the war group (ballistic injuries) and 41 patients in the civil group (nonballistic injuries) during the period 1991 to 1995. The new model was generated using the sum of GCS scores and ISS, to which a coded value was applied for summation., RESULTS: In the war group, the mortality rate was 23%; the sensitivity and specificity of WHIS were 100% and 79%, the sensitivity and specificity of GCS score were 90% and 85%, and the sensitivity and specificity of ISS were 100% and 49%, respectively. In the civil group, the mortality rate was 39%; the sensitivity and specificity of WHIS were 87% and 76%, the sensitivity and specificity of GCS score were 63% and 90%, and the sensitivity and specificity of ISS were 100% and 56%, respectively., CONCLUSION: With regard to civilians, war casualties with acute penetrating head injury more often have multiple injuries. WHIS represents a new scoring system that incorporates both GCS score and ISS.

5524. Turkcuoglu, P. and S. Aydogan (2006). "Intracranial foreign body in a globe-perforating injury." Canadian journal of ophthalmology. Journal canadien d'ophtalmologie **41**(4): 504-505.

CASE REPORT: To report a case with an intracranial foreign body in the setting of a globe-perforating injury. A 53-year-old man experienced a sudden pain in his right eye while he was breaking a stone with a sledgehammer. Upon examination, a 1.5 mm superomedial corneoscleral perforation site was noted. Cranial sections of axial orbital computed tomography (CT) revealed a foreign body at the middle cranial fossa., COMMENTS: A high index of suspicion is required to detect an intracranial foreign body in ocular injuries. Orbital CT must be included in preoperative evaluation of these patients and cranial sections must also be examined carefully.

5525. Turkoz, D. and C. Demirel (2021). "Retrospective clinical evaluation of patients undergoing surgery for acute epidural hematoma." Journal of Experimental and Clinical Medicine (Turkey) **38**(2): 187-191.

We aimed to evaluate mortality-associated factors among patients with acute epidural hematoma due to head trauma. Demographic characteristics, preoperative Glasgow Coma Scale score, epidural hematoma aetiology and radiological findings, accompanying systemic trauma results, hospitalisation duration, sequelae, and mortality features of patients experiencing epidural hematoma between 2014 and 2018 were evaluated. Overall, 79 patients were examined. The most frequent epidural hematoma aetiology was traffic accidents (51.9%), with temporal region being the most common epidural hematoma location (38 [48.2%] patients). Among all, 12 (15.2%) patients died and 67 (84.8%) were discharged. Of them, 57 (85.1%) patients were discharged without and 10 (14.9%) with neurological sequelae. Age>65 years (p=0.001) and low Glasgow Coma Scale score (p<0.05) were significantly associated with higher mortality. Overall mortality rate was 91.7% (p<0.001) in patients with systemic trauma accompanying epidural hematoma, with thoracic (12%) and orthopaedic (9%) trauma being the most common. Cranial injuries included linear fracture, 78.5%; pneumocephalus, 48.1%; cerebral contusion, 44.3%; traumatic subarachnoid haemorrhage, 32.9%; acute subdural hematoma; 26.6%, and collapse fracture, 15%. All cranial injuries except linear fractures were associated with high mortality (p<0.05). Epidural hematoma is associated with high mortality. Aetiology, Glasgow Coma Scale score, cranial pathology, age, and additional trauma are the major predictive mortality-associated factors.

5526. Turliuc, D. M., et al. (2015). "Intraorbital foreign body." Revista medico-chirurgicala a Societatii de Medici si Naturalisti din Iasi **119**(1): 179-184.

Penetrating orbitocranial injuries caused by intraorbital foreign body are a rare cause of morbidity being most common among young people. The term intraorbital foreign body refers to a foreign body that occurs within the orbit but outside the ocular globe. We report the case of a 12-year-old male child who sustained a right cranial facial trauma due to accidental fall on a piece of wood, which penetrated intraorbitally. Native cranial magnetic resonance imaging (MRI -1.5 T) revealed the presence of an intraorbital foreign body, 6 cm long and 1.5 cm wide, near the orbital apex. In our patient, early surgical extraction of the foreign body had a decisive role on his full recovery. In this case, although a large foreign body penetrated the entire length of the orbit, it did not cause damage to any intraorbital structure. Vision and right ocular globe function had an excellent prognosis.

5527. Turner, O. A. and A. T. Laird (1966). "Meningioma with traumatic etiology. Report of a case." Journal of neurosurgery **24**(1): 96-98.

5528. Tutton, M. G., et al. (2000). "Screwdriver assaults and intracranial injuries." Journal of accident & emergency medicine **17**(3): 225-226.

Four patients with intracranial penetrating injuries from screwdrivers are presented. Two cases were fatal; the others were left with functional deficits. In two of the patients a penetrating injury was not suspected initially because the history was limited and the significance of the small entry wounds were not appreciated. Unless these wounds are carefully examined a penetrating injury is easily overlooked.

5529. Twaij, S., et al. (2009). "Acute traumatic orbital cerebrospinal fluid cystocele mimicking orbital abscess." Journal of AAPOS : the official publication of the American Association for Pediatric Ophthalmology and Strabismus **13**(5): 491-493.

Posttraumatic cranio-orbital cerebrospinal fluid (CSF) fistula is rare, occurring when there is a communication between orbit and subarachnoid space. This communication can be caused by orbital tumors with intracranial extension or can be a result of orbital surgery. Low suspicion for traumatic orbital CSF fistula can lead to delay in diagnosis, which increases the risk of meningitis. We report a cranio-orbital CSF cystocele and fistula that mimicked orbital cellulitis in a 3-year-old boy following an orbitocranial penetrating injury.

5530. Tyagi, G., et al. (2020). "An unusual case of penetrating skull injury." Interdisciplinary Neurosurgery: Advanced Techniques and Case Management **21**.

Penetrating injury to the skull with a sharp object such as a screw driver is unusual and requires emergent and assiduous management. A middle aged male had presented to us with such an injury with the penetrating object embedded firmly in his temporal bone going intracranially. He underwent craniotomy with careful removal of the embedded object whose tip was rooted in the petrous temporal bone and barely missing the vital structures like petrous carotid artery and the inner ear. Patient had an uneventful post op course and follow up of 8 weeks. A penetrating screwdriver injury to the skull is a rare occurrence with high morbidity and mortality. Imaging to ascertain the intracranial structures involved followed by early and careful retrieval in the operating room form the mainstay of treatment.

5531. Tzelikis, P. F., et al. (2015). "Traumatic wound dehiscence after corneal keratoplasty." Arquivos brasileiros de oftalmologia **78**(5): 310-312.

PURPOSE: To assess patient characteristics, risk factors, outcomes, and the treatment of wound dehiscence (WD) in patients after corneal keratoplasty., METHODS: Retrospective chart review of 11 eyes of 11 patients with corneal grafts who underwent repair of WD from January 1, 2004 to December 31, 2012 at Hospital Oftalmologico de Brasilia., RESULTS: Eight (72.7%) patients were men and three were women. Six (54.5%) patients had deep anterior lamellar keratoplasty (DALK) and 5 had penetrating keratoplasty. The mean age at trauma was 31.1 years. The mean

time from corneal keratoplasty to WD was 12.82 months (range, 3-33 months). The mean best-corrected visual acuity of patients before trauma was 20/60 (0.48 logMAR) and after final treatment was 20/160 (0.90 logMAR) (P=0.15). In one case, visual acuity decreased to no light perception because of retinal detachment and phthisis bulbi. Accidental blunt trauma and fall were the most common causes of WD., CONCLUSION: Patients who undergo corneal keratoplasty have a life-long risk of WD. The full-thickness rupture at the graft-host junction in our study suggests that the junction remains vulnerable, even following DALK, and can rupture with trauma. In our series, depending upon the severity of the trauma, postkeratoplastic WD can be associated with a good visual prognosis.

5532. Uberti, M., et al. (2021). "Clinical Significance of Isolated Third Cranial Nerve Palsy in Traumatic Brain Injury: A Detailed Description of Four Different Mechanisms of Injury through the Analysis of Our Case Series and Review of the Literature." Emergency medicine international **2021**.

Third cranial nerve palsy (3cnP) following traumatic brain injury (TBI) is a worrying neurological sign and is often associated with an expanding mass lesion, such as extradural or acute subdural haematomas. Isolated 3cnP can be found in the absence of posttraumatic space-occupying mass lesion, yet it is often considered as a devastating prognostic factor in the context of diffuse axonal injury (DAI). Through the analysis of five exemplificative cases and a thorough review of the literature, we identified four possible mechanisms leading to 3cnP: (1) a partial rootlet avulsion at the site of exit from the midbrain, representing a direct shearing injury to the nerve; (2) a direct traction injury due to the nerve stretching against the posterior petroclinoid ligament at the base of the oculomotor triangle secondary to the downward displacement of the brainstem at the time of impact; (3) a direct vascular compression as a result of internal carotid artery (ICA) dissection or pseudoaneurysm; (4) an indirect injury caused by impaired blood supply to the third nerve in addition to the detrimental biochemical effects of the underlying brain injury itself. Understanding the exact mechanism underlying the onset of 3cnP is key to provide an informed clinical decision-making to the patients and ensure their best chances of recovery. Our experience corroborates data from the literature showing that, even in Grade III DAI, prompt recognition of isolated 3cnP can guide adequate treatment. Nonetheless, even when an overall good neurological outcome is achieved, recovery of isolated 3cnP is dismal, and only rarely the visual deficit completely resolves.

5533. Udoh, D. O., et al. (2010). "Self-inflicted transparietal intraventricular nail: Case report and surgical technique." African Journal of Neurological Sciences **29**(2).

Background Deliberate self-harm with stone- or hammer-driven nail through the cranium is unusual. The need is stressed for comprehensive radiological evaluation with computed tomography (CT) scan, with or without angiography, and removal through an open cranial procedure under general anaesthesia, rather than extraction through a burrhole under local anesthetic infiltration. Methods We present here a 27-year old male who presented at our Teaching Hospital setting with a self-inflicted hand-driven intracranial nail to the left parietal region. He had a detailed neurological examination, was evaluated pre-operatively with computerised tomography of the brain and underwent an open cranial procedure under general anaesthesia for nail retrieval. Psychiatric unit evaluated and managed him for chronic depression. Results The transparietal, intraventricular 10cm long nail was retrieved and associated abscess evacuated by an open cranial procedure. Pre-operative neurological impairments regressed and his mood stabilized with anti-depressants. He was discharged without further deficits and has remained well for over four years Conclusion Self-inflicted hand-driven intracranial nail is a very rare form of penetrating cranio-cerebral trauma. Preoperative computerised tomography scan of the brain, meticulous open cranial removal under general anaesthesia and psychiatric management enable discharge without further injury or deficits. On the other hand, removal through a burrhole or just pulling out the nail would not allow intraoperative visualisation of associated lesions; the latter also predispose to further vascular and parenchymal brain injuries, worsening neurolological impairments. © 2002 African Journal of Neurological Sciences.

5534. Udwadia, R. A., et al. (1994). "A transethmoid transorbital foreign body." The Journal of laryngology and otology **108**(5): 441-442.

5535. Uemura, A., et al. (2001). "Usefulness of gradient-echo T2*-weighted MR imaging in evaluation of transorbital penetrating cerebral injury." Clinical imaging **25**(3): 163-166.

Transorbital penetrating cerebral injury can cause severe morbidity if not identified and treated. After the removal of the object and without the clinical information, even the chance of suspicion of penetrating cerebral injury might be missed in the first investigation. We report a case of transorbital penetrating cerebral injury caused by a metal rod and diagnosed by MRI including gradient-echo T2*-weighted imaging.

5536. Ugurlu, K., et al. (2007). "Reconstructing wide palatomaxillary defects using free flaps combining bare serratus anterior muscle fascia and scapular bone." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **65**(4): 621-629.

PURPOSE: Wide palatomaxillary defects, mostly after tumor resections, can cause severe functional and esthetic problems. Although prosthetic obturator devices or local flaps are mostly adequate for uncomplicated small-size defects, free flaps are preferred for a 3-dimensional multitissue reconstruction of more complicated defects. Regarding the anatomical structure of the palatomaxillary region, the flap must be thin enough to separate the oral and nasal cavities while not compromising palatal function, yet rigid enough for adequate dental restoration. This goal is usually accomplished with a combined or complex free flap. Numerous free flaps containing both soft tissues and bone have been described in the literature. In this study, we present a novel use of the free scapular bone flap combined with serratus anterior fascia and its functional and esthetic results., PATIENTS AND METHODS: Nine cases are presented whose wide composite palatomaxillary defects were repaired with free angular scapular bone flap combined with serratus anterior fascia based on the subscapular vascular system, between 1999 and 2003. Scapular bone wrapped with the naked serratus anterior fascia, like a sandwich, was used to repair the palate., RESULTS: The naked fascia was epithelialized with the help of the surrounding mucosa in 4 to 6 weeks. Results were satisfying with regard to breathing, eating, speech, and facial contour after follow-ups for 2 months to 6 years., CONCLUSION: For the reconstruction of wide palatomaxillary defects, a combined flap of angular scapular bone wrapped with naked serratus anterior fascia was conceived useful for obtaining satisfactory functional and esthetic results.

5537. Uhl, E., et al. (1999). "Influence of platelet-activating factor on cerebral microcirculation in rats: part 2. Local application." Stroke **30**(4): 880-886.

BACKGROUND AND PURPOSE: Platelet-activating factor (PAF) is involved in the development of secondary brain damage after ischemic and traumatic brain injury. On the basis of data from studies in peripheral organs, we hypothesized that PAF-mediated effects after cerebral injury could be secondary to alterations in cerebral microcirculation., METHODS: Changes in cerebral microcirculation focusing on leukocyte-endothelium interactions were quantified with the use of a closed cranial window model in Sprague-Dawley rats (n=33) by means of intravital fluorescence microscopy. The brain surface was superfused with PAF in concentrations from 10(-3) (n=3) to 10(-12) mol/L (n=6) for 20 minutes (5 mL/h)., RESULTS: PAF 10(-4) mol/L (n=4) increased the number of rolling and adherent leukocytes in venules from 9.7+/-0.4 to 19.7+/-2.3 cells/100 mm. min (P=NS versus control) and from 2.2+/-0.5 to 4.3+/-0.7 cells/100 mm. min (P<0.05 versus control), respectively. Lower concentrations did not elicit leukocyte-endothelium interactions. Vessel diameters remained unchanged except for a transient increase of arteriolar diameters during superfusion with PAF 10(-4) and 10(-6) mol/L (n=6). Although only a limited area of the brain surface was exposed to PAF, the mediator induced a significant dose-dependent transitory arterial hypotension and caused irreversible circulatory shock at the high concentration (PAF 10(-3) mol/L). Arterial hypotension after administration of PAF 10(-3) mol/L could be attenuated by the intravenous pretreatment with the PAF antagonist WEB 2170BS., CONCLUSIONS: PAF, when locally released after brain injury, can penetrate the blood-brain barrier and induce systemic effects, including arterial hypotension. Its role as a mediator in the development of secondary brain damage seems, at least in the initial phase, not to be associated with disturbances of cerebral microcirculation or activation of leukocytes.

5538. Ulker, P. (2016). "The effect of acute and short term normobaric hyperoxia on hemorheologic parameters." Biorheology **53**(3-4): 171-177.

Backround:Possible toxic effects of hyperoxia have been reported previously. However, the number of studies investigating the influence of hyperoxia on blood cells is limited and there are no data regarding its hemorheological effects., OBJECTIVE: The aim of this study was to investigate the effects of acute hyperoxia, performed in human

subjects at normal atmospheric pressure, on the rheological properties of blood., METHOD: The study was conducted with 12 brain death patients mechanically ventilated in the intensive care unit. The patients were ventilated with 21%, 40%, and 100% oxygen before induction of apnea testing performed for diagnosis of brain death. Blood samples were obtained at each oxygen concentration value for all patients., RESULT: The results of the study indicated no significant change of red blood cell aggregation, deformability and plasma or whole blood viscosity associated with acute hyperoxia at normobaric conditions., CONCLUSION: The results of the study suggest that application of normobaric hyperoxia does not have detrimental effects on hemorheological parameters in brain death patients, and that organs considered for donation from such subjects are not adversely affected by abnormalities of blood flow and tissue perfusion.

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5539. Ulutaş, M. and M. Seçer (2014). "Shrapnel injury of isolated third cranial nerve." Journal of neurological surgery reports **75**(2): e217-e219.

Isolated third nerve palsy develops in numerous intracranial pathologies such as closed head trauma, tumor, and aneurysm. Isolated oculomotor nerve palsy caused by shrapnel injury is uncommon. After a penetrating intracranial shrapnel injury, our patient with oculomotor ophthalmoplegia underwent surgery. Microsurgery removed the shrapnel that was applying pressure on the third nerve, resulting in contusion. A partial recovery associated with regeneration was observed at month 9. Extraocular muscle surgery should be planned if palsy does not resolve over a prolonged period of time.

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5540. Umakhanov, R. U. (1981). "[Prevention of wound infection in open skull and brain injuries]." O profilaktike infitsirovaniia ran pri otkrytykh povrezhdeniiakh cherepa i golovnogo mozga.(1): 16-19.

Measures aimed at the prevention of complications gain foremost importance when timely surgical treatment of a penetrating craniocerebral wound cannot be conducted. Experimental research and clinical experience have shown that the administration of 50 000--100 000 U of an antibiotic (kanamycin, monomycin, hectamycin, chloramphenicol) into the wound soon after an open penetrating injury had been inflicted to the skull and brain protects the wound from microbial contamination. This provides the possibility for postponing the plastic operation of the defect in the dura mater.

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5541. Umesh, S. R. and S. R. Pejavar (2015). "Pattern and distribution of injuries in fatal road traffic accidents - A postmortem study conducted in BTGH, Gulbarga." Medico-Legal Update **15**(2): 137-142.

Deaths due to Road Traffic Accidents (RTA) are increasing at an alarming rate throughout the world. Thereby it poses itself as a major epidemiological and medicolegal problem. With increasing use of vehicles, injuries due to them are so common nowadays that it is necessary to be able to assess the injuries, the mechanisms by which they are caused and the cause of death. The study of injuries associated with fatal outcome helps in implementation of measures to prevent fatalities due to RTAs. Hence, the present study was conducted to know, pattern and distribution of injuries in victims of fatal RTAs, victim's age and sex and survival period. In addition, an attempt was also made to know the cause of death.

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5542. Umredkar, A. A. and S. Mohindra (2010). "Intracranial moving bullet syndrome." Neurology India **58**(1): 151-152.

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5543. Unal, O., et al. (2012). "Multiple gunshot carotico-jugular fistulas." BMJ case reports **2012**.

The development of post-traumatic fistula between the carotid artery and jugular vein is an extremely rare clinical condition. The authors present a 28-year-old patient, who sustained a gunshot injury to the right side of the neck 6 years ago, with undiagnosed contralateral carotico-jugular fistula.

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5544. Undabeitia, J., et al. (2014). "Knife inflicted penetrating head injury. Management considerations." Gaceta Medica de Bilbao **111**(2): 45-47.

Penetrating brain trauma is an infrequent event and is associated to high mortality rates. The may be caused by projectiles or locally introduced objects. Among the latest, the most frequent agents are blades. We report the case of a

male that suffered a penetrating traumatic injury in the context of an aggression. The trajectory ran through the mastoid with the distal portion resting over the sigmoid sinus. The foreign body was surgically extracted with no further complications. We describe the differential characteristics in the management of these injuries.

5545. Unden, J., et al. (2004). "Serial S100B levels before, during and after cerebral herniation." British journal of neurosurgery **18**(3): 277-280.

Protein S100B has been shown to increase in serum and cerebrospinal fluid (CSF) in various neurological diseases. However, the levels of S100B in conjunction with cerebral herniation have not been studied and the significance of extracerebral S100B has become an important issue. We report on a multi-trauma patient in whom cerebral herniation occurred 2 days after admission. Following this, organ-harvesting procedures were performed for transplantation. We measured serial serum S100B during both the ongoing herniation and the following extracerebral surgery. We found that S100B levels seemed to peak immediately prior to cerebral herniation and then decreased shortly thereafter and concluded that the source of the measured serum S100B in this patient was of predominately cerebral origin. In conjunction with the organ harvesting procedure S100B levels increased, indicating that extracerebral sources of the protein also exist.

5546. Ung, H., et al. (2017). "Intracranial EEG fluctuates over months after implanting electrodes in human brain." Journal of neural engineering **14**(5): 056011.

OBJECTIVE: Implanting subdural and penetrating electrodes in the brain causes acute trauma and inflammation that affect intracranial electroencephalographic (iEEG) recordings. This behavior and its potential impact on clinical decision-making and algorithms for implanted devices have not been assessed in detail. In this study we aim to characterize the temporal and spatial variability of continuous, prolonged human iEEG recordings., APPROACH: Intracranial electroencephalography from 15 patients with drug-refractory epilepsy, each implanted with 16 subdural electrodes and continuously monitored for an average of 18 months, was included in this study. Time and spectral domain features were computed each day for each channel for the duration of each patient's recording. Metrics to capture post-implantation feature changes and inflexion points were computed on group and individual levels. A linear mixed model was used to characterize transient group-level changes in feature values post-implantation and independent linear models were used to describe individual variability., MAIN RESULTS: A significant decline in features important to seizure detection and prediction algorithms (mean line length, energy, and half-wave), as well as mean power in the Berger and high gamma bands, was observed in many patients over 100 d following implantation. In addition, spatial variability across electrodes declines post-implantation following a similar timeframe. All selected features decreased by 14-50% in the initial 75 d of recording on the group level, and at least one feature demonstrated this pattern in 13 of the 15 patients. Our findings indicate that iEEG signal features demonstrate increased variability following implantation, most notably in the weeks immediately post-implant., SIGNIFICANCE: These findings suggest that conclusions drawn from iEEG, both clinically and for research, should account for spatiotemporal signal variability and that properly assessing the iEEG in patients, depending upon the application, may require extended monitoring.

5547. Unger, R. R., et al. (1976). "[Space requiring intracranial conditions and pregnancy]." Raumfordernde intrakranielle Prozesse und Schwangerschaft. **37**(3): 177-189.

Gravidity and the intracranial process are discussed in view of the question of whether to carry out an interruption of pregnancy or to carry the pregnancy to full term and end it by means of Cesarean section, on the basis of literature and 5 observations.--It is recommended to work out an individual plan of treatment together with the obstetrician and the neurologist. It was shown that there is a possibility of an operative treatment of intracranial processes of different genesis even in the advanced stage of pregnancy and with the continuation pregnancy.

5548. Uppot, R. N., et al. (1999). "Pneumocephalus and Brown-Sequard's Neurologic injury caused by a stab wound to the neck." AJR. American journal of roentgenology **173**(6): 1504.

5549. Uppuluri, A., et al. (2021). "Orbital Floor Fractures Concurrent with Acute Open-Globe Injuries." Ophthalmology **128**(4): 626-628.

5550. Uppuluri, A., et al. (2020). "Geographic trends in adult open globe injuries (OGIs)." Investigative Ophthalmology and Visual Science **61**(7).

Purpose : To identify geographic trends in demographic variables, cost, and management of adult OGIs in the United States from 2002-2014. Methods : We used the 2002-2014 National Inpatient Sample (NIS) Database in conjunction with diagnosis codes from the International Classification of Diseases, Ninth Revision to identify cases with a primary diagnosis of OGI. Once we identidied all cases of OGIs, we removed the pediatric cases (0-20 years of age) and divided the adult data into four geographic regions as supplied by the NIS Database: Northeast, Midwest, South, West. Cases in these regions were compared with respect to sex, race, age, ocular findings, ocular surgeries, and cost of admission. Results : We identidied 34,485 weighted cases of adult OGIs occurring between 2002-2014 (8457 in the Northeast, 6072 in the Midwest, 12264 in the South, and 7692 in the West). The ratio of men to women was roughly 2.33 to 1 across all geographic regions. The South had the highest rate (42.0%) of OGIs occurring in patients 21-40 years of age and the West had the highest rate (18.0%) of OGIs occurring in patients over 81 years of age. Penetrating injuries were the most common types of OGI seen in all regions (82.0-85.7%), and rates of intraocular foreign bodies (IOFBs) were between 11.9% and 12.9%. Rates of endophthalmitis were highest in the Midwest and South (1.9%). The prevalence of concurrent orbital fractures was highest in the Midwest (11.1%). The rates of vitrectomy and enucleation ranged from 12.4% to 14.2% and 2.7% to 5.5%, respectively. The average length of stay was 2-3 days in all regions. The average cost per day was highest in the West ($18,140.30). Conclusions : In our analysis of the NIS Database, we found that the South had the highest prevalence of OGIs between 2002 and 2014. The ratio of men to women and the breakdown of OGIs by age group (21-40, 41-60, 61-80, and 81+) were both similar across geographic regions. The prevalence rates of penetrating injuries, IOFBs, and ruptures in all four regions were comparable. The prevalence of endophthalmitis and orbital fractures was highest in the Midwest and South. Rates of pars plana vitrectomy were consistent throughout the United States, but rates of enucleation were higher in the Midwest and South. While the average length of stay was comparable across the regions, the average cost per day was 37-50% greater in the West as compared to other regions.

5551. Urban, M., et al. (1994). "Pancreatitis associated with remote traumatic brain injury in children." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **10**(6): 388-391.

Vomiting, abdominal distension, and feeding intolerance are common findings following brain injury in children, and are usually attributed to the brain injury or to delayed gastric emptying: a specific cause is usually not sought. We report six children who developed mild to moderate pancreatitis at least 7 days following apparently isolated brain injury, a previously unreported association. Five of the six patients received drugs that are known or suspected pancreatotoxins; all recovered without changes in the medications. When children develop feeding intolerance or upper gastrointestinal symptoms following traumatic brain injury pancreatitis should be suspected.

5552. Urbanova, P., et al. (2017). "The virtual approach to the assessment of skeletal injuries in human skeletal remains of forensic importance." Journal of forensic and legal medicine **49**: 59-75.

While assessing skeletal injuries in human skeletal remains, forensic anthropologists are frequently presented with fractured, fragmented, or otherwise modified skeletal remains. The examination of evidence and the mechanisms of skeletal injuries often require that separate osseous elements be permanently or temporarily reassembled or reconstructed. If not dealt with properly, such reconstructions may impede accurate interpretation of the evidence. Nowadays, routine forensic examinations increasingly incorporate digital imaging technologies. As a result, a variety of PC-assisted imaging techniques, collectively referred to as the virtual approach, have been made available to treat fragmentary skeletal remains. The present study employs a 3D virtual approach to assess mechanisms of skeletal injuries, and provides an expert opinion of causative tools in three forensic cases involving human skeletal remains where integrity was compromised by multiple peri- or postmortem alterations resulting in fragmentation and/or incompleteness. Three fragmentary skulls and an incomplete set of foot bones with evidence of perimortem fractures (gunshot wounds) and sharp force trauma (saw marks) were digitized using a desktop laser scanner. The digitized skeletal elements were reassembled in the virtual workspace using functionalities incorporated in AMIRA R version 5.0

software, and simultaneously in real physical space by traditional reconstructive approaches. For this study, the original skeletal fragments were substituted by replicas built by 3D printing. Inter-method differences were quantified by mesh-based comparison after the physically reassembled elements had been re-digitized. Observed differences were further reinforced by visualizing local variations using colormaps and other advanced 3D visualization techniques. In addition, intra-operator and inter-operator error was computed. The results demonstrate that the importance of incorporating the virtual approach into the assessment of skeletal injuries increases with the complexity and state of preservation of a forensic case. While in relatively simple cases the virtual approach is a welcome extension to a traditional approach, which merely facilitates the analysis, in more complex and extensively fragmentary cases such as multiple gunshot wounds or dismemberment, the virtual approach can be a crucial step in applying the principles of gunshot wounds or sharp force traumatic mechanisms. The unrestricted manipulation with digital elements enabling limitless repairs and adjustments to a "best-case scenario" also produced smaller inter-operator variation in comparison to the traditional approach.

5553. Ursprung, R., et al. (2022). "Gunshot wounds to the head: a comparison of postmortem magnetic resonance imaging, computed tomography, and autopsy." Acta radiologica (Stockholm, Sweden : 1987) **63**(4): 513-519.

BACKGROUND: Postmortem imaging has become a powerful diagnostic tool in forensics. Postmortem computed tomography (PMCT) is often used currently to complement and sometimes even replace an autopsy., PURPOSE: To compare PMCT, postmortem magnetic resonance imaging (PMMRI), and autopsy findings for gunshot wounds to the head., MATERIAL AND METHODS: Cross-sectional study. We performed a retrospective analysis of 24 cases with gunshot wounds to the head that underwent both PMCT and PMMRI between 2011 and 2018 at the Institute of Forensic Medicine, University of Zurich (Switzerland)., RESULTS: Our study confirms that PMCT and, to a slightly lesser degree, PMMRI provide additional information that is valuable when combined with autopsy findings. Air embolism was solely detected in PMCT (67% vs. 0% at autopsy). A retained bullet or projectile and bone fragments were diagnosed more frequently with PMCT (42%, 67%, and 92%) than at autopsy (33%, 42%, and 46%). Soft tissue lesions were more often detected with PMMRI than with PMCT. With regard to autopsy, subdural hemorrhage and ventricular hemorrhage were slightly more frequently diagnosed with PMMRI (63% and 75% vs. 38% and 58% at autopsy). Intracerebral hemorrhage was by far most often diagnosed with PMMRI (92%) compared with both PMCT (38%) and autopsy (14%)., CONCLUSION: All three modalities should ideally be considered in cases of craniocerebral gunshot wounds. However, it might be conceivable that depending on the forensic query, PMCT and PMMRI may be an adequate replacement for an autopsy.

5554. Ustaoglu, M., et al. (2020). "Demographic characteristics and visual outcomes of open globe injuries in a tertiary hospital in Istanbul, Turkey." European journal of trauma and emergency surgery : official publication of the European Trauma Society **46**(3): 549-556.

PURPOSE: To evaluate the demographic characteristics and visual outcomes of patients with open globe injury (OGI) in a tertiary hospital in Istanbul, Turkey., METHODS: The data of patients admitted with OGI to Sisli Hamidiye Etfal Training and Research Hospital, Istanbul, Turkey from January 2012 to December 2017 were reviewed retrospectively, and 100 of the 154 patients were included in the study., RESULTS: There were 79 (79%) male and 21 (21%) female patients with the average age of 33.7 +/- 20.7 (1-83). Presentation of the patients was more frequent in the first 3 days of the week (Monday 20%; Tuesday 17%; and Wednesday 20%) and within working hours (8 a.m.-5 p.m., 71%). The most common injury type was penetrating injury (75%), which was mostly caused by sharp objects (metal objects 32% and broken glass 22.7%). The ocular trauma score (OTS) was significantly higher in patients with penetrating injury and intraocular foreign body injury ($p < 0.001$), and those results were correlated with better visual prognosis. The patients with penetrating injury among the injury types and zone I injury among the injury zones had the highest final visual acuity. Patients in the age group of 0-14 years had statistically better visual outcome when compared to those in the other age groups ($p = 0.003$)., CONCLUSIONS: The higher initial visual acuity and OTS, penetrating injury, zone I injury and pediatric age are good prognostic factors for OGI. Additionally, scheduling a prepared surgical team and tools in working hours will be beneficial according to the frequency of admissions.

5555. Uusitalo, R. J. and J. Lehtosalo (1989). "Visual, refractive, and keratometric results of epikeratophakia in children. A two-year follow-up." Archives of ophthalmology (Chicago, Ill. : 1960) **107**(3): 358-363.

Fifty-two patients under the age of 16 years (68 eyes) received epikeratophakia grafts for the correction of aphakia. In 27 eyes, epikeratophakia was a primary procedure combined with lensectomy. Fifteen children underwent bilateral surgery. Overall, the success rate was 91%, and with repeated surgery it was 94%. The average change in refractive error was 15.9 diopters (D) and the average spectacle overcorrection was +0.3 D. Sixty-one percent (35/57) of the eyes were within 1 D of emmetropia and 97% (55/57) were within 3 D of emmetropia. Overall, the refraction was stable in the follow-up between six months and 1 1/2 years following surgery. However, a myopic shift of 2.0 D occurred between six months and 1 1/2 years in very young children following refractive surgery. The corneal curvature was measured only in older children and showed an average increase of 10.7 D. Visual acuity results in verbal patients were comparable to those in patients with contact lenses. The majority of smaller children demonstrated improvement in visual acuity with a combination of epikeratophakia and amblyopia therapy.

5556. Uysal, E. and Y. A. Acar (2020). "Pneumomediastinum, pneumocephalus, and bilateral pneumo-orbita in the same patient: a rare dangerous coexistence but a lucky prognosis." JPMA. The Journal of the Pakistan Medical Association **70**(9): 1655-1656.

Trauma is the leading cause of mortality and morbidity among young adults. In the emergency department, blunt and penetrating traumas must be evaluated carefully especially for life-threatening conditions. High-pressure air is a rare penetrating trauma type. Pneumomediastinum, pneumocephalus, and bilateral pneumo-orbita are all dangerous conditions and coexistence of them is extremely rare. There is no consensus for the treatment of this concurrence and, moreover, there is no opportunity for future randomized studies. Hence, in this study, we report a pneumomediastinum, pneumocephalus, and bilateral pneumo-orbita case after high-pressure air trauma and resolution with supportive care without any complication.

5557. Vaca, E. E., et al. (2013). "Facial fractures with concomitant open globe injury: mechanisms and fracture patterns associated with blindness." Plastic and reconstructive surgery **131**(6): 1317-1328.

BACKGROUND: Treatment of facial fractures in the setting of open-globe injuries poses a management dilemma because of the often disparate treatment priorities of multidisciplinary trauma teams and the lack of prognostic data regarding visual outcomes., METHODS: Patients in the University of Maryland Shock Trauma Registry sustaining facial fractures with concomitant open-globe injuries from January of 1998 to August of 2010 were identified. Odds ratios were calculated to identify demographic and clinical variables associated with blindness, and multivariate regression analysis was performed., RESULTS: A total of 99 patients were identified with 105 open-globe injuries. Seventy-nine percent of injuries were blinding, whereas 4.8 percent of globes achieved a final visual acuity greater than or equal to 20/400. Blindness was associated with penetrating injury, increasing number of facial fractures, zygomaticomaxillary complex fracture, admission Glasgow Coma Scale score less than or equal to 8, and globe injury spanning all three eye zones. Fracture repair was performed more frequently (62.5 percent) and more quickly (average time to fracture repair, 4.5 days) in cases of primary globe enucleation/evisceration when compared with complete (21.2 percent; 8 days; p=0.35) or incomplete (42.9 percent; 11 days; p=0.058) primary globe repair., CONCLUSIONS: Penetrating injury mechanism and zone of eye injury appear to be better indicators of visual prognosis than facial fracture patterns. Given the high rates of blindness, secondary enucleation, and delay of fracture repair in patients that were not primarily enucleated, the authors recommend that orbital fracture repair not be delayed in the hopes of eventual visual recovery in cases of high-velocity projectile trauma., CLINICAL QUESTION/LEVEL OF EVIDENCE: Risk, III.

5558. Vadamalai, K., et al. (2020). "A Nail in The Brain: Delayed Traumatic Pseudoaneurysm." Neurocritical care **32**(1): 357-358.

5559. Vaicys, C., et al. (2000). "Successful recovery after an orbitocranial injury." The Journal of trauma **49**(4): 788.

5560. Vaishnav, Y. J., et al. (2020). "Delayed Diagnosis of an Occult Wooden Orbital Foreign Body." Rhode Island medical journal (2013) **103**(5): 49-51.

An orbital foreign body should be suspected in cases of penetrating orbital injury, but they are not typically seen with low-velocity trauma and no obvious penetrating injury. Wooden foreign bodies are difficult to distinguish from orbital fat on computed tomography (CT), and without a high degree of suspicion for a foreign body, techniques to distinguish wood in the orbit may not be utilized. The authors present here a case of an initially unrecognized wooden orbital foreign body in the setting of orbital trauma where the patient denied any possibility of a foreign body and no evidence of a penetrating injury. The diagnosis was eventually made with an interdisciplinary review of the imaging between the orbital service and radiology, and the foreign body was subsequently removed via orbitotomy. Surgeons should maintain a high index of suspicion when there is a question of a foreign body on imaging, and a low threshold to involve radiology colleagues in the diagnostic evaluation.

5561. Vajkoczy, P., et al. (1999). "Penetrating craniocerebral injuries in a civilian population in mid-Europe." Clinical neurology and neurosurgery **101**(3): 175-181.

Our current neurosurgical understanding of civilian penetrating craniocerebral injuries is based on US metropolitan series. It is unknown whether all principles applied to these patients are relevant in the Mid-European setting with its distinct epidemiology. The objective of this study was to characterize our patients with penetrating craniocerebral injuries, to analyze their outcome, and to identify relevant prognostic factors. Thirty-two patients with penetrating craniocerebral injuries were entered into the study. Patient evaluation comprised neurological, laboratory and radiographic analyses. Motivating factors were suicide (75%), assault (13%), and accident (9%). Initial GCS score, coagulopathy on admission, and radiographic extent of injury could be identified as outcome predictors ($P < 0.001$). An aggressive therapeutic approach to patients with GCS 3-7 reduced mortality when compared to a conservative management (67 vs. 91%). Due to major differences in epidemiology and outcome of our penetrating craniocerebral injury patients when compared to major US metropolitan series, current therapeutic strategies applied to this patient population in mid-Europe should be reconsidered. The results of our study justify an aggressive neurosurgical approach even in those patients that are thought to have a deleterious prognosis. Predictive variables identified in this study and a novel CT-grading algorithm may help in decision making.

5562. Vajpayee, R. B., et al. (2000). "Large-diameter lamellar keratoplasty in severe ocular alkali burns: A technique of stem cell transplantation." Ophthalmology **107**(9): 1765-1768.

PURPOSE: To evaluate the efficacy of large-diameter lamellar keratoplasty in cases of severe ocular alkali burns., DESIGN: Prospective, noncomparative, interventional case series., PARTICIPANTS: Nine eyes of nine patients with severe ocular alkali burns (grade III/IV) exhibiting corneal vascularization, conjunctivalization, and chronic inflammation were recruited from the Cornea Clinic of Dr. Rajendra Prasad Centre for Ophthalmic Sciences, New Delhi, a tertiary eye care center., INTERVENTION: Large-diameter lamellar keratoplasty was performed using McCarey-Kaufman media-preserved donor corneas. The patients were followed up for a minimum of 6 months., MAIN OUTCOME MEASURES: Symptomatic relief, time to epithelialization, best-corrected visual acuity, Schirmer I, tear film break-up time, and central corneal clarity were the parameters evaluated., RESULTS: The mean duration between the injury and surgery was 29.5 +/- 19.4 months. No intraoperative complications were seen. Successful epithelialization of the ocular surface was achieved in all but one eye, and the mean time to epithelialization was 5.2 +/- 4.9 days. One eye had a persistent epithelial defect which was managed with a bandage soft contact lens. All patients achieved symptomatic relief. The preoperative best-corrected visual acuity was </=1/60 in all the patients. There was a significant improvement in vision in six eyes postoperatively ($P = 0.013$). The corneal clarity was grade 2+ or better in five eyes and 1+ in four eyes. No recurrence of corneal vascularization or signs of rejection were seen in any eye during the mean follow-up of 7.4 +/- 3.2 months. Causes of no improvement of vision included the presence of subepithelial nebulomacular haze in one eye caused by persistent epithelial defect and residual stromal haze., CONCLUSIONS: Large-diameter lamellar keratoplasty is a useful therapeutic modality in cases of severe alkali burns. It is a single-stage procedure that provides a stable ocular surface because of stem cell supplementation and may visually rehabilitate the patient.

5563. Vakil, M. T. and A. K. Singh (2017). "A review of penetrating brain trauma: epidemiology, pathophysiology, imaging assessment, complications, and treatment." Emergency radiology **24**(3): 301-309.

Gunshot injuries are the most common cause of penetrating brain injury (PBI) and carry a high morbidity and mortality. The incidence of PBI has increased over the last decade with an estimated 35,000 civilian deaths annually.

Patients that survive to reach the hospital require rapid triage and imaging evaluation. CT findings in conjunction with the Glasgow Coma Scale are typically used to determine which patients are surgical candidates. Radiologists should be familiar with the various injury patterns and imaging findings which are poor prognostic indicators, notably brainstem, bilateral hemispheric, multilobar, or transventricular injuries. Post-traumatic complications, including intracranial infections, cerebrospinal fluid leaks, traumatic intracranial aneurysms, intraventricular hemorrhage, dural venous sinus thrombus, and bullet fragment migration, also have specific imaging features and serious treatment implications. In this article, we review the initial imaging evaluation of penetrating brain injury using computed tomography with and without angiography. We also describe the imaging features of various post-traumatic complications and their treatment implications. Finally, we discuss the clinical and imaging parameters that serve as important prognostic indicators and the surgical management.

5564. Valassina, A., et al. (2013). "Pelvic ring injuries in children: Long term results." Journal of Orthopaedics and Traumatology **14**(1): S15.

Introduction Pediatric pelvic ring injuries are rare lesions (incidence: 1/100000 people per year). Mortality can reach 25 %, even though bony lesion is rarely the direct cause of death. Due to the rarity of these lesions only few published reports exist in the literature with long term results and there is no general consensus about treatment strategies. Aim of the study is to report the long-term results about the treatment of pelvic ring injuries and to suggest new treatment strategies based on biomechanical-developmental criteria. Materials and methods All the patients with an age from 0 to 14 years and pelvic ring injury were included in the study. Type of fracture (modified Torode and Zieg classification system), associated organ lesions, type of treatment and complications were recorded. The outcome measures adopted were:Majeed score, radiographic evaluation (Keshishyan's method) and the measure of leg length discrepancy. Results Twelve patients were included in the study (median age: 9.9 years, range: 1-14). The types of fracture were: 1 patient with type I, 1 with type II (gunshot injury), 4 with type IIIA (out of which 2 with quadrant lesions), 2 with type IIIB and 4 with type IV. Five (42 %) patients presented hemodynamic instability. Associated injuries were: traumatic brain injury (34 %); thoracic injuries (25 %); abdominal and urogenital lesions (25 %). No arterial embolisation was needed. All type IV fractures and the gunshot injury were treated surgically. The mean follow-up time was 6.8 years (range: 1-9 years). At the last follow-up the pelvic asymmetry improved of 51.4 %and the median Majeed score was 80/80. Only one patient with significant leg length discrepancy (3 cm) showed poor result in terms of pain and function. No other complications were recorded. No patient died. Discussion Pelvic ring injuries in children are rarely associated with life-threatening haemorrhages. The biomechanical characteristics of the paediatric pelvis make the quadrant dislocations and stable ring lesions more frequent until 7-8 years of age. After this age pelvic lesions become even more similar to the adult types. The potential of residual growth and remodelling process allow to compensate even high grade of dislocations. Nevertheless, the characteristics of the growth process don't allow to compensate vertical displacement. Conclusions Unstable pelvic ring injuries have to be managed surgically by ORIF even in the children. Stable lesions and quadrant dislocations may be treated conservatively, even if the fractures with vertical displacement >1 cm have little chance of remodelling and need surgical treatment.

5565. Valdes, E., et al. (2020). "Special considerations in the assessment of catastrophic brain injury and determination of brain death in patients with SARS-CoV-2." Journal of the neurological sciences **417**: 117087.

INTRODUCTION: The coronavirus disease 2019 (Covid-19) pandemic has led to challenges in provision of care, clinical assessment and communication with families. The unique considerations associated with evaluation of catastrophic brain injury and death by neurologic criteria in patients with Covid-19 infection have not been examined., METHODS: We describe the evaluation of six patients hospitalized at a health network in New York City in April 2020 who had Covid-19, were comatose and had absent brainstem reflexes., RESULTS: Four males and two females with a median age of 58.5 (IQR 47-68) were evaluated for catastrophic brain injury due to stroke and/or global anoxic injury at a median of 14 days (IQR 13-18) after admission for acute respiratory failure due to Covid-19. All patients had hypotension requiring vasopressors and had been treated with sedative/narcotic drips for ventilator dyssynchrony. Among these patients, 5 had received paralytics. Apnea testing was performed for 1 patient due to the decision to withdraw treatment (n = 2), concern for inability to tolerate testing (n = 2) and observation of spontaneous respirations (n = 1). The apnea test was aborted due to hypoxia and hypotension. After ancillary testing, death was declared in three patients based on neurologic criteria and in three patients based on cardiopulmonary criteria (after withdrawal of support (n = 2) or cardiopulmonary arrest (n = 1)). A family member was able to visit 5/6 patients prior to

cardiopulmonary arrest/discontinuation of organ support., CONCLUSION: It is feasible to evaluate patients with catastrophic brain injury and declare brain death despite the Covid-19 pandemic, but this requires unique considerations.

5566. Valdivia, M., et al. (2007). "Effect of posttraumatic donor's disseminated intravascular coagulation in intrathoracic organ donation and transplantation." Transplantation proceedings **39**(7): 2427-2428.

INTRODUCTION: Our aim was to evaluate the influence on yield and function of intrathoracic organs from donors after severe cranial trauma complicated by disseminated intravascular coagulation (DIC)., MATERIALS AND METHODS: This retrospective observational study in a patient cohort with severe cranial trauma reading to brain death compared the number of harvested thoracic organs among individuals with versus without previous DIC. We examined exclusions for organ donation and their probable relationship to DIC. We also analyzed blood components transfused to normalize coagulation parameters. The organ recipients were followed for 1 month to detect acute graft failure., RESULTS: Among 147 organ donors, 37 were brain dead after suffering severe cranial trauma and 13 met DIC criteria upon admission. We did not observe demographic differences among donors, although there was a trend for DIC donors to be younger (32 +/- 10 vs 40 +/- 21 years old; P = .11). Twenty-eight donors (12 with DIC and 16 without) and 29 donors (13 with DIC and 16 without) met age and medical criteria for potential heart or lung donation, respectively. Donation exclusion was related to trauma instead of DIC itself. We did not find any difference among the number of cardiac and lung organs harvested from organ donors with DIC (67% and 31%, respectively) or without DIC (75% and 44%, respectively). All DIC donors had clinical bleeding and received multiple units of blood products. Organs were harvested 37 +/- 23 (13 to 80) hours after admission. All patients had normalized coagulation parameters at surgery. In the postoperative evolution, none of the cardiac or lung recipients from DIC donors met primary graft failure criteria., CONCLUSIONS: We concluded that hearts and lungs from donors with previous DIC were suitable for transplant recipients.

5567. Valentine, J., et al. (1984). "Gunshot injuries in children." The Journal of trauma **24**(11): 952-956.

Ninety consecutive patients between 2 and 15 years of age sustaining gunshot wounds were analyzed and a management algorithm evolved. Key management steps included fluid resuscitation in the field by trained paramedical personnel and recognition of the severity of the wound when large-caliber or shotgun injuries were encountered. Arteriograms were most helpful in locating vascular injuries; venograms were inaccurate. Morbidity was directly related to missile size and impact area, and to the number of organs injured. Any hospitalization beyond 2 weeks' duration should have social service, home-bound school service, psychiatry, and physical therapy in consultation. During a 5-year period only two of the 90 patients died secondary to hemorrhagic shock.

5568. Valesova, L., et al. (2003). "[Primary pars plana vitrectomy in the treatment of penetrating eye injuries involving intraocular foreign bodies in the vitreous body]." Primarni pars plana vitrektomie v lecbe penetrujiciho poraneni oka zasahujiciho do sklivce s nitroocnim cizim teliskem. **59**(4): 228-238.

The method of choice in the treatment of penetrating eye injuries affecting the vitreous body with an intraocular foreign body is in the majority of patients primary pars plana vitrectomy with transvitreal extraction of the foreign body (FB). During the period from April 1999 till September 2000 the authors treated thus at the Ophthalmological Clinic of the General Faculty Hospital and 1st Medical Faculty Charles University Prague 26 eyes of 26 young men with an average age of 34 years. The mean interval between the injury and primary PPV was 8.5 days. The patients were followed up on average for 23.5 months. The entrance of the penetrating injury was in 17 eyes in the cornea or limbus, in 9 eyes in the sclera. In two eyes posttraumatic endophthalmitis developed. The intraocular FB was 6 mm2 in size in 16 eyes and 6-20 mm2 in 10 eyes. In primary PPV we indicated in 14 eyes internal tamponade with gas or silicone oil. On account of late retinal complications which developed as a result of proliferative vitreoretinopathy we indicated in eight eyes PPV reoperation. At the end of the investigation period in 3 eyes inoperable detachment of the retina developed. As the main negative prognostic factor for final visual acuity the authors evaluated a size of the FB greater than 6 mm2, other negative prognostic factors are the scleral entrance injury, complications of the entrance injury (prolapse of the iris, vitreous body, haemophthalmus) and the development of posttraumatic exogenous endophthalmitis.

5569. Valle, E. J., et al. (2014). "Do all trauma patients benefit from tranexamic acid?" The journal of trauma and acute care surgery **76**(6): 1373-1378.

BACKGROUND: This study tested the hypothesis that early routine use of tranexamic acid (TXA) reduces mortality in a subset of the most critically injured trauma intensive care unit patients., METHODS: Consecutive trauma patients (n = 1,217) who required emergency surgery (OR) and/or transfusions from August 2009 to January 2013 were reviewed. At surgeon discretion, TXA was administered at a median of 97 minutes (1-g bolus then 1-g over 8 hours) to 150 patients deemed high risk for hemorrhagic death. With the use of propensity scores based on age, sex, traumatic brain injury (TBI), mechanism of injury, systolic blood pressure, transfusion requirements, and Injury Severity Score (ISS), these patients were matched to 150 non-TXA patients., RESULTS: The study population was 43 years old, 86% male, 54% penetrating mechanism of injury, 25% TBI, 28 ISS, with 22% mortality. OR was required in 78% at 86 minutes, transfusion was required in 97% at 36 minutes, and 75% received both. For TXA versus no TXA, more packed red blood cells and total fluid were required, and mortality was 27% versus 17% (all $p < 0.05$). The effects of TXA were similar in those with or without TBI, although ISS, fluid, and mortality were all higher in the TBI group. Mortality associated with TXA was influenced by the timing of administration ($p < 0.05$), but any benefit was eliminated in those who required more than 2,000-mL packed red blood cells, who presented with systolic blood pressure of less than 120 mm Hg or who required OR (all $p < 0.05$)., CONCLUSION: For the highest injury acuity patients, TXA was associated with increased, rather than reduced, mortality, no matter what time it was administered. This lack of benefit can probably be attributed to the rapid availability of fluids and emergency OR at this trauma center. Prospective studies are needed to further identify conditions that may override the benefits from TXA., LEVEL OF EVIDENCE: Therapeutic study, level IV.

5570. Valle, G., et al. (1994). "Tc-99m HMPAO SPECT in a cerebral gunshot wound." Clinical nuclear medicine **19**(8): 699-702.

The authors examined regional cerebral blood flow by using Tc-99m HMPAO SPECT studies in a patient who received a gunshot wound to the brain. Although the presence of the retained bullet's fragments adversely affected the quality of CT images and contraindicated MRI studies, the SPECT examination did not have the same constraints and allowed both therapy assessment and prognostic evaluation. The repair of the cortical defect could also be assessed.

5571. Valoriani, S., et al. (2017). "Sharp Force Trauma Death in a Young Individual From Medieval Gloucester." The American journal of forensic medicine and pathology **38**(2): 111-114.

The authors of the present work evaluate the trauma observed on the skeletal remains of an individual from medieval Gloucester and reconstruct the events that led to his death. The almost complete skeleton was recovered from the cemetery of St Owen and dates to the late medieval period. Several methods were used to determine the sex and age of the individual. The anthropological examination showed that the remains belonged to a young male, between the ages of 17 and 19 years. The young man also had antemortem pathologies that were related to his diet and lifestyle, as he appears to have had iron-deficiency anemia and Schmorl nodes. The trauma observed on the remains consisted of 3 cut marks located on the cranium, left radius, and right scapula. The cuts seem to have been inflicted by a heavy weapon, such as a sword. The trauma pattern observed is consistent with defensive action, and the fact that this skeleton was the only one in the collection that has evidence of trauma suggests that this was a case of interpersonal violence.

5572. Van Arsdell, G. S., et al. (1991). "Bullet fragment venous embolus to the heart: case report." The Journal of trauma **31**(1): 137-139.

This report describes a case of bullet fragment embolus to the heart following a small-caliber gunshot wound to the mouth. Skull and C-spine films appeared to account for the projectile; however, chest X-ray followed by fluoroscopy and two-dimensional echocardiography demonstrated a venous missile embolus in the right heart. The bullet was palpated, trapped in the right ventricle, and easily extruded.

5573. van As, A. B., et al. (1995). "Shotgun pellet embolus to the anterior cerebral artery." Injury **26**(9): 631-632.

5574. van Beurden, H. E., et al. (2003). "Fibroblast subpopulations in intra-oral wound healing." Wound repair and regeneration : official publication of the Wound Healing Society [and] the European Tissue Repair Society **11**(1): 55-63.

The objective of this study was to characterize fibroblasts at sequential time points during intra-oral wound healing in the rat. Experimental wounds were made at several time points in the mucoperiosteum of the palate of 35-day-old Wistar rats. Fibroblasts were cultured from the biopsies under standard conditions for the same number of passages. The expression of the integrin subunits alpha 1, alpha 6, and beta 1; and the intermediate filaments alpha-smooth muscle actin and vimentin were analyzed by flow cytometry. Western blot analysis was performed at 0, 8, and 60 days postwounding to confirm the expression of both intermediate filaments. The phenotypic profiles of fibroblasts cultured from subsequent stages in the wound healing process differed considerably. We conclude that distinct fibroblast phenotypes can be isolated from different stages in wound healing. These phenotypes remained stable during in vitro culturing. In addition, cryosections of the wound areas were made at identical time points and were immunohistochemically stained for the same antigens. The immunohistochemical staining correlated well to the flow-cytometric data. These results suggest the occurrence of multiple subpopulations of fibroblasts with a specialized function during wound healing. We hypothesize that undesirable consequences of wound healing might be prevented through the modulation of specific fibroblast subpopulations.

5575. Van Caelenberg, A. I., et al. (2010). "Computed tomography and cross-sectional anatomy of the head in healthy rabbits." American journal of veterinary research **71**(3): 293-303.

OBJECTIVE: To obtain a detailed anatomic description of the rabbit head by means of computed tomography (CT)., ANIMALS: 6 clinically normal Dendermonde White rabbits weighing 3 kg and raised for human consumption and 1 Netherland dwarf rabbit., PROCEDURES: The commercially raised rabbits were slaughtered in a slaughterhouse, flayed, and decapitated. The dwarf rabbit was euthanatized. Two hours later, each rabbit head was positioned with the ventral side on the CT table to obtain transverse and sagittal, 1-mm-thick slices. Dorsal images were obtained by placing each head perpendicular to the table. Immediately after the CT examination, 3 heads were frozen in an ice cube at -14 degrees C until solid and then sectioned at 4-mm-thick intervals by use of an electric band saw. Slab sections were immediately cleaned, photographed, and compared with corresponding CT images. Anatomic sections were examined, and identified anatomic structures were matched with structures on corresponding CT images., RESULTS: The bone-window CT images yielded good anatomic detail of the dentition and the bony structures of rabbit skulls. The soft tissue structures that could be determined were not better identifiable on the soft tissue-window CT images than on the bone-window images., CONCLUSIONS AND CLINICAL RELEVANCE: CT images of the heads of healthy rabbits yielded detailed information on the skull and some surrounding soft tissue structures. Results of this study could be used as a guide for evaluation of CT images of rabbits with various cranial and dental disorders.

5576. van Dellen, J. R. and R. Lipschitz (1978). "Stab wounds of the skull." Surgical neurology **10**(2): 110-114.

Sixteen cases of penetrating stab wounds of the head, where the knife blade has still been in situ on arrival at hospital, are presented. The indications for cerebral angiography, to establish vascular injury, and the spectrum of presentation are discussed. A technique of safe removal is described. There were no fatalities in the cases reviewed.

5577. van den Bergh, B., et al. (2015). "Conservative treatment of a mandibular condyle fracture: Comparing intermaxillary fixation with screws or arch bar. A randomised clinical trial." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **43**(5): 671-676.

INTRODUCTION: A mandibular condyle fracture can be treated conservatively by intermaxillary fixation (IMF) or by open reposition and internal fixation (ORIF). Many IMF-modalities can be chosen, including IMF-screws (IMFS). This prospective multi-centre randomised clinical trial compared the use of IMFS with the use of arch bars in the treatment of mandibular condyle fractures., RESULTS: The study population consisted of 50 patients (mean age: 31.8 years). Twenty-four (48%) patients were allocated in the IMFS group. Twenty-six (52%) patients were assigned to the arch bars group. In total 188 IMF-screws were used (5-12 screws per patient, mean 7.83 screws per patient). All pain scores were lower in the IMFS group. Three patients developed a malocclusion (IFMS-group: one patient, arch bars-group: two patients). Mean surgical time was significantly shorter in the IMFS group (59 vs. 126 min; $p<0.001$). There were no needlestick injuries (0%) in the IMFS group and eight (30.7%) in the arch bars group ($p=0.003$). One IMF-screw fractured

on insertion (0.53%), one (0.53%) screw was inserted into a root. Six (3.2%) screws loosened spontaneously in four patients. Mucosal disturbances were seen in 22 patients, equally divided over both groups., CONCLUSION: Considering the advantages and the disadvantages of IMFS, and observing the results of this study, the authors conclude that IMFS provide a superior method for IMF. IMFS are safer for the patients and surgeons.

5578. van den Brink, W. A., et al. (1998). "Monitoring brain oxygen tension in severe head injury: the Rotterdam experience." Acta neurochirurgica. Supplement **71**: 190-194.

Cerebral ischemia is considered the central mechanism leading to secondary brain damage in patients with severe head injury. We investigated the technique of continuous monitoring of local brain tissue oxygen tension as parameter for cerebral oxygenation. Eighty-two patients with non penetrating severe head injury were studied. No complications of the monitoring technique were seen. Postmeasurement calibration of the catheters showed a very low zero drift and acceptable sensitivity drift. Low PbrO2 values were seen within the first 12 to 24 hours of injury. Early occurrence of values below 10 mm Hg indicated a poor prognosis. Comparative measurements between two catheters performed in six patients showed differences in absolute values measured, but a good correlation of relative changes was observed. We conclude that continuous monitoring of PbrO2 is reliable, clinically applicable and provides the clinician with a better insight in cerebral oxygenation and hopefully should help in targeting therapy towards improved cerebral oxygenation.

5579. van den Munckhof, P., et al. (2012). "Open-wound treatment for gunshot to the brain." Journal of neurosurgery. Pediatrics **10**(1): 64-66.

The authors report a case of a gunshot wound to the brain in a 2.5-year-old girl. To treat the uncontrollably elevated intracranial pressure, the patient underwent bilateral decompressive craniectomy and experimental open-wound treatment. She recovered to a good functional level.

5580. van Dijck, J. T., et al. (2018). "Decision making in very severe traumatic brain injury (Glasgow Coma Scale 3-5): a literature review of acute neurosurgical management." Journal of neurosurgical sciences **62**(2): 153-177.

INTRODUCTION: Patients presenting with an early Glasgow Coma Scale (GCS) Score of 3-5 after blunt or penetrating skull-brain assaults are categorized as having sustained a very severe traumatic brain injury (vs-TBI). This category is often overlooked in literature. Impact on patients and families lives however is huge and the question "whether to surgically treat or not" frequently poses a dilemma to treating physicians. Little is known about mortality and outcome, compared to what is known for the group of severe TBI patients (s-TBI) (GCS 3-8). The main goal of this review was creating more awareness for the neurosurgical treatment of this patient group., EVIDENCE ACQUISITION: A literature search (2000-2017) was conducted discussing "severe TBI (GCS 3-8)", "(neuro)surgical management" and "outcome". Ultimately 45 out of 2568 articles were included for further analysis., EVIDENCE SYNTHESIS: Mortality rates and unfavorable outcome are high for s-TBI patients and as expected higher for vs-TBI patients. Mortality rates reach up to 100% for specific subgroups with GCS=3 and bilaterally fixed dilated pupils. Functional outcome was generally poor, but sometimes, although seldom, favorable in specific groups of vs-TBI patients after neurosurgical intervention. Factors like initial GCS, pupillary abnormalities and age seem to be associated with worse outcome., CONCLUSIONS: Overall this literature review showed high rates of unfavorable outcome and mortality for vs-TBI patients. However, some studies, reporting relatively low mortality rates, reported "good" outcome for specific groups of vs-TBI patients. It is concluded that clinical decision making, in particular those on treatment limitations, should never be taken based on the GCS alone.

5581. van Dijke, J. H. M. and D. Schakenraad (2011). "[A toddler with a haematoma of an eye after a fall]." Een peuter met een hematoom van een oog na een val. **155**(18): A2193.

A 2-year-old boy had fallen at home with a pencil in his hand. On physical examination we found only some blood in the inner corner of his right eye, but MRI showed a traumatic pencil tract into his frontal lobes.

5582. Van Hulle, C., et al. (2021). "Veterans in AD prevention clinical trials: An evaluation of the association of tbi on memory and global cognition." Journal of Prevention of Alzheimer's Disease **8**(SUPPL 1): S75-S76.

Background: Traumatic Brain Injury (TBI) is a risk factor for developing Alzheimer's Disease (AD). TBI occurs more frequently among veterans than non-veterans and therefore warrants special consideration in AD prevention clinical trials of aging Veterans. Objectives: To determine if the presence of TBI is associated with poorer cognitive function relative to peers without TBI, we compared baseline performance on tests of memory and global cognition among VA-eligible veterans stratified by probable TBI. Methods: Participants were drawn from an on-going 18-month, randomized, placebo-controlled clinical trial studying the effects of high-dose eicosapentaenoic acid (icosapent ethyl) on neuroimaging and cerebrospinal fluid AD biomarkers and cognition; the Brain Amyloid and Vascular Effects (BRAVE) of Eicosapentaenoic Acid Study (NCT02719327). Participants were VA -eligible Veterans ages 50-75 with no diagnosis of memory disorder or impairment. Participants were excluded if they were unable to safely take the study medication or participate in MRI or lumbar puncture procedures. Study analyses included N=114 Veterans who were seen for a prestudy screening and baseline visit. Cognitive assessments were administered prior to randomization. For this analysis, we selected three measures of memory function (Digit Symbol Substitution task, a test of working memory speed; Free and Cued Selective Reasoning test [FCSRT] free recall, a measure of associative memory; Logical Memory Delayed Recall) and one measure of global cognition (Mini Mental State Exam [MMSE]). Criteria for probable TBI was adapted from the DSM-V. Participants were designated as probable TBI based on self-reports of an impact or other event causing rapid movement or displacement of the brain within the skull (blast, accident, fall, bullet wound, or fragment), resulting in loss of consciousness (N=34), loss of memory (N = 11) dazed or confused state (N = 44), concussion or other head injury (N = 34). TBI data were missing for two participants. Participants also completed the Mini International Neuropsychiatric Interview (MINI), which identified current PTSD. Other sufferers of PTSD were identified through self-report or diagnosis indicated in electronic health records. We used Ordinary Least Square (OLS) linear regression with age and education as covariates. Education was coded into 5 categories: No high school diploma, high school diploma or GED; technical school graduate or 2 year college/associate's degree; some college but not a 2 or 4 year degree; 4 year college degree; some post-baccalaureate education. Results: Most enrollees in BRAVE are male (N=94, 86%) and white (107, 97%). Mean age is 65.5 years (SD = 6.7). Seventeen enrollees (15%) report no college experience, 29 have an associate's degree or degree from a technical school (26%), 25 report some college experience but no degree (23%), 25 (23%) have a 4 year degree, and 14 reported some post-baccalaureate college (13%). Half (N=55) of enrollees met criteria for TBI; 27 indicated the event occurred during deployment. TBI and non-TBI groups were comparable on age, education, gender, race, and depression rating. Those with TBI had a slightly greater incidence of PTSD diagnosis (18 vs 11, p=.10) and were more likely to report two or more deployments (19 vs 8, p= .07). However, covarying for age and education level, the TBI group did not differ from non-TBI group on Digit symbol substitution (b = 0.87, p = .41), FCSRT free recall (b = -0.53, p = .53), or logical memory delayed (b = 0.81, p= .13). Enrollees with probable TBI scored higher than those without probable TBI on the MMSE (b = 0.63, p = .003, TBI group mean = 28.7 [SD = 1.3], non-TBI group mean = 27.8, [SD = 1.7]). Conclusion: Ensuring people from diverse backgrounds join clinical trials is key to advancing health equity. Increasing enrollment of Veterans into AD prevention clinical trials is critical in that they are at higher risk for AD than the general population. In this study, the probable TBI group was indistinguishable from the non-TBI gro p on baseline measures of memory and outperformed the non-TBI group on measure of global cognition. The criteria used to assign TBI may have been overly broad, although our sample is in line with national statistics showing that a third of those with probable TBI also have PTSD. TBI has been shown to lower the age of dementia onset, however, the BRAVE sample is relatively young and may not be experiencing even subtle cognitive deficits yet. For this study, probable TBI was reduced to a simple dichotomy, but many factors can affect short- and long-term recovery from TBI including type of injury, age, and existing comorbidities. Incorporating these complexities into future research will be critical to finding effective therapies to prevent or treat AD in Veterans.

5583. Van Lierde, K. M., et al. (2015). "Longitudinal progress of overall intelligibility, voice, resonance, articulation and oromyofunctional behavior during the first 21 months after Belgian facial transplantation." Journal of communication disorders **53**: 42-56.

PURPOSE: The purpose of this study is to document the longitudinal progress of speech intelligibility, speech acceptability, voice, resonance, articulation and oromyofunctional behavior in a male facial transplant patient 8 days, 15 days, 5 months, 12 months and, finally, 21 months after surgery., METHOD: Identical objective (Dysphonia Severity Index, nasometry, acoustic analysis) and subjective (consensus perceptual evaluation, Dutch speech intelligibility test; flexible videolaryngostroboscopy/naso-endoscopy) assessment techniques and questionnaires (speech and voice

handicap index, oral health impact profile, facial disability index) were used during each of the five postsurgical assessments., RESULTS: The pattern of results shows a longitudinal progress of speech intelligibility and acceptability and of the interactive processes underpinning overall speech intelligibility. Vocal quality is normal and resonance is characterized by hypernasality. The phonetic inventory is complete but four phonetic disorders remain. Outcomes pertaining to articulation (formant analysis) show evident progress over time. Lip functions are improving but still decreased., CONCLUSIONS: Transplantation of the face in this patient has largely restored speech. To what extent resonance, articulation, and lip functions can be enhanced by the permanent use of a palatal obturator, by specialized facial and lip movement exercises in combination with motor-oriented speech therapy, is subject for further research. Learning outcomes Facial transplantation: Readers will be able to (1) describe the relationship between facial transplantation and the impact on speech and oromyofunctional behavior, (2) identify variables that influence the outcome after facial transplantation, (3) define an assessment protocol after facial transplantation, (4) define facial transplantation.

5584. Van Lierde, K. M., et al. (2014). "Speech characteristics one year after first Belgian facial transplantation." The Laryngoscope **124**(9): 2021-2027.

OBJECTIVES/HYPOTHESIS: Facial transplantation has progressed over the past 8 years. We did the first Belgian facial transplantation by vascularized composite tissue allotransplantation and report the 1-year follow-up regarding speech and oromyofunctional behavior., STUDY DESIGN: Outcome study., METHODS: The recipient, a 56-year-old man, had his face severely injured due to a ballistic injury. In January 2012, in a 20-hours surgical procedure, a digitally planned facial composite tissue allotransplantation was performed consisting of a large amount of bone together with the soft tissue of the entire lower two-thirds of the face. Speech intelligibility, voice, resonance, articulation, and oromyofunctional behavior were measured 12 months after the transplantation using objective and subjective assessment techniques., RESULTS: No intraoperative surgical complications occurred, and the postoperative course was uneventful. Survival of the graft was complete, the bony structures-both maxillae and part of the left mandible-and mucosal lining of the nasal cavities and hard palate could all be vascularized by connecting only the facial vessels. Twelve months after transplantation, the speech intelligibility is normal in words, but slightly impaired in sentences due to moderate hypernasality. Two articulation disorders and lip incompetence are present. Facial emotional readability was present but decreased., CONCLUSION: Speech outcome, as one of several determinants of feasibility, can be a positive argument when considering the option of facial allotransplantation.

5585. van Lierop, A. C., et al. (2009). "Retained knife blades in the ear, nose and throat: three cases." The Journal of laryngology and otology **123**(3): 351-355.

OBJECTIVE: To discuss the management and to review the literature regarding retained knife blades in the head and neck., CASE REPORT: We present three cases in which patients presented with retained knife blades in the head and neck region; in two of these, the diagnosis was delayed by more than eight weeks. In all patients, the retained knife blade was removed through the pathway of insertion, without significant sequelae., DISCUSSION: The methods of removal, appropriate radiological investigations and patient profiles are discussed., CONCLUSIONS: We propose that radiography be performed on all patients presenting with facial stab injuries which are anything more than superficial. We further suggest that the direct extraction of sharp objects through the pathway of insertion is safe if radiological studies show no risk of vascular injury.

5586. van Netten, J. J., et al. (2018). "Diabetic Foot Australia guideline on footwear for people with diabetes." Journal of foot and ankle research **11**: 2.

BACKGROUND: The aim of this paper was to create an updated Australian guideline on footwear for people with diabetes., METHODS: We reviewed new footwear publications, (inter)national guidelines, and consensus expert opinion alongside the 2013 Australian footwear guideline to formulate updated recommendations., RESULT: We recommend health professionals managing people with diabetes should: (1) Advise people with diabetes to wear footwear that fits, protects and accommodates the shape of their feet. (2) Advise people with diabetes to always wear socks within their footwear, in order to reduce shear and friction. (3) Educate people with diabetes, their relatives and caregivers on the importance of wearing appropriate footwear to prevent foot ulceration. (4) Instruct people with diabetes at

intermediate- or high-risk of foot ulceration to obtain footwear from an appropriately trained professional to ensure it fits, protects and accommodates the shape of their feet. (5) Motivate people with diabetes at intermediate- or high-risk of foot ulceration to wear their footwear at all times, both indoors and outdoors. (6) Motivate people with diabetes at intermediate- or high-risk of foot ulceration (or their relatives and caregivers) to check their footwear, each time before wearing, to ensure that there are no foreign objects in, or penetrating, the footwear; and check their feet, each time their footwear is removed, to ensure there are no signs of abnormal pressure, trauma or ulceration. (7) For people with a foot deformity or pre-ulcerative lesion, consider prescribing medical grade footwear, which may include custom-made in-shoe orthoses or insoles. (8) For people with a healed plantar foot ulcer, prescribe medical grade footwear with custom-made in-shoe orthoses or insoles with a demonstrated plantar pressure relieving effect at high-risk areas. (9) Review prescribed footwear every three months to ensure it still fits adequately, protects, and supports the foot. (10) For people with a plantar diabetic foot ulcer, footwear is not specifically recommended for treatment; prescribe appropriate offloading devices to heal these ulcers., CONCLUSIONS: This guideline contains 10 key recommendations to guide health professionals in selecting the most appropriate footwear to meet the specific foot risk needs of an individual with diabetes.

5587. Van Sickels, J. E., et al. (1979). "Vascular injury and penetrating facial trauma." Journal of oral surgery (American Dental Association : 1965) **37**(3): 195-197.

Three patients with gunshot wounds to facial and vascular structures were described. They demonstrate the importance of angiography in the acute care phases of treatment. In one case, angiography lead to eventual surgical management of an arteriovenous fistula. The other two cases described arterial injury that required careful surgical follow-up to detect delayed complications.

5588. van Veen, E., et al. (2018). "Brain death and postmortem organ donation: report of a questionnaire from the CENTER-TBI study." Critical care (London, England) **22**(1): 306.

BACKGROUND: We aimed to investigate the extent of the agreement on practices around brain death and postmortem organ donation., METHODS: Investigators from 67 Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury (CENTER-TBI) study centers completed several questionnaires (response rate: 99%)., RESULTS: Regarding practices around brain death, we found agreement on the clinical evaluation (prerequisites and neurological assessment) for brain death determination (BDD) in 100% of the centers. However, ancillary tests were required for BDD in 64% of the centers. BDD for nondonor patients was deemed mandatory in 18% of the centers before withdrawing life-sustaining measures (LSM). Also, practices around postmortem organ donation varied. Organ donation after circulatory arrest was forbidden in 45% of the centers. When withdrawal of LSM was contemplated, in 67% of centers the patients with a ventricular drain in situ had this removed, either sometimes or all of the time., CONCLUSIONS: This study showed both agreement and some regional differences regarding practices around brain death and postmortem organ donation. We hope our results help quantify and understand potential differences, and provide impetus for current dialogs toward further harmonization of practices around brain death and postmortem organ donation.

5589. van Vugt, A. B. (2003). "Pitfalls in penetrating trauma." Acta chirurgica Belgica **103**(4): 358-363.

In Western Europe the most frequent cause of multiple injuries is blunt trauma. Only few of us have experience with penetrating trauma, without exception far less than in the USA or South-Africa. In Rotterdam, the Erasmus Medical Centre is a level I trauma centre, situated directly in the town centre. All penetrating traumas are directly presented to our emergency department by a well organized ambulance service supported by a mobile medical team if necessary. The delay with scoop and run principles is very short for these cases, resulting in severely injured reaching the hospital alive in increasing frequency. Although the basic principles of trauma care according to the guidelines of the Advanced Trauma Life Support (ATLS) (1-2) are the same for blunt and penetrating trauma with regard to priorities, diagnostics and primary therapy, there are some pitfalls in the strategy of management in penetrating trauma one should be aware of. Simple algorithms can be helpful, especially in case of limited experience (3). In case of life-saving procedures, the principles of Damage Control Surgery (DCS) must be followed (4-5). This approach is somewhat different from "traditional" surgical treatment. In the Ist phase prompt interventions by emergency thoracotomy and laparotomy are carried out, with only two goals to achieve: surgical control of haemorrhage and contamination. After temporary life-

saving procedures, the 2nd phase is characterized by intensive care treatment, dealing with hypothermia, metabolic acidosis and clotting disturbances. Finally in the 3rd phase, within 6-24 hours, definitive surgical care takes place. In this overview, penetrating injuries of neck, thorax, abdomen and extremities will be outlined. Penetrating cranial injuries, as a neurosurgical emergency with poor prognosis, are not discussed. History and physical examination remain the corner stones of good medical praxis. In a work-up according to ATLS principles airway, breathing and circulation should be evaluated with great care. Neurovascular examination related to trauma of the spinal cord, peripheral nerves as well as vascular involvement should be carried out also in extremity injuries. Physical examination should be completed by localization of all stabwounds, in- and outshot openings as well as recto-vaginal examination and inspection of the oropharynx.

5590. van Walsum, A. D., et al. (2001). "[Local and regional in-hospital trauma care following fireworks depot explosion in Enschede]." De lokale en regionale intramurale traumaopvang bij de Enschedese vuurwerkramp. **145**(48): 2330-2335.

UNLABELLED: On Saturday 13 May, 2000 at about 15:30 h, the Dutch city of Enschede was struck by the explosion of a midtown firework depot. Twenty-two people were killed and almost 1,000 people were wounded. A complete district with 1,000 houses was destroyed. In total, 527 victims were treated in one of the regional hospitals, 76 (14%) of whom were admitted and 451 (84%) were treated as outpatients. Of the clinically treated victims, 11 patients were triaged as T1 and needed immediate intervention, 63 patients were triaged as T2 where treatment within six hours was indicated, and two T3 patients did not need urgent treatment. The outpatients mainly suffered secondary blast injuries to the head and extremities due to flying debris. Of the 11 T1 patients, 10 underwent acute surgery; intervention radiology was performed in one patient. The injuries of the severely wounded T1 patients consisted of penetrating thoracic, abdominal and skull injuries, as well as blunt abdominal trauma and compound fractures. Two patients from the disaster area underwent acute vascular surgery for acutely burst aortic aneurysms. The in-hospital trauma care was characterised by the spontaneous arrival of a large number of extra medical personnel. The regional distribution of the trauma patients was adequate. The regional capacity of the emergency rooms, IC-units and operating facilities proved to be sufficient. Routing of lightly-wounded patients was found to be important. The communication in all phases of the disaster management appeared to be poorly structured., CONCLUSION: During the initial trauma care, the routing of vast numbers of ambulant, lightly-wounded patient, as well as extra doctors and nurses, needs careful planning.

5591. Vander, J. F. and C. C. Nelson (1988). "Penetrating orbital injury with cavernous sinus involvement." Ophthalmic surgery **19**(5): 328-330.

Penetrating orbital injuries may involve intracranial structures as well. We report an unusual case of permanent visual loss, temporary complete ophthalmoplegia, and penetration of the internal carotid artery following penetrating nail injury. CT scanning and arteriography are important diagnostic tests to consider prior to removal of an orbital foreign body. This case also demonstrates the importance of delaying repair of traumatic ptosis and ophthalmoplegia.

5592. VanderArk, G. D., et al. (1970). "Repair of cerebrospinal fluid fistulas using a tissue adhesive." Journal of neurosurgery **33**(2): 151-155.

5593. Vane, D. W., et al. (2001). "Emotional considerations and attending involvement ameliorates organ donation in brain dead pediatric trauma victims." The Journal of trauma **51**(2): 329-331.

PURPOSE: The purpose of this study was to ascertain a strategy for maximizing parental consent for organ donation in traumatically injured children suffering from brain death. Our hypothesis was that appropriate attending surgeon involvement and delay in evaluating children for brain death leads to an increased percentage of organ donors., METHODS: From January 1993 to August 1999, the records of all children who died in a Level I trauma center were evaluated. Those children suffering brain death that were suitable for organ donation were entered into the study. Cases were reviewed for patient demographics, time to entry into brain death protocol (measured from time of admission), time to parent notification about brain death (measured from time of admission), specific attending involved in the case (with level of involvement), and success of organ donation request. In all, 43 charts were reviewed., RESULTS: Of 43 deaths, 33 were deemed suitable for donation. Age of suitable donors ranged from 1 month to 18 years. In all, 11 attending physicians were involved in the care of these children. Overall, 20 of 33 were organ donors (60%). When the

attending surgeon was involved, donation success for organ retrieval was 86%, whereas if the attending was not involved personally, the success rate dropped to 23% ($p < 0.04$). One senior pediatric surgeon obtained a success rate of 12 of 12 children. It was this surgeon's policy to not initiate brain death protocols in children immediately on entry into the emergency room, but rather to delay initiation until family could be gathered and spend time with the affected child in order that the family could recover from the initial shock of trauma (always at least overnight). When time to initiation of brain death protocol was examined, success was obtained when a delay of 15.5 hours was respected, versus 7.0 hours when donation was requested but denied ($p < 0.03$)., CONCLUSION: These data indicate that attending involvement is important when parents of brain dead children are asked about organ retrieval ($p < 0.04$). Delay in initiating brain death protocols in order for family members to deal with the shock of the initial trauma appears to increase willingness to participate in organ donation.

5594. Vanlierde, M. J. (1989). "Post-traumatic asymptomatic saccular aneurysm of the internal carotid artery." The Journal of laryngology and otology **103**(1): 115-116.

A patient presented with mild upper airway obstruction after being shot from behind through the neck and soft palate. Two days later he developed palsies of the IXth to XIIth cranial nerves inclusive on the traumatised side. These palsies resolved spontaneously after three weeks. Further investigation revealed the presence of a saccular aneurysm of the internal carotid artery. The internal carotid artery was ligated after gradual closure for three days using a Preston clamp.

5595. Vaqas, B., et al. (2013). "An occult intracranial foreign body introduced via a conjunctival wound." Trauma (United Kingdom) **15**(3): 252-256.

We present a case of a 23-year-old man who suffered a facial assault. An intracranial foreign body, a socket from a socket wrench, was introduced into the cranial cavity via a medial conjunctival entry wound which presented with minimal physical signs. The entry wound and the foreign body were missed during the patient's first presentation to an emergency department leading to a delay in diagnosis. Subsequent periorbital swelling and visual blurring prompted delayed investigation leading to detection of the foreign body. This case report highlights the need for a high index of suspicion of intracranial complications when assessing ocular injuries. The mechanism of the penetrating injury, the ophthalmological findings and the surgical and antibiotic management are discussed.

5596. Vaquero, J., et al. (1982). "Pneumocephalus after air rifle wound of the brain." Neuroradiology **23**(3): 161-162.

5597. Varelas, P. N., et al. (2017). "Primary Posterior Fossa Lesions and Preserved Supratentorial Cerebral Blood Flow: Implications for Brain Death Determination." Neurocritical care **27**(3): 407-414.

BACKGROUND: Patients with primary posterior fossa catastrophic lesions may clinically meet brain death criteria, but may retain supratentorial brain function or blood flow. These patients could be declared brain-dead in the United Kingdom (UK), but not in the United States of America (USA). We report the outcome of adult patients with primary posterior fossa lesions without concurrent major supratentorial injury., METHODS: Henry Ford Hospital database was reviewed over a period of 88 months in order to identify all adult patients with isolated brainstem or posterior fossa lesions. We excluded patients with concurrent significant supratentorial pathology potentially confounding the clinical brain death examination. One more patient from a different hospital meeting these criteria was also included., RESULTS: Three patients out of 161 met inclusion criteria (1.9% of all brain deaths during this period). With the addition of a fourth patient from another hospital, 4 patients were analyzed. All four patients had catastrophic brainstem and cerebellar injuries meeting the clinical criteria of brain death with positive apnea test in the UK. All had preserved supratentorial blood flow, which after a period of 2 h to 6 days disappeared on repeat testing, allowing declaration of brain death by US criteria in all four. One patient became an organ donor., CONCLUSIONS: Patients with primary posterior fossa catastrophic lesions, who clinically seem to be brain-dead, evolve from retaining to losing supratentorial blood flow. If absent cerebral blood flow is used as an additional criterion for the declaration of death by neurological criteria, these patients are not different than those who become brain death due to supratentorial lesions.

5598. Vargas, J., et al. (2022). "A clinical decision tool to predict the need for cervical imaging in children less than 8 years." Critical care medicine **50**(1 SUPPL): 794.

INTRODUCTION/HYPOTHESIS: Pediatric cervical spine injury (CSI) occurs in 1-2% of pediatric blunt traumas. If unrecognized, there is significant risk of neurologic disability. Identification of CSI based solely on history in infants and children is problematic as cognitive development limits the reliability of the exam. We previously identified 6 risk factors that increased the odds of having a CSI in children < 8 years. The objective of this study was to determine the probability of not having a CSI in the absence of these risk factors in children < 8 years who sustained trauma. METHODS: This is a reanalysis of study data in which 6 risk factors for having a CSI after trauma were identified (cervical spine tenderness, motor vehicle injury, loss of consciousness (LOC), distracting injury, displaced skull fracture, and ventricular hemorrhage). Data were obtained from children < 8 years with traumatic injury admitted to 1 of 3 level 1 pediatric trauma centers between August 2007 and August 2017. CSI was defined as 1) radiographic evidence of CSI, or 2) radiographic evidence of CSI and/or treatment due to clinical concern. Negative predictive values (NPV) were calculated, first including the absence of all 6 risk factors and then including fewer. RESULTS: Of 5187 patients evaluated, 80(1.7%) had a CSI based upon radiography and 111(2.1%) based on clinical concern. 1045 patients did not have any of the 6 risk factors and only 1(0.10%) had a CSI by radiography and 4(0.38%) by clinical concern. Not including the absence of neck tenderness in the model had little effect on the NPV. However, when only absence of motor vehicle injury, LOC, displaced fracture and ventricular hemorrhage remained in the model, the probability of CSI by radiography (6/2212 (0.27%) or clinical concern (10/2208 (0.45%) increased. Use of only absence of LOC was a poor negative predictor of CSI (radiography: 40/4290 (0.92%); clinical concern: 61/4269 (1.41%)). CONCLUSION: Children < 8 years who sustain trauma not from motor vehicle injury and have no LOC, displaced skull fracture, distracting injury or ventricular hemorrhage are at very low risk of a CSI. The absence of neck tenderness has little effect on the NPV. These data suggest that children who do not have these risk factors may not need radiographic imaging of their cervical spine.

5599. Varnamkhasti, M. and A. Thomas (2011). "Brain and facial trauma: A neuroradiology perspective." Trauma **13**(4): 317-333.

Traumatic head and facial injuries are common causes of emergency department admissions. Head trauma, in particular, is the commonest reason for emergency out of hours computed tomography (CT) performed. Most patients with traumatic brain injuries (TBIs) have mild head injuries, but up to 20% require hospitalisation or further management. The fixed size of the bony cranial cavity means that only small increases in volume within the intracranial compartment can be tolerated before pressure within the cavity increases dramatically leading to secondary brain injury, with potentially catastrophic consequences. Head and brain injuries are commonly associated with facial trauma, particularly of the upper face, and it is important to be aware of this because the treatment of the former injuries may need to take precedence over the facial injuries. This review aims to summarise the epidemiology of blunt trauma to the head and face and the various patterns of TBI. The role of CT, both in the acute setting and in follow-up these patients, is described.

5600. Vartanian, A. J. and A. Alvi (2000). "Bone-screw mandible fixation: an intraoperative alternative to arch bars." Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery **123**(6): 718-721.

OBJECTIVES: Bone-screw mandible fixation (BSMF) is evaluated as an alternative to intraoperative arch-bar maxillomandibular fixation before plating of mandibular fractures. BSMF is achieved by wire ligation of opposing bone-screws placed in the maxilla and mandible., METHODS: A retrospective evaluation of 23 patients with 40 mandibular fractures who underwent mandibular fracture repairs. BSMF was used instead of arch bars to ensure proper dental occlusion. All fractures were then plated, after which BSMF was removed before termination of anesthesia., RESULTS: Normal occlusion was observed in 21 patients (91.3%), Class II malocclusion was noted in 1 patient (4. 3%), and 1 patient was edentulous. No complications related to the use of BSMF were observed., CONCLUSION: BSMF can serve as a viable alternative to arch-bar maxillomandibular fixation for obtaining temporary intraoperative occlusion. BSMF produces acceptable malocclusion rates and offers the advantages of decreased intraoperative time, lower risk for percutaneous and mucosal wire punctures, and ease of use.

5601. Vascik, J. M. and J. M. Tew, Jr. (1982). "Foreign body embolization of the middle cerebral artery: review of the literature and guidelines for management." Neurosurgery **11**(4): 532-536.

Two cases of traumatic middle cerebral artery occlusion secondary to migratory intravascular metallic pellets are presented. Surgical removal of the occlusive pellet was achieved in one patient, and vessel patency was restored. One patient recovered from his neurological deficit without surgical intervention. Factors such as the availability of a microvascular surgeon, the status of the neurological deficit resulting from the embolus, the time interval from injury to the proposed operation, and the extent of ancillary injuries sustained concurrently all bear weight on the decision to explore surgically or treat by medical measures. We believe that in cases of trauma an attempt to remove intravascular emboli is warranted to prevent migration of the embolus and distal propagation of thrombus, to avoid chronic sepsis, to prevent arterial erosion, and to restore the integrity of the vascular tree.

5602. Vaudano, E., et al. (1995). "The effects of a lesion or a peripheral nerve graft on GAP-43 upregulation in the adult rat brain: an in situ hybridization and immunocytochemical study." The Journal of neuroscience : the official journal of the Society for Neuroscience **15**(5 Pt 1): 3594-3611.

We have sought to determine (1) if thalamic neurons upregulate the growth associated protein GAP-43 as a response to injury, or if a peripheral nerve graft is required to induce, enhance or sustain such a response, and (2) if thalamic neurons with different regenerative potentials also display different GAP-43 responses. Levels of GAP-43 protein (detected by LM and EM immunohistochemistry) and of GAP-43 mRNA (detected by in situ hybridization) were compared in the thalamus of adult rats between 1 d and 180 d after making a stab lesion or after implanting a peripheral nerve autograft. Stab injury is a sufficient stimulus to cause a transient upregulation in GAP-43 expression by neurons in the thalamus (both around the graft tip and in particular in the thalamic reticular nucleus) in the first week after injury but this response is both prolonged, and enhanced in the presence of a peripheral nerve graft. In addition, we demonstrate directly, by double labelling, that neurons of the thalamic reticular nucleus displaying high levels of the mRNA for GAP-43, have axons regenerating in the distal portion of the graft. These findings lend direct support to the hypothesis that upregulation of the GAP-43 gene is essential for prolonged regenerative axonal growth. We also demonstrate GAP-43 protein in graft Schwann cells and in brain astrocytes close to the site of graft implantation.

5603. Vayvada, H., et al. (2005). "Management of close-range, high-energy shotgun and rifle wounds to the face." The Journal of craniofacial surgery **16**(5): 794-804.

Close-range, high-energy shotgun wounds of the face are life-threatening and devastating traumas of the face. Suicidal attempts are the main reason in the great majority of the patients in civilian life. There is no consensus on the timing of reconstruction for bone and soft tissue defects resulting from high-energy shotgun wounds. The conventional method is primary repair as soon as possible and serial debridements and definitive reconstruction in the delayed stage. An alternative to this approach is the immediate definitive surgical reconstruction of the patient during the first operation for acute management of trauma. We had 15 patients with close-range, high-energy shotgun wounds in 10 years. Six of 15 patients referred to our center for definitive reconstruction after the acute management of the patients were performed in another center and the rest were all admitted in the acute period. Either conventional approach with delayed reconstruction for 10 patients or immediate definitive surgical reconstruction for 5 patients was used. Immediate reconstruction eliminated disadvantages of the conventional method such as high infection and scarring rate and deformities resulting from contraction of tissues. The emotional conditions of the patients were evaluated and major depression signs were determined. Functional evaluation showed that there was great correlation between facial appearance after reconstruction and social activity level.

5604. Vazirani, J., et al. (2016). "Autologous simple limbal epithelial transplantation for unilateral limbal stem cell deficiency: multicentre results." The British journal of ophthalmology **100**(10): 1416-1420.

PURPOSE: To report outcomes of autologous simple limbal epithelial transplantation (SLET) performed for unilateral limbal stem cell deficiency (LSCD) at multiple centres worldwide., METHODS: In this retrospective, multicentre, interventional case series, records of patients who had undergone autologous SLET for unilateral LSCD, with a minimum of 6 months of follow-up, were reviewed. The primary outcome measure was clinical success, defined as a completely epithelised, avascular corneal surface. Kaplan-Meier survival curves were constructed and survival probability was calculated. A Cox proportional hazards analysis was done to assess association of preoperative characteristics with risk

of failure. Secondary outcome measures included the percentage of eyes achieving visual acuity of 20/200 or better, percentage of eyes gaining two or more Snellen lines and complications encountered., RESULTS: 68 eyes of 68 patients underwent autologous SLET, performed across eight centres in three countries. Clinical success was achieved in 57 cases (83.8%). With a median follow-up of 12 months, survival probability exceeded 80%. Presence of symblepharon (HR 5.8) and simultaneous keratoplasty (HR 10.8) were found to be significantly associated with a risk of failure. 44 eyes (64.7%) achieved a visual acuity of 20/200 or better, and 44 eyes (64.7%) gained two or more Snellen lines. Focal recurrences of pannus were noted in 21 eyes (36.8%) with clinical success., CONCLUSION: Autologous SLET is an effective and safe modality for treatment of unilateral LSCD. Clinical success rates and visual acuity improvement are equal to or better than those reported with earlier techniques.

5605. Vega, L. G. and K. Brewer (2012). "Reconstruction of the severely atrophic maxilla or acquired maxillary defects using zygomatic implants: Outcome Study of 41 implants." Journal of oral and maxillofacial surgery **70**(9): e13-e14.

Dental rehabilitation is the ultimate goal of the reconstruction efforts for the severely atrophic maxilla or acquired maxillary defects. Multiple techniques dealing with these challenging reconstructions have been described in the literature. Most these techniques include bone grafting which has the disadvantage of prolonged the treatment plan, increased costs, and the potential of donor site morbidity. Zygoma implants are a graftless solution for the rehabilitation these patients. The purpose of this study was to evaluate indications, surgical problems and treatment outcomes related to the placement of zygoma implants and their prosthetic rehabilitation. Forty-one zygoma implants were placed in 11 consecutive patients (8 women, 3 men) between September 2007 and November 2011. The patient age range was 50 to 73 years with a mean age of 61.5 years. Six patients were treated due to severe maxillary atrophy and 5 were due to acquired maxillary defects. Three of the acquired defects were hemimaxillectomies due to cancer ablation, 1 was secondary to a gunshot wound, and 1 was a total maxillectomy secondary to a fungal infection. Three of the acquired maxillary defect patients underwent additional soft tissue reconstruction with a radial forearm free flap. Nine patients were reconstructed with 4 zygomatic implants, 1 was reconstructed with 3 zygo- matic implants and 1 had 2 zygoma implants placed. Five patients were reconstructed with a combination of zygomatic and conventional dental implants. A total of 10 dental implants were placed. Outcomes measures were zygomatic and conventional implants' survival rates, satisfaction with the prosthetic restoration as well as complications. Follow-up ranged from 10 months to 5 years with a mean of 30 months. No zygomatic implants were lost and minor complications occurred in 3 patients. Complications reported included less than ideal implant position, oral-antral communication and periimplantitis. Additionally 2 conventional implants were lost in two patients before loading. There were no reported cases of sinusitis, swelling, infection, or nerve damage. All patients were successfully restored with either a fixed or removable prosthesis. All patients reported high levels of satisfaction with the reconstruction. Within the limitations of the present study, the results suggest that reconstruction of the severely atrophic maxilla or acquired maxillary defects with zygomatic implants provides a viable and predictable treatment option with minimal complications.

5606. Vega, O. A. (2011). "A new device for alveolar bone transportation." International journal of oral and maxillofacial surgery **40**(10): 1036.

Purpose: To discuss a retrospective study of a new technique for alveolar bone transport by distraction osteogenesis, using a Hyrax modified device by the principal author (OAV). Patients and methods: There were treated seven patients: 5 male and 2 two female; five patients with cleft palate and lip diagnosis, one with a high-speed gunshot wound, and one patient with facial trauma sequel due to mandibular fracture. All of them were treated with an alveolar bone transportation technique (ABT) through the use of the modified Hyrax device (VEGAX). Before surgery bifocal distraction osteogenesis of adjacent alveolar bone was performed on four patients, while the trifocal type was performed on the other three patients. However, in one case, direct dental anchorage was not used, only orthodontic appliances. Results: In all the cases, new bone formation and gingival tissue around the defectwas obtained, closure of alveolar fistula, movement from posterior to anterior of the alveolar process; no complications were observed in any patient. In one case, two teeth involved in the disc of the ABT were extracted, due to a previous condition of periodontal disease. Conclusion: The alveolar bone transport by distraction osteognesis with the VEGAX device is an easy and accessible technique for almost every patient with alveolar defects due to diverse causes. In all the presented cases, predictability and success were demonstrated.

5607. Velasco, G. C. and G. M. C. Ambrocio (2021). "Bullet slug in the ethmoid sinus – A case report." Otolaryngology Case Reports **21**.

Objectives: To describe a case of a foreign body (bullet slug) lodged in the ethmoid sinus of an 8-year old female from a gunshot injury. Study design: Case report. Results: An 8-year-old female presented at the emergency room due to a gunshot wound on her right parietotemporal area. She was awake with stable vital signs and GCS 15, with no noted exit wound and no active bleeding on the injury site. CT scan revealed a 1.5cm × 1.5cm hyperdense foreign body with well-defined margins in her left anterior ethmoid sinus with no intracranial extension nor evident damage to vital structures. Endoscopic removal of the foreign body (bullet slug) was performed. The intraoperative findings verified the bullet slug lodged in the superoposterior part of the nasal septum, between the middle turbinates. The bullet slug was successfully extracted with no intraoperative and postoperative complications. Subsequent follow-up post-surgery with all involved services was uneventful. Conclusion: To prevent complications and improve patient outcomes, otolaryngologists should be aware of the presentation, diagnosis, and management of a bullet slug in the ethmoid sinuses. Important considerations should be given to pediatric patients due to the unique locations of their vital structures and their developing paranasal sinuses.

5608. Velioglu, Y., et al. (2018). "Gunshot Injury of Head and Neck Region with an Atypical Bullet Trajectory: The Importance of Whole Body Computed Tomography Scan." Journal of the College of Physicians and Surgeons--Pakistan : JCPSP **28**(9): S215-S216.

Nowadays, gunshot injuries have become a common medical-legal issue because of easy accessibility of firearms. Gunshot injuries of head and neck region are highly morbid and fatal, particularly when they affect vital organs. In rare cases, atypical tract lines resulting from such injuries can cause difficulties in the diagnosis and treatment. In this report, a high energy gunshot injury involving head and neck region with an atypical bullet trajectory is presented. A 24-year male soldier was brought to the emergency department on account of gunshot injury following a conflict. Although the entrance and exit holes of bullets were confined to head and neck region, the whole body computed tomography scan was carried out in spite of his borderline hemodynamics. Whole body computed tomography revealed massive hemopneumothorax, mediastinal shift, hepatic laceration, and foreign body (bullet) in the liver. The patient was operated successfully by a multidisciplinary surgical team on emergency basis. This report highlights the necessity and importance of whole body computed tomography scan in such cases.

5609. Vella, A. E., et al. (2006). "Predictors of fluid resuscitation in pediatric trauma patients." The Journal of emergency medicine **31**(2): 151-155.

Advanced Trauma Life Support (ATLS) is accepted as the standard for the first hours of trauma care. However, ATLS is designed primarily for adults. In children, vascular access can be difficult and time-consuming. Due to the differences in the epidemiology of children suffering traumatic injury, they may not require aggressive fluid resuscitation. The objective of the study was to establish predictors of fluid resuscitation, and to determine whether all pediatric Level I Trauma victims require two intravenous catheters. Medical charts of all patients aged < 18 years meeting Level I Trauma criteria who presented to Childrens Hospital Los Angeles (CHLA) between January 1 and December 31, 1999 were retrospectively reviewed. There were 152 patients reviewed with a median age of 6 years (range 4 months to 17 years); 64% were boys. The mechanism of injury was motor vehicle crash 49%, fall 37%, crush 8%, gunshot 5%, and knife 1%. Injuries included closed head 88%, penetrating abdomen/chest 6%, and other 6%. Vital signs over time showed no change in 59%, got better in 34%, and got worse in 7%. Fluid resuscitation included no bolus in 70%, 1 bolus in 20%, 2 boluses in 7%, > 2 boluses in 3%. The ICU admitted 23%, 12% were intubated, survival was 95%, and 59% received a prehospital i.v. The i.v. #1 site: antecubital 51%, hand 41%, foot 5%, femoral 1%. The i.v. #2 site: hand 30%, antecubital 20%, foot 2%, none 48%. T test showed no statistically significant differences in fluid resuscitation or second i.v. placement based on the mechanism of injury. T test for unequal variances showed a statistically significant difference in means with $p < 0.001$ for second i.v. placement as compared with only i.v. fluid amount, age, and Injury Severity Score (ISS). Revised Trauma Score was the only predictor of worsening of vital signs (logistic regression [LR], $p < 0.001$). Age was the only predictor of second i.v. placement (LR, $p < 0.03$). ISS was the only predictor of a bolus being given (LR, $p < 0.01$). In our study, blunt trauma occurred in 90% of children, with 10% requiring > 1 fluid bolus. ISS was the only predictor of the need for fluid resuscitation and is not likely to be helpful in the clinical setting. In our

population, nearly 50% had no second i.v. This preliminary review of the nature of pediatric trauma suggests that ATLS guidelines may not always be appropriate for the management of pediatric trauma.

5610. Vellimana, A. K., et al. (2021). "Endovascular Considerations in Traumatic Injury of the Carotid and Vertebral Arteries." Seminars in Interventional Radiology **38**(1): 53-63.

Cervical carotid and vertebral artery traumatic injuries can have a devastating natural history. This article reviews the epidemiology, mechanisms of injury, clinical presentation, and classification systems pertinent to consideration of endovascular treatment. The growing role of modern endovascular techniques for the treatment of these diseases is presented to equip endovascular surgeons with a framework for critically assessing patients presenting with traumatic cervical cerebrovascular injury.

5611. Velnar, T. and R. Pregelj (2014). "Craniocerebral trauma as a result of a compressor tube explosion: A case report." Brain injury **28**(5-6): 610.

Objectives: Traumatic brain injury is frequently encountered in neurosurgical practice. Although penetrating trauma is less common than closed injuries, it is more often lethal. Cavitation effect, vascular and neuronal damage, secondary brain injury and infection are the main causes of poor outcome. Methods: Clinical presentation of a 35-year old patient is described, who suffered explosion head injury. During the explosion of a construction machine, a foreign body (a part of a high-pressure compressor air tube, 6 cm in length, made of steel wires and plastic mantle) penetrated the basal parts of the frontal lobes through maxilla, medial orbit and ethmoid. It was embedded in the vessels of the anterior communicating complex, elevating it to the lower falx. At admission, GCS was rated at 14. No paresis was evident. Results: Through the inter-hemispheric approach, the foreign body was removed, debridement and reconstruction were done and all vessels were spared. The initial recovery was good and sedation was gradually discontinued. However, the patient's clinical condition deteriorated after 1 week due to vasospasm-induced brain infarction and meningitis and he died weeks later of infection and multi-organ failure. Conclusions: Penetrating injury to the brain has a poor prognosis and high disability among the survivors. Minimizing secondary insults to the brain tissue, strict adherence to the brain trauma guidelines and infection prevention are imperative. The deterioration may appear also late in the treatment course, after initial promising recovery.

5612. Velnar, T. and R. Pregelj (2016). "Compressor tube explosion causing severe craniocerebral trauma: A case report." Brain injury **30**(5-6): 559.

Objectives: Traumatic brain injury is frequently encountered in neurosurgical practice. Although penetrating trauma is less common than closed injuries, it is more often lethal. Cavitation effect, vascular and neuronal damage, secondary brain injury and infection are the main causes of poor outcome. Methods: Clinical presentation of a 35-year old patient is described, who suffered explosion head injury. During the explosion of a construction machine, a foreign body (a part of a high-pressure compressor air tube, 6 cm in length, made of steel wires and plastic mantle) penetrated the basal parts of frontal lobes through the maxilla, medial orbit and ethmoid. It was embedded in the vessels of the anterior communicating complex, elevating it to the lower falx. At admission, GCS was rated at 14. No paresis was evident. Results: Through the interhemispheric approach, the foreign body was removed, debridement and reconstruction were done and all vessels were spared. The initial recovery was good and sedation was gradually discontinued. However, the patient's clinical condition deteriorated after 1 week due to vasospasm induced brain infarction and meningitis and he died of infection and multi-organ failure. Conclusions: Penetrating injury to the brain has a poor prognosis and high disability among the survivors. Minimizing secondary insults to the brain tissue, strict adherence to the brain trauma guidelines and infection prevention are imperative. The deterioration may appear also late in the treatment course, after initial promising recovery.

5613. Venkata Naga, S. R., et al. (2020). "A case of T-cell ALL with remarkable recovery after treatment with an innovative induction chemotherapy regimen." Pediatrics **146**(1): 462-464.

Introduction Acute Lymphoblastic Leukemia (ALL) is the most common pediatric malignancy; most cases are derived from precursor B-cells; T-cell ALL comprises approximately 15% of cases. In the past, T-ALL has had lower cure rates than precursor-B ALL, often presenting with higher white blood cell (WBC) counts and extramedullar disease in the

mediastinum or central nervous system (CNS). In recent years cure rates for T-ALL have improved significantly with intensive chemotherapy regimens. Case report An 8-year old male with no significant medical history presented with a 2-week history of increasing lethargy, headaches, abdominal pain and episodes of emesis. On physical exam, he was poorly-responsive with a right gaze preference and his left arm and leg had increased tone. A complete blood count revealed WBC of 731.4 x 103/mcL, hemoglobin 5.8 gm/dL and platelet count 52 x 103/mcL. Flow cytometric analysis of peripheral blood was diagnostic of T-ALL MRI of the brain showed numerous foci of evolving intracranial hemorrhages without obvious mass lesions or leukemic infiltrates. Over an interval of hours, his mental status deteriorated further and a head CT showed enlarging lesions with evidence of uncal herniation. He was treated with dexamethasone, mannitol and underwent a decompressive right craniectomy. Once his clinical condition was stabilized, consideration was given to treatment of his T-ALL both systemically as well as in his CNS. Intrathecal chemotherapy was not considered feasible; therefore, an innovative regimen was devised, using chemotherapy medications active in T-ALL with significant penetration of the blood-brain barrier. This regimen included high-dose methotrexate and high-dose cytarabine as well as conventional drugs for ALL induction (vincristine and dexamethasone). He responded well to this modified induction regimen and was in remission four weeks after his initial diagnosis. Repeat MRI showed significant resolution of hemorrhagic brain lesions and surrounding edema, with no evidence of herniation. He then went on to receive standard T-ALL chemotherapy. His T-ALL has been in continuous remission for 2 years with negative minimal residual disease measurements. He has shown remarkable improvement in his neurologic function and is walking without difficulty and attending school. Discussion It is recognized that some T-ALL patients, like ours, present with hyperleukocytosis, organ infiltration and complications of tumor lysis and well as CNS involvement. However, cure rates for T-ALL approach 85% if solid remissions are achieved. Our patient's dramatic presentation with bulky CNS infiltration, hemorrhage and herniation was rare and typically would result in significant morbidity or mortality. His initial management posed unique problems which prevented the use of a standard chemotherapy approach. Our case demonstrates that potentially-devastating clinical scenarios can be overcome with the use of an individualized protocol which ultimately resulted in leukemia remission as well as restoration of his neurologic function.

5614. Ventruba, J. (2004). "Orbital roof fractures in children from the point of view of a neurosurgeon." Scripta Medica Facultatis Medicae Universitatis Brunensis Masarykianae **77**(4): 191-206.

Childhood is a highly risky age group in terms of orbital injuries. Injuries of the forehead in the presence of orbital ecchymosis, swelling and haematoma of the eyelids, infiltration and swelling of the surrounding tissues and the face must be carefully examined for a high level of suspicion of the presence of orbital fracture and exclusion of intracranial complications which may accompany orbital fractures (impressive fracture of the skull, epidural haematoma, pneumocephalus, dilaceration of dura mater, contusion or dilaceration of the brain, liquorrhoea, fronto-orbital encephalocele). An examination must be conducted by a traumatologist (surgeon, neurosurgeon), neurologist, and ophthalmologist. In the case of acute injuries, the most efficient radiological examination is CT, i.e. brain, orbit (with coronary projections as a minimum) and 3-D reconstruction of the skeleton. MR is performed when there is a suspicion of liquorrhoea and orbital encephalocele, and in very small children. The most frequent place of orbital trauma is the orbital roof. Orbital fractures without displaced bone fragments and with exclusion of intracranial complications are treated conservatively. Displaced fragments either in the orbit or the intracranial space indicate an operation. The aim of the operation is to remove displaced bone fragments, stop bleeding and evacuate blood clots, and to reconstruct the damaged bone cover. In the orbit, increased attention must be paid to complete liberation of the optic nerve, ophthalmogyric muscles, and other potential compressed structures. Parallel neurosurgical treatment of the intracranial trauma is obvious and, in many cases, of priority. The timing of the operation is within 24 hours after the injury unless the condition requires urgent operation (open injuries, epidural bleeding).

5615. Ventura, F., et al. (2002). "Suicide with the latest type of slaughterer's gun." The American journal of forensic medicine and pathology **23**(4): 326-328.

The authors describe a case of suicide by a single shot to the head from the latest type of captive bolt pistol (which has lateral instead of frontal gas outlets), with the aim of finding criteria to identify correctly the lesions caused by this type of weapon correctly and to distinguish them from those caused by typical firearms.

5616. Ventura, F., et al. (2011). "Suicide with "Florbert shotgun": case report." The American journal of forensic medicine and pathology **32**(4): 321-323.

The authors describe the case of a suicide with a shotgun charged with 9 caliber Flobert cartridge, that, if shot at a distance, generally does not cause mortal wounds. In the case in re, on the contrary, the mortal gunshot had been discharged in contact with the roof of the mouth causing not particularly destroying cranium-encephalic wounds. Consequently, there is description of the features of the entrance wound and of intracorporeal path, which can simulate distance wounds caused by handguns charged with classic small caliber cartridges.

5617. Verdaguer, J., et al. (2001). "Sliding osteotomies in mandibular reconstruction." Plastic and reconstructive surgery **107**(5): 1107-1114.

The aim of this article is to describe a few simple and atraumatic methods for mandibular reconstruction following the ablation of tumors or traumas. These reconstruction techniques are indicated for rebuilding short mandibular defects (less than 4 cm) or for patients in poor general condition with larger defects that cannot be remedied using longer and more complicated procedures. Five types of osteotomies were used: "C," single, double, bilateral sliding, and sagittal sliding. Osteotomies were performed on 14 patients, 13 with malignant tumors and one with a gunshot wound. Good results were obtained in 10 patients, total failure occurred in two, and complications without failure of the reconstruction arose in the other two.

5618. Verdonck, P., et al. (2016). "Penetrating and blunt trauma to the neck: clinical presentation, assessment and emergency management." B-ENT **Suppl 26**(2): 69-85.

Penetrating and blunt trauma to the neck: clinical presentation, assessment ana emergency management. In Belgium, and even in Western Europe, penetrating and blunt injury to the neck is relatively uncommon in both the civilian and military populations. Pre-hospital and emergency assessment and management will therefore always prove challenging, as individual exposure to this specific type of injury remains low. Historically, the neck has been divided into three anatomical zones with specific landmarks to guide the diagnostic and therapeutic approach to penetrating neck injuries. Most penetrating injuries need to be explored surgically, although with the advent of multi-detector computed tomographic angiography (MDCTA), which yields high diagnostic sensitivity, this inflexible approach has recently changed to a more targeted management, based on clinical, radiographic and, if deemed necessary, endoscopic findings. However, some authors have addressed their concern about this novel, 'no-zone' approach, since the risk of missing less apparent aerodigestive tract injuries may increase. It is recommended, therefore, that all patients with penetrating neck injuries be closely observed, irrespective of the initial findings. The incidence of blunt neck injury is much lower, and this makes risk assessment and management even more difficult in comparison with penetrating injuries. Again, MDCTA is most often the first diagnostic tool if a blunt neck injury is suspected, due to its good sensitivity for blunt cerebrovascular injuries (BCVI) as well as for aerodigestive tract injuries. Specific patterns of injury and unexpected neurological and neuro-radiological findings in trauma patients should always warrant further investigation. Despite ongoing debate, systemic anticoagulation is recommended for most BCVI, sometimes combined with endovascular treatment. Aerodigestive tract injuries may present dramatically, but are often more subtle, making the diagnosis more difficult than other types of neck injuries. Treatment may be conservative if damage is minimal, but surgery is warranted in all other cases.

5619. Verheggen, R., et al. (2005). "Experiences with LactoSorb™ miniplates and screws - Long-term follow-up data in paediatric patients and infant minipigs." Osteologie **14**(2): 101-110.

Perosseous intracranial translocation of metallic devices (Pit-effect) in the growing infant skull is caused by an appositional and resorptional bony remodelling process. We investigated the characteristics of a biodegradable fixation system (LactoSorb™) in cranial paediatric surgery with regard to clinical long-term results and analysed the histological changes and degradation process in an appropriate animal model. 23 children underwent either craniotomy and orbitotomy, repair of depressed skull fractures or fronto-orbital advancement and cranial vault remodelling. Fixation of bony flaps was obtained using LactoSorb™ devices. The stability and bone healing characteristics were extensively studied in infant minipigs. Following frontal craniotomy bone grafts were fastened by LactoSorb™ devices. After 3, 6, 9, 12 and 18 months the animals were sacrificed and the frontal sinus complex was resected to evaluate histomorphological changes. Radiographic examinations and clinical follow-up investigations were performed up to 34

months after surgery and revealed stability of the bony fragments without evidence of displacement or disturbed skull growth. Referring to the animal studies, histological investigations indicated complete resorption of the biopolymer after 18 months. The use of LactoSorb™ miniplates and screws led to a rigid fixation of cranial bone fragments. In growing skull, biodegradable devices are promising to avoid the Pit-effect. As greatest benefit, no further plate removal is necessary once the healing process has been finished. © 2005 by Verlag Hans Huber.

5620. Verheijde, J. L. and M. Y. Rady (2010). "Conversion of catastrophic neurological injuries to heart-beating organ donation." Intensive care medicine **36**(12): 2158-2159.

5621. Verhoff, M. A., et al. (2008). "Investigations on an isolated skull with gunshot wounds using flat-panel CT." International journal of legal medicine **122**(5): 441-445.

The use of computed tomography (CT) scanners is rapidly becoming established in forensic medicine. Current multislice CT (MSCT) scanners attain a resolution of 0.42 mm. An isolated skull with gunshot injuries was examined with a high-resolution eXplore Locus Ultra flat-panel CT (eLU-CT) and MSCT. Structures and minute fissures in the bone interior, which were neither visible macroscopically nor with the MSCT data, could be imaged with the eLU-CT data. In addition, a tiny interior impact defect from a retained missile could be detected by eLU-CT, which clearly aided the reconstruction of the gunshots in this case.

5622. Verlicchi, A., et al. (1998). "Civilian gunshot wounds to the head with brain stem localization. A case report." Journal of neurosurgical sciences **42**(4): 227-232.

The authors present a case of a patient wounded to the head and back by civilian firearm projectiles. The case peculiarity is that only one bullet reached the brain stem level causing significant neurological deficits. The final clinical picture is comparable to the "caudal pontine tegmentum syndrome". The authors describe both the bullet path and the intracranial localization taking into account ballistic details. The problems associated with prognosis, diagnosis, and treatment for gunshot wounds are discussed. In addition, the authors explain the main intracranial lesions and their mechanisms, the role of investigation, and the protocol of medical and surgical treatment. Lastly, a systematic approach for treating these types of gunshot wounds is outlined.

5623. Verma, A., et al. (2010). "Successful medical treatment of cerebral aspergillosis with voriconazole following liver transplantation." Liver Transplantation **16**: S200.

Background: Extension of invasive aspergillosis (IA) to the central nervous system (CNS) is associated with an exceedingly high mortality upto 100%. One major cause contributing to this devastating outcome is a poor penetration of frequently used antifungals into the CNS, such as amphotericin B. The best treatment strategy remains controversial. Voriconzole is a broad spectrum triazole proven to be a superior alternative to Amphotericin B in IA and readily penetrate the blood-brain barrier yielding fungicidal drug concentrations within the CNS. However because of its hepatotoxicity and interaction with immunosuppressive drugs, it's wide usage in post liver transplant recipients (PLTR) has been restricted. We report 3 cases of cerebral aspergillosis successfully treated with voriconazole. Patients and Results: The medical record of 3 LTR with proven cerebral aspergillosis were reviewed. Patients 1 & 2 were transplanted for drug induced acute liver failure (Female 50 yrs old; Male 33 yrs old) and patient 3 for primary biliry cirrhosis (Female 51 yrs old). Patient1&2 developed disease during the 3rd post LT week & in patient 3 detected on week 11. On CT scan all three patient had brain lesion and lung lesion in patient1&2. Aspergillus fumigatus was isolated in patient 1&2. Fungal were confirmed in brain aspirates in paitients1&2 and in eye aspirate in patient 2. Patient1&2 developed disseminated IA whilst on therapeutic does of Ambisome 3mg/ kg. Following diagnosis all three were treated with voriconazole and another antifungal was added caspofugin in patient 1&2 and Ambisome in patient 3 till improved clinically.Voriconazole was continued as single agent for 6-9 month in all three patients. Daily monitoiring of liver & renal function and immunosuppressive drug was done, there was no obvious side effects due to voriconazole. Patient 3 was in renal failure prior to onset and continues to have renal impairment. Patient 1died at 216 days PLT due to chronic rejection, whilst the others are currently alive at 221 and 610 days PLT respectively Conclusion: In our experience in cases of brain aspergillosis refractory to ambisome voriconazole is safe and effective in the successful management of cerebral aspergillosis in LTR.

5624. Verma, S. B., et al. (2008). "Late complication after tropic storm accident: subcutaneous and intracranial actinomycetoma." International wound journal **5**(5): 655-659.

We report a 53-year-old farmer who developed subcutaneous and cerebral masses 24 years after penetrating trauma during a tropic storm. Computed tomography scans, magnetic resonance imaging and histopathology disclosed actinomycetoma, a disease that rarely develops after trauma and is only occasionally seen with intracranial manifestation. Clinically, the cutaneous manifestation resembled acne keloidalis nuchae or dissecting folliculitis of the scalp. He was treated by neurosurgery and antibiosis.

5625. Verne, D. (1969). "Supportive care for the patient with facial trauma." Journal of oral surgery (American Dental Association : 1965) **27**(7): 472-479.

5626. Veronezi, R. J. B., et al. (2018). "Epidemiological study of traumatic spinal cord injury in goiânia." Revista Brasileira de Neurologia e Psiquiatria **22**(1): 30-44.

Purpose: Spinal cord injuries are a growing cause of morbidity and mortality in the population. Studies on etiology and aggravation of this trauma are critical to subsidize health policies for this population. This study aimed to describe the epidemiological profile of patients with spinal cord injury in Goiânia, Goiás, Brazil. Methods: Epidemiological study with documental analysis of 265 cases of spinal cord injury treated at the Emergency Hospital of Goiania in 2013. Results: The trauma was prevalent in male young people. The main cause was traffic accidents. The thoracolumbar region was the most affected. Half of the patients showed no spinal cord injury, but 52.45% presented some motor deficit. Treatment was conservative in most cases. In 109 patients required surgery due to trauma associated with being the head trauma the most frequent. Mortality was 14% and the highest risk of death occurred in cases aged under 60 years, cervical spine trauma and complete spinal cord injury. The average hospital stay was 6 days and was higher in surgical patients. All patients were seen by the Unified Health System, generating a cost of R-756,449.37. Conclusion: These findings allow guidance on efficient allocation of resources for the management of these diseases and indicate the need to create targeted strategies to prevent this type of injury in this population.

5627. Verrett, A., et al. (2011). "Characterization of craniomaxillofacial injuries during operations enduring freedom and iraqi freedom - A 10 year review." Journal of oral and maxillofacial surgery **69**(9): e-95.

Statement of the Problem: 1. To expand and update past epidemiological studies on Craniomaxillofacial (CMF) injuries in Operations Iraqi Freedom, Enduring Freedom, and New Dawn (OIF/OEF/ OND), using 10 years of current wartime data from the Joint Theatre Trauma Registry (JTTR) a. To characterize and describe CMF battlefield injuries sustained by US services members in 10 years of OIF/OEF/OND b. Compare with previous studies regarding severity, classification and location of CMF injuries. Materials and Methods: 1. The JTTR was queried from October 19, 2001, to April 6, 2001, using ICD-9 codes. a. Non-battlefield injuries, killed in action and return to duty cases were excluded. b. Stratification of facial fractures rendered using ICD-9 codes. Results of Investigation: In a 10-year period, the total number of injured personnel was 42,913 of which 23,609 required level III echelon treatment. There were 11,951 unique patients with CMF injuries based on ICD-9 and Abbreviated Injury Score (AIS) codes. CMF injuries account for 24.4% (5,782/23,609) of all incidents. CMF fractures are responsible for 11.5% (2,709/ 23,609). The categorization of the fractures are as follows: nasal (26%), orbital (17%), malar/maxillary (28%), mandible (18%), and unclassified (29%). There is a prominent frequency of open fractures with ratio of open to closed fractures 1.34:1. Explosive devices and penetrating injuries were involved in most battlefield CMF injuries (45.8% and 40.8%). Other methods included gunshot wounds (3.4%), motor vehicle accidents (0.8%), and not documented/other (0.3%). The incidence of CMF injuries by branch of service was Army (74.1%), Marines (22.0%), Navy (2.1%), and Air Force (1.5%). Conclusion: Of the injured US serviced members, 24% had injuries to the CMF regions in Operations Iraqi Freedom/Enduring Freedom/New Dawn during a 10- year period. Multiple penetrating soft-tissue injuries and fractures by explosives were commonly seen. Advancing battlefield medicine, body armor, and use of explosives devices has likely elevated the relative frequency and incidence of CMF injuries. Further research is needed to characterize the severity of CMF battle injuries related to treatment outcome.

5628. Veselinovic, I., et al. (2019). "Suicide with an unusual home-manufactured firearm." Forensic science, medicine, and pathology **15**(2): 288-291.

A 22-year-old male with a medical history of depression was found lying on his right side with a pool of blood around his head. A pistol-shaped metal device was found next to the right hand of the deceased. Examination of the body revealed the presence of a gunshot wound to the head. The entrance wound was located in the right temporal area and was partially surrounded by a semicircular muzzle imprint. Analysis of the firearm revealed a home-manufactured device constructed from the posterior part of a captive bolt gun chamber containing a firing pin. The front part of an original captive bolt's cylinder was replaced with a conical iron tube, which could be detached from the chamber by an unscrewing action. The tube was unrifled and drilled in order to accept standard 9 mm ammunition. A hollow rectangular piece of metal was welded to the posterior part of the chamber perpendicularly and used as a grip. Cases of injuries caused by different types of captive bolt guns are well documented in the forensic literature. However, conversions of captive bolts in projectile-discharging devices or their use in the construction of zip guns, as well as the injuries produced by such types of firearms, are extremely rare in forensic and medico-legal practice.

5629. Viagappan, G. M., et al. (1998). "Brain abscess caused by infection with Moraxella catarrhalis following a penetrating injury." The Journal of infection **36**(1): 130-131.

5630. Viana-Fernandes, C. E., et al. (1998). "[Intracranial metal foreign bodies and contraindications of MRI. Apropos of a case]." Corps etrangers metalliques intracraniens et contre-indications de l'IRM. A propos d'une observation. **79**(8): 764-766.

We report a firearm wound of the brain which could not be analyzed by computed tomography because of induced artifacts. MRI study was remarkably after verifying the non-ferromagnetic nature of the projectiles.

5631. Vickers, K. L. (2020). "Impact of compensatory recommendations on consistency in adherence to behavioral regimens in traumatic brain injury." Dissertation abstracts international: section B: the sciences and engineering **81**(2-B): No.

Background: Adherence is the extent to which one's behavior aligns with prescribed healthcare recommendations and it has been found to be a mediating factor of rehabilitation success after traumatic brain injury (TBI). Individuals post- TBI are at risk due to executive dysfunction. Although methods of overcoming executive difficulties as they relate to adherence have been posited (e.g., compensatory strategies), there has been no systematic study of the relationship between adherence behaviors and executive functioning during an unstructured regimen in this population. Moreover, cognitively-mediated aspects of adherence, such as consistency, which may represent targetable mechanisms of non-adherence have not been explored.Objective: The current study aimed to investigate the relationship between compensatory recommendations, executive function, and adherence behaviors during a prescribed behavioral regimen. Primary aims were to investigate: 1) the impact of compensatory recommendations on consistency in adherence, 2) the impact of compensatory recommendations on overall adherence, and 3) the relationship between executive functioning and consistency in adherence. An exploratory aim investigated how relationship between compensatory strategy, executive function, and consistency in adherence changed over the course of the 4-weeks.Method: 13 adults with a history of non-penetrating head injury were recruited for the current study and randomized into two groups: one that received compensatory recommendations (n = 7; Mage = 43.71, SD = 12.16; 43% male) and one that received no strategy (n = 6; Mage = 46.00, SD = 7.13; 67% male). All participants completed cognitive testing before engaging in a 4-week online behavioral regimen. For each day of the regimen, three online cognitive activities were prescribed. Outcome measures included adherence (events completed of 84) and consistency in adherence (variability in timing of event completion). Participants also completed a follow-up survey.Results: A series of Pearson correlations and regression-based analyses revealed that presence of a compensatory strategy did not predict consistency in adherence, nor did it predict overall adherence after controlling for covariates. In supplementary analyses, individuals who received a compensatory strategy had better adherence for the CAT during week 1, but their adherence decreased to be equivalent to the no strategy group over the course of four weeks. Additionally, one measure of executive function (response inhibition) was significantly related to consistency in adherence. Upon further analyses, it was determined this relationship differed by group. Consistency in adherence followed a quadratic pattern

over time, such that all individuals were least consistent during the third week of the regimen, but were more consistent before and after that point.Conclusions: Consistency in adherence does not appear to be improved by the addition of a compensatory strategy. Although this component of adherence was related to executive function, this association appeared strongest among individuals who did not receive a strategy and who were more cognitively compromised. Adherence improved with the addition of a compensatory strategy initially, but declined over time to be equal to the no strategy group. Clinically, these findings suggest that compensatory strategies may need to be nuanced and target specific mechanisms of non-adherence. Moreover, the need for regular follow-up during a behavioral regimen to encourage continued motivation over time may be necessary to maximize adherence. Limitations include a small sample size, uneven groups with respect to cognitive function, and executive functioning measures which do not approximate real-world behaviors.

5632. Viel, G., et al. (2009). "Intersecting fractures of the skull and gunshot wounds. Case report and literature review." Forensic science, medicine, and pathology **5**(1): 22-27.

When two fracture lines of a solid surface (ice, glass, eggshell, etc.) intersect, it is always possible to tell which one has been made first. Indeed pre-existing damage of the surface arrests all the fracture lines produced by subsequent impacts. This well-known principle (established by Puppe in 1903) has been largely used in glass fracture analysis, but can be applied also to the examination of skull fractures. It can help sequencing blunt force or gunshot injuries determining the direction of fire and differentiating entrance from exit wounds in the absence of specific distinguishing features (i.e., internal/external beveling of the skull or overlying skin indicators). In this context, we report the case of a 76-year-old man who shot himself in the mouth with a Walther PPK 7.65 handgun and highlight the utility of the application of both Puppe's Rule and Multislice Computed Tomography (MSCT) in the examination of gunshot wounds to the skull.

5633. Viel, G., et al. (2009). "Planned complex suicide by penetrating captive-bolt gunshot and hanging: case study and review of the literature." Forensic science international **187**(1-3): e7-11.

Captive-bolt guns or slaughterer's guns are devices widely used in meat industry and private farmer households for slaughtering animal stocks. They consist of a simple cylindrical metal tube (barrel) with a metal bolt placed in their centre (around 9-15cm long and 1-1.5cm wide). The bolt is actuated by a trigger pull and is propelled forward by compressed air or by the discharge of a blank powder gun cartridge. Violent deaths inflicted by captive-bolt guns are rarely encountered in forensic practice and are predominantly suicidal events. We report an unusual complex suicide by hanging and self-shooting with a slaughterer's gun in a 21-year-old boy. The victim after putting a ceiling fixed rope around his neck shot himself in the head (occipital region) with a Kerner captive-bolt gun. He used two mirrors (a cosmetic mirror and a man-sized one) in order to properly visualize his back and to target the occipital region of his head. Radiological data (computed tomography with three dimensional reconstruction) and autopsy findings are discussed according to the clinical and forensic literature. A brief review on planned complex suicides is also given.

5634. Viero, A., et al. (2014). "An unusual case of "dyadic-death" with a single gunshot." Forensic science international **244**: e1-5.

The terms "dyadic death" or "murder-suicide" refer to an incident where an individual commits homicide and then takes his or her own life. These events are generally committed by men within the family network, using firearms or sharp force instruments, and make up a relatively small proportion of homicides overall. Herein, we present the application of post-mortem multislice computed tomography (CT) and micro-CT analysis to an unusual case of dyadic death, where a 38-year-old man fired a single gunshot to his own right temple, killing himself and his 50-year-old wife, lying on the bed beside him. The integration of radiological, autoptic and histological data allowed us to reconstruct the trajectory of the gunshot, the most probable dynamics of the event, and to classify the incident as a "suicide-homicide", because the female victim died a few minutes later than her husband and murderer.

5635. Vincent, F., et al. (2005). "Should a renal dose of norepinephrine stimulate hyperfiltration in head trauma patients?" Chest **127**(6): 2282-2283.

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5636. Vinogradova, T. P. (1976). "[Trauma and tumor]." Travma i opukhol' **38**(9): 76-84.

The analysis of the literature data and the author's own findings justifies the conclusion that a single mechanical trauma may be of importance in the development of tumours of various genesis, as well as in the development and localization of metastastatic foci.

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5637. Vinuthinee, N., et al. (2015). "Gunshot-like wound caused by sling shot injury – A case report." International medical case reports journal **8**: 47-50.

We report a rare case of sling shot injury that presented with a gunshot-like wound with preseptal cellulitis, in a toddler. An 11-month-old Malay child presented with a gunshot-like wound over the forehead following sling shot injury. On examination, he had a deep circular laceration wound over the forehead, measuring 2.0 cm in diameter, with minimal bleeding. There was no obvious foreign body seen inside the wound and no palpable foreign body surrounding the wound. The gunshot-like wound was associated with left preseptal cellulitis. A skull X-ray showed a white opaque foreign body in the left frontal bone. Computed tomography (CT) scan of orbit and brain revealed a left comminuted fracture of the left orbital roof, and left frontal brain contusion with prelesional edema. Wound exploration was performed and revealed a 0.5 cm unshattered marble embedded in the left frontal bone. The marble and bone fragments were removed. The left preseptal cellulitis responded well to intravenous antibiotic and topical antibiotic.

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5638. Viola, L., et al. (2004). "Suicide with a butcher's bolt." Journal of forensic sciences **49**(3): 595-597.

The captive bolt pistol is an atypical firearm exclusively produced and used for butchery of breeding animals, but in some rare cases, it has been used as a lethal weapon for committing suicide by butchers, breeders and other people who have access to such weapons during their professional activities. This study describes the suicide committed by a butcher in the province of Udine (N. Italy) in 2001 who shot himself with his own captive bolt pistol that produced in the right temporal region a circular wound and a bone lesion of the temporal squama with a groove involving the frontal lobe; he died five days later of the fatal consequences of the meningo-encephalic lesions. The medico-legal issues implicated in this case, seen in the light of the data reported in the international literature, illustrate the difficulties faced when diagnosing these types of lesions, bearing in mind their rarity and peculiar nature, and introduce elements of differential diagnosis regarding lesions produced by similar weapons that lead to ascertainment of the event as accidental, suicidal, or homicidal.

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5639. Vitanovics, D., et al. (2014). "[Tailored cranioplasty using CAD-CAM technology]." Szemelyre szabott koponyacsontpotlasok CAD-CAM technologia felhasznalasaval. **67**(11-12): 390-396.

OBJECTIVE: The majority of cranial defects are results of surgical intervention. The defect must be covered within resonable period of time usually after 4-6 week given the fact that the replacement of bone improve the brain circulation. Number of surgical techniques and materials are available to perform cranioplasty. Due to favorable properties we chosed ultra high molecular weight polyethylene as material. In this paper the authors show a procedure which allows tailored artificial bone replacement using state of art medical and engineering techniques., METHODS: between 2004 and 2012, 19 patients were operated on cranial bone defect and a total of 22 3D custom-designed implants were implanted. The average age of patients was 35.4 years. In 12 patients we performed primary cranioplasty, while seven patients had the replacement at least once. Later the implants had to be removed due to infection or other causes (bone necrosis, fracture). All patients had native and bone-windowed 1 mm resolution CT. The 3D design was made using the original CT images and with design program. Computer controlled lathe was used to prepare a precise-fitting model. During surgery, the defect was exposed and the implant was fixed to normal bone using mini titanium plates and screws. All of our patients had control CT at 3, 6 and 12 months after surgery and at the same time neurological examination., RESULTS: Twenty-one polyethylene and one titanium implants were inserted. The average follow-up of the patients was 21.5 months, ranged from two to 96 months. We follow 12 patients (63.15%) more than one year. No intraoperative implant modifications had to be made. Each of the 22 implant exactly matched the bone defect proved by CT scan. No one of our patients reported aesthetic problems and we did not notice any kind of aesthetic complication. We had short term complication in three cases due to cranioplasty, subdural, epidural haemorrhage and skin defect., CONCLUSION: Polyethylene is in all respects suitable for primary and secondary

cranioplasty. Combined with 3D CAD- CAM method excellent aesthetic and functional result was achieved. In our study no case of infection occured. Proper preoperative preparation is important.

5640. Viteri, S., et al. (2020). "Activity of tepotinib in brain metastases (BM): Preclinical models and clinical data from patients (pts) with MET exon 14 (METex14) skipping NSCLC." Annals of Oncology **31**: S831.

Background: BM occur in 20–40% of NSCLC harboring METex14 skipping. We investigated the activity of the MET inhibitor tepotinib in BM in preclinical models and in pts from the VISION study (NCT02864992). Methods: Penetration of the blood–brain barrier was assessed in Wistar rats (n=3) at 3.66 mg/kg/h iv tepotinib by determining the unbound brain (fu br)-to-plasma (fu pl) concentration or exposure ratio (Kp u,u). Efficacy was assessed in two lung cancer patient-derived xenografts (PDX) from BM harboring high MET amplification (MET gain in copy number: LU5349 = 11, LU5406 = 24) grown in NOD-SCID mice. Subcutaneous PDX (n=5/group) or PDX orthotopically implanted into the brain (n=10/group) were treated with tepotinib 125 mg/kg or vehicle control orally once daily. Intracranial tumor growth was monitored by gadolinium-based MRI. In VISION Cohort A, pts with METex14 skipping NSCLC received tepotinib 500 mg once daily. Systemic objective response, as assessed per RECIST v1.1 by independent review committee (IRC) was a preplanned analysis in pts with baseline brain lesions identified by IRC (BM-IRC) or investigator assessment (BM-INV). Results: Preclinical data indicated high binding of tepotinib in the brain, with unbound tepotinib in brain tissue lower than in plasma (fu br = 0.4%, fu pl = 4%). Concentrations of unbound tepotinib in the brain were 25% of plasma (Kp u,u = 0.25).Tepotinib treatment resulted in tumor regression in both PDX models (mean % tumor volume: –84% in LU5349, –63% in LU5406). As of 1 Jan 2020, 22/152 pts enrolled in Cohort A had baseline BM, with similar baseline pt characteristics and comparable systemic response data (Table) as the overall population. [Formula presented] Conclusions: Tepotinib administration resulted in tumor regression in MET-driven lung cancer BM PDX models. Clinical activity in pts with NSCLC harboring METex14 skipping with baseline BM was consistent with the overall population in VISION. Cohort C aims to assess intracranial response. Clinical trial identification: NCT02864992. Editorial acknowledgement: Medical writing assistance (funded by Merck KGaA, Darmstadt, Germany) was provided by Syneos Health, London, UK. Legal entity responsible for the study: Merck KGaA, Darmstadt, Germany. Funding: Merck KGaA, Darmstadt, Germany. Disclosure: S. Viteri: Advisory/Consultancy: AbbVie; Advisory/Consultancy, Speaker Bureau/Expert testimony, Travel/Accommodation/Expenses: BMS; Advisory/Consultancy, Speaker Bureau/Expert testimony, Travel/Accommodation/Expenses: Roche; Speaker Bureau/Expert testimony: MSD; Travel/Accommodation/Expenses: OSE Pharma; Travel/Accommodation/Expenses: Merck. J. Mazieres: Advisory/Consultancy: Roche; Advisory/Consultancy: BMS; Advisory/Consultancy: MSD; Advisory/Consultancy: AstraZeneca; Advisory/Consultancy: Pfizer; Advisory/Consultancy: Novartis. R. Veillon: Advisory/Consultancy, Speaker Bureau/Expert testimony: MSD; Advisory/Consultancy: Pfizer; Advisory/Consultancy: Novartis; Speaker Bureau/Expert testimony, Research grant/Funding (self): BMS; Speaker Bureau/Expert testimony, Research grant/Funding (self): Roche; Research grant/Funding (self): Takeda; Research grant/Funding (self): AbbVie; Research grant/Funding (self): Merck. E. Felip: Advisory/Consultancy, Speaker Bureau/Expert testimony: Pfizer; Advisory/Consultancy, Speaker Bureau/Expert testimony: Roche; Advisory/Consultancy: Boehringer Ingelheim; Advisory/Consultancy, Speaker Bureau/Expert testimony: AstraZeneca; Advisory/Consultancy, Speaker Bureau/Expert testimony: BMS; Advisory/Consultancy: Guardant Health; Advisory/Consultancy, Speaker Bureau/Expert testimony: Novartis; Advisory/Consultancy, Speaker Bureau/Expert testimony: Takeda; Advisory/Consultancy: AbbVie; Advisory/Consultancy: Blueprint Medicines; Advisory/Consultancy, Speaker Bureau/Expert testimony: Lilly; Advisory/Consultancy: Merck KGaA; Advisory/Consultancy, Speaker Bureau/Expert testimony: MSD; Advisory/Consultancy: Janssen; Advisory/Consultancy: Samsung; Speaker Bureau/Expert testimony: Medscape; Speaker Bureau/Expert testimon : prIME Oncology; Speaker Bureau/Expert testimony: Touchtime; Research grant/Funding (self): Fundación Merck Salud; Research grant/Funding (self): Grant for Oncology Innovation (GOI); Officer/Board of Directors: Grifols (Independent Member). X. Le: Advisory/Consultancy: AstraZeneca; Advisory/Consultancy, Research grant/Funding (self): Eli Lilly; Advisory/Consultancy: EMD Serono; Research grant/Funding (self): Boehringer Ingelheim. M.C. Garassino: Advisory/Consultancy: Boehringer Ingelheim; Advisory/Consultancy: Novartis; Advisory/Consultancy: Pfizer; Advisory/Consultancy: Seattle Genetics; Advisory/Consultancy: Daiichi Sankyo; Advisory/Consultancy: Sanofi; Speaker Bureau/Expert testimony: Otsuka Pharma; Speaker Bureau/Expert testimony: Incyte; Advisory/Consultancy, Speaker Bureau/Expert testimony: Eli Lilly; Advisory/Consultancy, Speaker Bureau/Expert testimony: BMS. T.S. Stanton: Honoraria (self), Travel/Accommodation/Expenses: BMS; Honoraria (self): Ipsen; Honoraria (self): Axess Oncology; Honoraria (self): Intellisphere. M. Morise: Honoraria (self), Research grant/Funding (self): AstraZeneca; Research grant/Funding (self): Boehringer Ingelheim; Honoraria (self), Research grant/Funding (self), Travel/Accommodation/Expenses: Chugai;

Research grant/Funding (self): EMD; Research grant/Funding (self): Kissei; Research grant/Funding (self): Novartis; Honoraria (self), Research grant/Funding (self): Ono; Honoraria (self), Research grant/Funding (self), Travel/Accommodation/Expenses: Pfizer; Research grant/Funding (self): Taiho; Honoraria (self), Travel/Accommodation/Expenses: Eli Lilly; Honoraria (self), Travel/Accommodation/Expenses: MSD. S. Matsumoto: Research grant/Funding (self): AstraZeneca; Research grant/Funding (self): Pfizer; Honoraria (self), Research grant/Funding (self): Novartis; Honoraria (self), Research grant/Funding (self): Chugai Pharma; Honoraria (self), Research grant/Funding (self): MSD; Honoraria (self): Lilly; Honoraria (self): Merck Serono. F. De Marinis: Advisory/Consultancy, Speaker Bureau/Expert testimony: Roche; Advisory/Consultancy: AstraZeneca; Advisory/Consultancy: BMS; Speaker Bureau/Expert testimony: Pfizer. A. Clark: Full/Part-time employment: EMD Serono Research & Development Institute, Inc., Billerica, MA, US, a business of Merck KGaA, Darmstadt, Germany. M. Friese-Hamim: Full/Part-time employment: Merck KGaA, Darmstadt, Germany. C. Stroh: Full/Part-time employment: Merck KGaA, Darmstadt, Germany. R. Bruns: Full/Part-time employment: Merck KGaA, Darmstadt, Germany. G. Otto: Full/Part-time employment: Merck KGaA, Darmstadt, Germany. P.K. Paik: Advisory/Consultancy: AbbVie; Advisory/Consultancy: BMS; Advisory/Consultancy: Calithera; Advisory/Consultancy, Research grant/Funding (institution): Celgene; Advisory/Consultancy: Lilly; Advisory/Consultancy: Takeda; Research grant/Funding (self), Research grant/Funding (institution): EMD Serono. All other authors have declared no conflicts of interest.

5641. Vitkus, K. and M. Vitkus (1990). "Microsurgical reconstruction of shotgun-blast wounds to the face." Journal of reconstructive microsurgery **6**(3): 279-286.

Successful management of shotgun-blast injuries to the face with loss of composite tissue is discussed. While emphasis in the literature has generally been on weapons ballistics and their destructive effect on tissues, the most massive tissue destruction can be anticipated from close-range gun-barrel effects due to rapidly expanding gases. The authors stress uncommonly aggressive tissue transfer as the method of choice in reconstructing facial shotgun wounds. The surgeon must evaluate patient psychological readiness for step-by-step reconstruction. Fistulas are avoided by transplanting several small flaps, rather than one large flap. The dorsalis pedis flap is recommended as an excellent choice for contaminated intraoral reconstruction. A staged approach providing osteocutaneous composite tissue for repair of shotgun-blast facial wounds is presented. At subsequent stages, soft tissue defects are repaired and restoration of mandibular continuity is provided with the use of the scapular flap and other alternatives. Microsurgical management of facial gunshot wounds can provide satisfactory reconstruction and almost normal function.

5642. Viviano, S. L., et al. (2017). "Pediatric Facial Fractures: An Assessment of Airway Management." The Journal of craniofacial surgery **28**(8): 2004-2006.

Pediatric facial fractures present unique and challenging management considerations, especially with regards to airway management. Anatomical differences in children increase both airway resistance and the difficulty of intubation. A surgical airway may be required if intubation is unable to be performed. The purpose of this study was to examine a single center's experience with pediatric facial fractures to determine the frequency of advanced airway use, as well as the risk factors that may predispose a patient to requiring an advanced airway. A retrospective review of all facial fractures at a level 1 trauma center was performed from 2000 to 2012. Patients age 18 years and younger were included. Patient demographics were collected, as well as location of fractures, concomitant injuries, services consulted, and surgical management strategies. Information was collected regarding the need for an advanced airway, including intubation and the need for a surgical airway. A total of 285 patients met inclusion criteria. Of these, 57 patients (20%) required emergency intubation and 5 (1.8%) required a surgical airway. Intubation was significantly related to fractures of the midface, frontal sinuses, spine, skull, and pelvis, as well as depressed Glasgow coma scores and traumatic brain injury. The need for a surgical airway is extremely uncommon (1.8%), and tracheostomy was only needed in the setting of penetrating head trauma. Both emergent intubation and tracheostomy are associated with complications, but these complications must be weighed against the potentially life-saving measure of securing an airway.

5643. Vivien, B., et al. (2013). "An unexpected intracranial blade." Prehospital emergency care : official journal of the National Association of EMS Physicians and the National Association of State EMS Directors **17**(1): 95-97.

While self-mutilations with stab wounds are relatively common in psychiatric patients suffering from schizophrenia and personality disorders, they are rarely performed as suicidal attempts. Even in psychotic patients,

suicidal stab wounds of the skull are rare in the literature. We report the case of a 34-year-old schizophrenic man whom emergency medical services (EMS) providers cared for at his home because of a complete self-amputation of his right hand, without any other apparent wound than a facial laceration. The patient was transferred to the acute surgical ward for evaluation of the possibility reimplantation of the amputated hand. When his neurologic status rapidly declined after hospital admission, a whole-body computed tomography (CT) scan was performed for other injuries. Unexpectedly, cerebral CT scan showed the presence of an intracranial 11-cm-long blade, whose distal tip was located in the left temporal cerebral lobe. Given the nature of the cerebral injuries on CT scan and the major impairment of the neurologic status of the patient, the neurosurgeon considered surgical extraction of the blade to be futile, and the patient's condition rapidly deteriorated to brain death.

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5644. Vláčil, O. and J. Kincl (2011). "Acute orbital cellulitis - diagnostics and treatment." Pediatrie pro Praxi **12**(5): 304-305.

Acute orbital cellulitis is the most common disease in childhood. In 85 % of cases arising from infection of the paranasal sinuses, the transfer from surrounding skin inflammation, after penetrating injury of the orbit or the hematogenous transfer is possible. The patient is threatened mainly temporary or permanent loss of visual acuity, intracranial spread of infection, usually by the cavernous sinus and the consequent risk of sepsis with an overall alteration of the state. The therapy is the overall administration of broad spectrum antibiotics. Although the results of early treatment are very good, preservation of visual acuity is not always obvious.

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5645. Vladutiu, C., et al. (2009). "[The role of diagnostic imaging in pediatric ophthalmology]." Valoarea diagnosticului imagistic in oftalmopediatrie. **53**(3): 80-84.

The paper underlines the importance of the imagistic examination in the diagnosis and the therapeutical orientation in an orbital injury in a four-year-old child. The orbital injury ends with a foreign body (fragment of a pencil) in the orbit. The situation and the orientation of the foreign body was revealed by the computer tomography and the MIMICS program. Afterwards, the MRI exam ruled out a muscular injury and permitted a correct strabological diagnose and a correct strabismus surgery.

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5646. Vlkova, E. and I. Slapak (1991). "[Injuries of the orbit caused by foreign body]." Verletzungen der Augenhohle durch Fremdkorper. **198**(2): 117-120.

Four cases of injury of the orbit by a big foreign body without damage to the bulbus are described. The bodies were extracted and the healing was without complications. Two of these bodies penetrated into the brain and in one case surgical intervention was necessary. In both instances vision was lost because of damage to the optic nerve.

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5647. Vlkova, E., et al. (1989). "[Penetration of an orbital foreign body into the intracranial space]." Cizi orbitalni teleso penetrujici do nitrolebi. **45**(5): 372-374.

The authors describe a case of orbitocerebral injury by a wooden foreign body, size 66 x 7.5 mm which penetrated by the upper palpebral aperture into the middle cranial fossa. The extraction was performed by nasal lower orbitotomy.

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5648. Vloka, C., et al. (2020). "Long term follow up after transorbital penetrating injury: A case report." American Journal of Ophthalmology Case Reports **19**.

Purpose: Traumatic brain injury is the leading cause of mortality and disability among young individuals. Unfortunately, there are few publications concerning long term follow up of patients with these types of injuries. We present a case of trans-orbital penetrating brain injury with an 18 year follow up. Observations: A 43-year-old, previously healthy, male was accidently impaled on a fencing foil resulting in a penetrating brain injury. Initial symptoms included diplopia, ophthalmoparesis, a non-reactive pupil, decreased visual acuity, decreased sensation across the cheek, dysphagia and dysarthria. CT scan taken on presentation showed a clear tract of the foil traversing the various structures of the brain. One week after the trauma, the patient developed a unique constellation of paroxysmal attacks of autonomic dysfunction consisting of profuse diaphoresis and decreased skin temperature on the left side of the body, as

well as dilation of the left pupil. Three months after the accident, the patient suddenly experienced severe constant pain affecting the left side of his body associated with thermal and tactile allodynia. On latest follow up, 18 years after the accident, the patient continues to have chronic pain, allodynia, and lack of temperature sensation throughout the left face, arm, and leg. He has a wide based, hemi-ataxic gait, with the left leg swinging out and around. EMG and nerve conduction studies have found no voluntary activity in the temporalis and masseter muscles resulting in atrophy and fibrosis. An MRI shows linear encephalomalacia along the path of the foil extending to the pons, involving the right spinothalamic tract, and cerebellum. Conclusions and Importance: Our case illustrates the importance of such a longitudinal follow up. It demonstrates the possible severity of the sequelae from these types of injuries including chronic pain and gait ataxia, as well as EOM and autonomic dysfunction. Due to the potential ongoing needs of such patients, it is important to plan a long-term, team-based approach that centers around physical therapy and improving long term quality of life.

5649. Vo, D. T., et al. (2017). "Novel Use of an Image-Guided Stereotactic Approach in Trauma for Localization of Transcranial Bullet." Cureus **9**(7): e1501.

Penetrating brain injuries from gunshot wounds can carry a poor prognosis and require an aggressive, multifaceted approach to obtain a good prognosis and outcome. An initial evaluation requires appropriate imaging studies followed by management and prophylaxis against increased intracranial pressure, infection, and seizures. Surgical management is then followed to ensure the watertight closure of any wounds, removal of any areas of hematoma, and removal of any potential areas of infection. In this paper, we report the case of a patient who presented with a self-inflicted gunshot wound to the head and then received aggressive medical and surgical management. This case presents that an image-guided stereotactic approach with suitable medical management should be used in patients with penetrating missile injuries to the head.

5650. Vogel, F. S. (1971). "The anatomy of head trauma." Pathology annual **6**: 321-336.

5651. Vogel, S. (1988). "Anencephalic babies." Discover **9**(4): 22.

5652. Voils, S. A., et al. (2020). "Letter to the editor (infection after penetrating brain injury)." The journal of trauma and acute care surgery **88**(3): e119.

5653. Voisin, M. R., et al. (2017). "One and a half syndrome following penetrating head injury: Case report." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **41**: 88-90.

The authors report a case of a 22-year-old otherwise healthy female who presented following a head injury during a bar altercation, with no associated loss of consciousness and an unknown mechanism of injury. Examination revealed an isolated 1cm laceration on the right upper eyelid, superior to her medial canthus. She experienced diplopia on right horizontal gaze due to a left internuclear ophthalmoplegia (INO) with an associated left conjugate horizontal gaze palsy, collectively described as a left one-and-a-half syndrome. CT and MRI demonstrated evidence of a deep penetrating injury above the right medial canthus, traversing the ethmoid and sphenoid sinuses, the dorsum sella, narrowly missing the basilar artery, penetrating the pons, and extending to the floor of the contralateral fourth ventricle. The patient was diagnosed with multiple sinus fractures, lesions in her left paramedian pontine reticular formation (PPRF) and medial longitudinal fasciculus (MLF), and progressive pneumocephalus. She underwent a transsphenoidal endoscopic repair via a vascularized mucosal flap without complication. Postoperatively, the patient's pneumocephalus resolved and her conjugate gaze markedly improved; however, minimal diplopia remained. This case demonstrates the importance of the clinical exam, and its benefit in localizing imaging findings and guiding treatment.

5654. Volk, A. S., et al. (2019). "Facial Gunshot Wounds." Facial plastic surgery : FPS **35**(6): 578-583.

Craniomaxillofacial gunshot injuries, resulting from assault, suicide attempts, and accidental trauma, represent a major public health dilemma in the United States. Due to the extent of injury and resulting osseous and soft tissue loss, facial gunshot wounds pose a unique challenge to the reconstructive surgeon. Initial management should use advanced trauma life support principles with the goal of patient stabilization. Acute operative management should center around wound decontamination, debridement, and temporary closure. Historically, definitive surgical management focused on delayed reconstruction secondary to high rates of wound infections, necrosis, and ischemia. With improvements in imaging modalities, the advent of virtual surgical planning, and the popularization of microvascular free flaps, contemporary methods have shifted toward earlier more definitive reconstruction. Autologous free tissue transfer has resulted in a decrease in hospital stay and the number of overall surgeries. Importantly, due to the variability in injury pattern and complexity in reconstruction, a systematic approach toward intervention is needed to mitigate complications and optimize overall functional and aesthetic outcomes. Copyright Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.

5655. Volpicelli, M. and A. M. Mansour (1989). "Near-miss of the optic nerve from a deep penetrating orbital injury with a kitchen knife." Journal of clinical neuro-ophthalmology **9**(1): 61-62.

5656. von Arx, T., et al. (2014). "Perforation of the sinus membrane during sinus floor elevation: a retrospective study of frequency and possible risk factors." The International journal of oral & maxillofacial implants **29**(3): 718-726.

PURPOSE: To analyze the frequency of perforation of the sinus membrane during maxillary sinus floor elevation (SFE) and to assess possible risk factors., MATERIALS AND METHODS: Seventy-seven cases of SFE performed with a lateral window approach were evaluated retrospectively. Clinical and radiographic variables potentially influencing the risk of sinus membrane perforation were evaluated and divided into patient-related factors (age, sex, smoking habit); surgery-related factors (type of surgical approach, side, units, sites, and technique of osteotomy); and maxillary sinus-related factors (presence and height of septum, height of residual ridge, thickness of lateral sinus wall, width of antrum, and thickness and status of sinus membrane)., RESULTS: The following factors presented with at least a 10% difference in rates of perforations: smokers (46.2%) versus nonsmokers (23.4%), simultaneous (32%) versus staged (18.5%) approach, mixed premolar-molar sites (41.2%) versus premolar-only sites (16.7%) versus molar-only sites (26.2%), presence of septa (42.9%) versus no septa (23.8%), and minimum height of residual ridge <=4 mm (34.2%) versus > 4 mm (20.5%). These same parameters, except minimum height of residual ridge, also showed an odds ratio above 2. However, none of the comparisons reached statistical significance., CONCLUSION: The present study failed to demonstrate any factor that statistically significantly increased the risk of sinus membrane perforation during SFE using the lateral window approach.

5657. Von Hekkel, A. F., et al. (2022). "Successful Nonsurgical Management of a Traumatic Dens Fracture in a Cat with Clinical and Radiographic Resolution." Journal of the American Animal Hospital Association **58**(1): 48-53.

An adult domestic shorthair presented with obtundation, vestibular ataxia, head tilt, and visible evidence of facial injury following motor vehicle trauma. Plain radiographs and computed tomography imaging revealed a complete minimally displaced transverse fracture of the caudal aspect of the dens of the C2 vertebra and multiple minimally displaced cranial fractures. The dens fracture was managed with 8 wk of strict rest, followed by 4 wk of supervised activity at home. No external immobilization was performed. Neurological examinations at 8 days, 10 wk, and 9 mo following initial presentation were normal. Repeat radiographic and computed tomography examinations at 10 wk and 9 mo following the traumatic event demonstrated progressive and eventual complete osseous union of the fractured dens. To the authors' knowledge, this is the first report of successful nonsurgical management of a traumatic dens fracture in an adult cat with documented radiographic and clinical resolution. This report suggests that nonsurgical management can be considered in such cats and that complete resolution with osseous union is feasible.

5658. Von Oertzen, J. and C. E. Elger (2004). "Epileptic seizures and epilepsy secondary to brain injuries." Intensivmedizin und Notfallmedizin **41**(5): 331-336.

Up to 20% of epilepsies are caused posttraumatically. Posttraumatic seizures are subdivided into immediate seizures and delayed early seizures occurring during the first 24 hours or seven days after the injury, respectively, and

late seizures occurring after the first week. Posttraumatic epilepsy (PTE) is used to define the situation of recurring late seizures (more than 2). Early seizures are most often caused by the brain injury itself. Early seizures occurring after mild head injury may indicate more severe head injury and should lead to further diagnostics. This type of posttraumatic seizure should be treated precautionary with anticonvulsants as seizures may cause further brain damage to the vulnerable injured brain. This treatment will not affect the incidence of late seizures or PTE, which are both caused by a chronic epileptic focus. Treatment of PTE should be started after they have occurred as the incidence of PTE is not affected by prophylactic anticonvulsive treatment. High incidence of PTE is given after penetrating brain injuries or all kinds of brain injuries with (cortical) hemorrhage.

5659. Von Rahden, B. H. A., et al. (2004). "[Esophageal perforation by portions of a wild boar]." Osophagusperforation durch Wildschweinteile. **129**(4): 314-316.

We report a case of esophageal perforation by impacted portions of a wild boar. The 77-year-old patient was admitted 5 days after an opulent dinner. He complained of dysphagia and retrosternal pain and showed signs of severe sepsis. Endoscopy revealed meat and bone portions impacted in the esophagus. Surprisingly, impactation had not happened near any of the anatomical narrowings, but in the middle third. A CT scan showed penetration of the foreign body into the mediastinum and purulent mediastinitis. The patient underwent transthoracic esophagectomy and drainage of the severe, purulent mediastinal infection. Postoperative multi organ failure required a prolonged treatment in the intensive care unit. After recovery the gastrointestinal continuity was restored with gastric pull-up in the anterior mediastinum. The further course was uneventful.

5660. von See, C., et al. (2009). "Forensic imaging of projectiles using cone-beam computed tomography." Forensic science international **190**(1-3): 38-41.

In patients with gunshot injuries, it is easy to detect a projectile within the body due to the high-density of the object, but artefacts make it difficult to obtain information about the deformation and the exact location of the projectile in surrounding tissues. Cone-beam computed tomography (CBCT) is a new radiological imaging modality that allows radio-opaque objects to be localised and assessed in three dimensions. The full potential of the use of CBCT in forensic medicine has not yet been explored. In this study, three different modern projectiles were fired into the heads of pig cadavers (n=6) under standardised conditions. Tissue destruction and the location of the projectiles were analysed separately using CBCT and multi-slice computed tomography (MDCT). The projectiles had the same kinetic energy but showed considerable differences in deformation behaviour. Within the study groups, tissue destruction was reproducible. CBCT is less severely affected by metallic artefacts than MDCT. Therefore CBCT is superior in visualising bone destruction in the immediate vicinity of the projectile and projectile deformation, whereas MDCT allows soft tissue to be evaluated in more detail. CBCT is an improved diagnostic tool for the evaluation of gunshot injuries. In particular, it is superior to MDCT in detecting structural hard-tissue damage in the immediate vicinity of high-density metal projectiles and in identifying the precise location of a projectile in the body.

5661. von Stockert, T. R. (1982). "On the structure of word deafness and mechanisms underlying the fluctuation of disturbances of higher cortical functions." Brain and language **16**(1): 133-146.

5662. Vonder Haar, C., et al. (2014). "Comparison of the effect of minocycline and simvastatin on functional recovery and gene expression in a rat traumatic brain injury model." Journal of neurotrauma **31**(10): 961-975.

The goal of this study was to compare the effects of minocycline and simvastatin on functional recovery and brain gene expression after a cortical contusion impact (CCI) injury. Dosage regimens were designed to provide serum concentrations in a rat model in the range obtained with clinically approved doses; minocycline 60 mg/kg q12h and simvastatin 10 mg/kg q12h for 72 h. Functional recovery was assessed using motor and spatial learning tasks and neuropathological measurements. Microarray-based transcriptional profiling was used to determine the effect on gene expression at 24 h, 72 h, and 7 days post-CCI. Gene Ontology analysis (GOA) was used to evaluate the effect on relevant biological pathways. Both minocycline and simvastatin improved fine motor function, but not gross motor or cognitive function. Minocycline modestly decreased lesion size with no effect of simvastatin. At 24 h post-CCI, GOA identified a significant effect of minocycline on chemotaxis, blood circulation, immune response, and cell to cell signaling pathways.

Inflammatory pathways were affected by minocycline only at the 72 h time point. There was a minimal effect of simvastatin on gene expression 24 h after injury, with increasing effects at 72 h and 7 days. GOA identified a significant effect of simvastatin on inflammatory response at 72 h and 7 days. In conclusion, treatment with minocycline and simvastatin resulted in significant effects on gene expression in the brain reflecting adequate brain penetration without producing significant neurorestorative effects.

5663. Vonnez, J. L., et al. (2013). "Asymptomatic dural venous sinus thrombosis after skull fracture." Swiss Medical Weekly **143**: 25S.

Introduction: Dural venous sinus thrombosis (DVST) is an uncommon finding in children head trauma. We report a case of asymptomatic marginal thrombosis of the sagittal sinus associated with a frontal bone fracture in a 3 year old child. Case report: A healthy 3 years old boy is admitted for cranio-cerebral trauma after falling from the roof of a camping car. He presents initial sleepiness, one episod of vomiting, but no loss of consciousness. Initial Glasgow coma score is 13/15 (E3, M5, V5). Native CT-scan of the skull shows a non displaced frontal bone fracture crossing the anterior part of the superior sagittal sinus. An angio-CT-scan performed two days later reveals a marginal, non-occlusive thrombosis of the sagittal sinus. The child receives enoxaparin 14 mg daily (1.2 mg/kg) subcutaneous for one month. Repeated MRI shows a complete radiologic resolution of the thrombosis. Interestingly, two months after the accident, the child presents with a two days history of headache, sunken eyes and facial swelling suggestive of relapse. A new MRI shows no sign of thrombosis or venous edema and the symptoms disappear spontaneously. Discussion: Radiologic studies in adults show that DSVT complicates up to 40% of skull fracture crossing dural sinuses [1]. Although rare after children head trauma (only 2% of cases [2]), sinus thrombosis should be excluded in all children with such skull fractures. Anticoagulation to prevent extension is probably beneficial, despite lack of specific clinical trials to support this therapy. Conclusion: Imaging to exclude DSVT should be performed on all children presenting with a skull fracture crossing a cranial venous sinus, because specific treatment can be indicated.

5664. Vora, N. A., et al. (2007). "Endovascular management of a traumatic ophthalmic artery aneurysm." The Journal of trauma **63**(1): 192-194.

5665. Vorrasi, J., et al. (2018). "What Factors Necessitate Removal of Retained Ballistic Fragments in the Head and Neck?" Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **76**(4): 819-825.

PURPOSE: The purpose of this study was to estimate the frequency of retained ballistic fragment (RBF) removal and to identify factors associated with an increased risk for RBF removal. To date, there are no studies focused on identifying factors associated with removal of RBFs localized to the maxillofacial region., MATERIALS AND METHODS: Using a retrospective cohort study design, the authors enrolled a sample composed of patients with RBFs localized to the maxillofacial region. The predictor variables included bullet size, location, involvement of bone, involvement of sinus, antibiotics, multiple antibiotics, and multiple locations. The primary outcome variable was RBF retrieval. The secondary outcome variables were timing of operative retrieval, fragment site infection, and migration of RBF. Appropriate uni- and bivariate statistics were computed and logistic regression modeling was used., RESULTS: The sample was composed of 20 patients (mean age, 30 yr; 80% male) and 55% (11 patients) required or desired object removal overall. The number of projectiles ranged from 1 to 19 (total, 48) in the 20 patients. The logistic model identified larger size, final location of bone, final location of soft tissue, and final location of sinus as having a higher probability of removal that was statistically significant ($P < .05$); however, size was the only variable with a substantial odds ratio (OR; 1.96; $P < .05$). There was no evidence of migration and a low rate (2.3%) of infection was noted at subsequent follow-up radiography and clinical examination., CONCLUSION: Size was the only statistically significant predictor variable with a substantial OR (1.96; 95% confidence interval, 1.31-3.40; $P < .05$). There was a low risk of infection even when considering oral pharyngeal contamination and low risk of migration. Further studies could focus on prudent antibiotic use and larger patient populations.

5666. Voss, J. O., et al. (2018). "Penetrating Foreign Bodies in Head and Neck Trauma: A Surgical Challenge." Craniomaxillofacial Trauma and Reconstruction **11**(3): 172-182.

Penetrating foreign bodies of different origins in the head and neck are rare and potentially dangerous injuries, which might pose problems for their detection, primary care, and final treatment. Depending on the severity of the underlying trauma, some injuries present a higher risk for the presence of foreign bodies. Minor wounds, including common lacerations, are likely to be contaminated with loose gravel debris or dental fragments, and need to be distinguished from severe wounds caused by impalement, shootings, stabbings, and explosions. Blast injuries resulting from terror attacks are challenging recent therapeutic concepts. Even though these injury patterns are uncommon, they carry the risk of impacted objects with dramatic consequences. Despite improving medical imaging techniques, detection remains a challenge as it is dependent on the material of the foreign body, the affected anatomical site, and the injury severity. Therefore, a detailed history of the circumstances leading to trauma is essential when foreign objects are not visible during clinical examination. Precise detection of the foreign body, its anatomical position, and the affected surrounding structures are vital, especially for impalement injuries of the head and neck area. Therefore, an interdisciplinary planning approach is essential prior to removal of the foreign object. Finally, tension-free anatomical adaptation of the corresponding structures is crucial for maintaining and restoring aesthetic and function. Here, we give an overview of the diagnosis and treatment of cases of foreign body injuries encountered in our department.

5667. Voss, M., et al. (1995). "Patients who reattend after head injury: a high risk group." BMJ (Clinical research ed.) **311**(7017): 1395-1398.

OBJECTIVE: To assess risk factors for important neurosurgical effects in patients who reattend after head injury., DESIGN: Retrospective study., SUBJECTS: 606 patients who reattended a trauma unit after minor head injury., MAIN OUTCOME MEASURES: Intracranial abnormality detected on computed tomography or the need for neurosurgical intervention., RESULTS: Five patients died: two from unrelated causes and three from raised intracranial pressure. On multiple regression analysis the only significant predictor for both abnormality on computed tomography (14.4% of reattenders) and the need for operation (5% of reattenders) was vault fracture seen on the skull radiograph ($P < 10(-6)$); predictors for abnormal computed tomogram were a Glasgow coma scale score < 15 at either first or second attendance ($P < 0.0001$) and convulsion at second attendance ($P < 0.05$); predictive for operation only was penetrating injury of the skull ($P < 10(-6)$). On contingency table analysis these associations were confirmed. In addition significant associations with both abnormality on computed tomography and operation were focal neurological abnormality, weakness, or speech disturbance. Amnesia or loss of consciousness at the time of initial injury, personality change, and seizures were significantly associated only with abnormality on computed tomography. Headache, dizziness, nausea, and vomiting were common in reattenders but were found to have no independent significance., CONCLUSIONS: All patients who reattend after head injury should undergo computed tomography as at least 14% of scans can be expected to yield positive results. Where this facility is not available patients with predictors for operation should be urgently referred for neurosurgical opinion. Other patients can be readmitted and need referral only if symptoms persist despite symptomatic treatment or there is neurological deterioration while under observation. These patients are a high risk group and should be treated seriously.

5668. Vrankovi, et al. (1992). "Management of missile wounds of the cerebral dura mater: experience with 69 cases." Neurochirurgia **35**(5): 150.

Over the period of seven months: from July 1991 to January 1992 sixty-nine patients with penetrating head war-injuries, were admitted in our hospital. Missile wounds of the dura mater require in most cases urgent operative management: watertight closure of the dura defects. However, a dilemma still exists as to the best material to be used to restore the missile dural defects. There are several possibilities: an autologous substitute as periosteum (pericranium) from surrounding, fascia of the temporalis muscle, fascia lata, or allograft transplant as lyophilised cerebral dura mater (lyodura). In the group of 69 patients, 7 were treated conservatively, 13 were treated surgically, but without closing the dural wounds because of their critical condition, and in 45 surgically treated patients the dural defects were covered with 53 transplants: with periosteum in 22 patients but 24 coverings, with fascia of temporalis muscle in 2 patients, with lyodura in 6 patients, with fascia lata in 15 patients but 21 coverings. In 4 patients the dura wounds were sutured by interrupted sutures. The best results were obtained in the fascia lata group.

5669. Vrankovic, D., et al. (1992). "Management of missile wounds of the cerebral dura mater: experience with 69 cases." Neurochirurgia **35**(5): 150-155.

Over the period of seven months: from July 1991 to January 1992 sixty-nine patients with penetrating head war-injuries, were admitted in our hospital. Missile wounds of the dura mater require in most cases urgent operative management: watertight closure of the dura defects. However, a dilemma still exists as to the best material to be used to restore the missile dural defects. There are several possibilities: an autologous substitute as periosteum (pericranium) from surrounding, fascia of the temporalis muscle, fascia lata, or allograft transplant as lyophilised cerebral dura mater (lyodura). In the group of 69 patients, 7 were treated conservatively, 13 were treated surgically, but without closing the dural wounds because of their critical condition, and in 45 surgically treated patients the dural defects were covered with 53 transplants: with periosteum in 22 patients but 24 coverings, with fascia of temporalis muscle in 2 patients, with lyodura in 6 patients, with fascia lata in 15 patients but 21 coverings. In 4 patients the dura wounds were sutured by interrupted sutures. The best results were obtained in the fascia lata group.

5670. Vrankovic, D., et al. (1997). "[Therapeutic outcome in penetrating craniocerebral injuries in children. Personal experiences during war conditions]." Therapeutische Ergebnisse bei penetrierenden kraniozerebralen Verletzungen von Kindern. Unsere Erfahrungen unter Kriegsverhaltnissen. **100**(1): 13-16.

During the war period 1991-1992 in Croatia, ten wounded children (16 years of age or younger) with war injuries to the brain were admitted to the Division of Neurosurgery, Osijek Clinical Hospital. Six of them had been wounded by shrapnel and four by pistol or rifle bullets. All but one were managed surgically (i.e. by craniotomy). The outcome was: as follows three children had a good recovery, four retained a moderate neurological deficit, and three died (injured by shrapnel). Five of the wounded (four injured by shrapnel and one by bullets) had associated injuries (fractures of the leg bones, eye lesion, amputation of the right leg) which influenced morbidity, and in one case mortality. Children wounded with shrapnel had brain edema on admission to hospital. Our experience indicates that the thermal effect from heated shrapnel, as well as velocity, mass, size and shape of the shrapnel, could be an additional factor for the development of severe brain edema.

5671. Vrankovic, D., et al. (1998). "Self-inflicted gunshot wounds to the head during the war and post-war period." Injury **29**(5): 369-373.

Thirty-five patients with self-inflicted gunshot brain injury were admitted to our hospital during 1991-96. War conditions and availability of firearms influenced the increase in these injuries, nearly six times greater than in the previous 6-year peace time period (1985-90). Our management protocol consisted of radical debridement of the missile track and evacuation of haematomata. For in-driven bone fragments we followed a less radical approach, but, if a post-operative computed tomogram (CT) showed a cluster of retained bone fragments, we operated on this. Attention was paid to the development of intracranial infection performing in such cases a contrast enhanced brain computed tomography. Ten patients died early and 29 were managed operatively. Twelve survived, and were followed-up for up to 60 months. No case of suicide recidivism was noted. We conclude that patients with a Glasgow Coma score of 3 should not be considered for operation. Per-operatively ultrasonography was very helpful in localizing and extracting in-driven bone fragments. Post-operatively, a CT scan is needed to demonstrate retained bone fragments.

5672. Vrebos, J. and C. C. Dupuis (1998). "[The life of Maurice Virenque (1888-1946). From "Gueules Cassees" to cervicofacial facelift]." A la rencontre de Maurice Virenque (1888-1946). Des "Gueules cassees" au lifting cervico-facial. **43**(2): 169-174.

When going through the biography and bibliography of M. Virenque, one realizes that he was an outstanding maxillo-facial surgeon, who developed his knowledge mainly during the two world wars 1914-1918 and 1939-1945 and gave exceptional care to soldiers with severe face and skull injuries, the so-called "Gueules Cassees". Nevertheless, he did not disregard the importance of aesthetic surgery born between the two wars. Due to his large experience in maxillo-facial surgery and his broad knowledge of the anatomy of the face, he occupies a special place among the forerunners of facelifts by stressing on the importance of plication of the deep aponeurotic layers of the face, thus allowing the elaboration of a modified approach to the problems of the aging face.

5673. Vulekovic, P., et al. (1995). "[Treatment of penetrating craniocerebral injuries from the Vukovar conflict, 1991-1992. Analysis of a series]." Lecenje penetrantnih kraniocerebralnih povreda s Vukovarskog ratista, 1991-1992. Analiza serije. **48**(11-12): 421-424.

Throughout the course of Vukovar conflict from July, 1991, to May, 1992, there were 37 patients with war craniocerebral injuries evacuated to our Clinic. 29 patients suffered penetrating missile craniocerebral injuries, in 14 (48%) there were fragment wounds and in 15 (52%) gunshot wounds. The series was analyzed according to wounding agents, sites of head penetration, CT scan findings, neurological findings, operative and postoperative complications, and mortality. We have found significant difference in mortality between wounded who sustained fragment wounds (14%) and those with gunshot wounds (27%). Further we emphasize the necessity of CT scanning, concerning a high haematoma incidence of 27 percent. Presence of retained in-driven bone or metal fragments in our series had no influence on development of either seizure disorder or an infectious complication. This supports a thesis of a limited brain debridement as a correct approach in the treatment of penetrating missile injuries.

5674. Vural, M., et al. (2009). "Unusual orbitocranial penetrating injury by a grinding wheel: case report." Chinese journal of traumatology = Zhonghua chuang shang za zhi **12**(5): 315-317.

5675. Wade, C. E., et al. (2013). "Characterization of a swine model fo Penetrating Ballistic-like Brain Injury (PBBI)." Journal of neurotrauma **30**(15): A98.

Introduction Penetrating TBI only accounts for 10-12% of the patients with TBI. Penetrating TBI has a high rate of mortality accounting for 40% of TBI deaths. We developed a large animal model in swine using penetrating ballistic-like brain injury (PBBI) to determine the consequences of increasing magnitudes of injury. Methods Experiments were conducted on sexually mature male miniature swine randomly assigned to varying magnitudes of PBBI injury. Injury was induced employing the PBBI methods developed by Tortella et al in rodents. Following a craniectomy placement of an inflatable intracranial probe allowed creation of cavitational injuries of 0% (surgical control; n = 5), ~0.1 (probe only; n = 4), 2.5% (n = 4) and 5% (n = 3) of the estimated brain volume. Animals were instrumented and followed for 6 hours after injury. Physiological measurements were obtained throughout the experiment and blood samples taken at predetermined time intervals. The size of the cavitational injury was determined histologically and tissue damage by immumohistological staining only on animals surviving the experimental duration. Values are mean ± SEM and differences were determined by AVOVA, $p < 0.05$. Results In response to increasing injury ICP at 60min increased by 31± 18.2%, 199 ± 62% and 132 ± 31% for 0, 2.5 and 5% injuries, respectively. These increases did not persist for the duration of the experiment. There were no sustained differences in MAP, thus CPP was decreased with increasing injury. Cardiac output and heart rate were not significantly altered, nor were blood gases and chemistries. Body mass, brain mass and brain volume were not different between groups. With increasing PBBI total, cavitational and tissue injury volumes increased in a dose dependent manner. The total injury sizes were 38± 11.6, 57± 3.5, and 116 ± 16.7mm2. The cavitational injury progressively represented an increasing amount of the total injury, 29± 11.0, 37 ± 8.3 and 44± 5.8 %. With increasing injury there was a greater region proximal to the caviational injury containing dystrophic, silver-impregnated, neurons, and in glial activation based on GFAP immunopositive cells. Conclusions In a large animal swine model using PBBI we were able to induce injuries of increasing magnitude. These injuries acutely increased ICP, but failed to elicit alterations in cardiovascular hemodynamics. The initial increase in ICP resolved within hours. With increasing PBBI the total volume of injury rose. The contribution of the cavitational injury was increased as PBBI was increased. Thus, in the smaller penetrating wounds the majority of the injury is due to secondary injury and therefore amenable to early interventions to attenuate the volume of the total injury.

5676. Wagner, A., et al. (1996). "Image-guided surgery." International journal of oral and maxillofacial surgery **25**(2): 147-151.

Interventional video tomography (IVT), a new imaging modality, achieves virtual visualization of anatomic structures in three dimensions for intraoperative stereotactic navigation. Partial immersion into a virtual data space, which is orthotopically coregistered to the surgical field, enhances, by means of a see-through head-mounted display (HMD), the surgeon's visual perception and technique by providing visual access to nonvisual data of anatomy, physiology, and function. The presented cases document the potential of augmented reality environments in maxillofacial surgery.

5677. Wagner, A. K., et al. (2000). "Intentional traumatic brain injury: epidemiology, risk factors, and associations with injury severity and mortality." The Journal of trauma **49**(3): 404-410.

BACKGROUND: Intentional injury is associated with significant morbidity and mortality and has been associated with certain demographic and socioeconomic groups. Less is known about the relationship of intentional traumatic brain injury (TBI) to injury severity, mortality, and demographic and socioeconomic profile. The objective of this study was to delineate demographic and event-related factors associated with intentional TBI and to evaluate the predictive value of intentional TBI on injury severity and mortality., METHODS: Prospective data were obtained for 2,637 adults sustaining TBIs between January 1994 and September 1998. Descriptive, univariate, and multivariate analyses were conducted to determine the predictive value of intentional TBI on injury severity and mortality., RESULTS: Gender, minority status, age, substance abuse, and residence in a zipcode with low average income were associated with intentional TBI. Multivariate analysis found minority status and substance abuse to be predictive of intentional injury after adjusting for other demographic variables studied. Intentional TBI was predictive of mortality and anatomic severity of injury to the head. Penetrating intentional TBI was predictive of injury severity with all injury severity markers studied., CONCLUSION: Many demographic variables are risk factors for intentional TBI, and such injury is a risk factor for both injury severity and mortality. Future studies are needed to definitively link intentional TBI to disability and functional outcome.

5678. Wagner, M., et al. (1984). "[Gunshot injuries in peacetime and their therapy]." Schussverletzungen im Frieden und deren Therapie. **362**(4): 275-288.

Between 1976 and 1982 46 patients with gunshot injuries (43 m., 3 f.) were seen at the University of Heidelberg Department of Surgery. Frequent causes of injury in 42 adults (40 m., 2 f.) and 4 children (3 m., 1 f.) were suicide attempts (19) and carelessness in the handling of shotguns (11). Criminal offence was related to nine injuries; no retrospective classification of the event causing the injury was possible in further seven cases. Affected in descending order of frequency were brain and lung (10 each), soft tissue of thigh (9), intraabdominal organs (5), heart (4), liver and bone (3 each), blood vessels (2) and facial skull, penis, buttock, neck and mediastinum (1 each). Six patients suffered from combined injuries, in three cases a combined abdomino-thoracic injury was seen. Whilst suicidal injuries of the skull are related to poor prognosis, other peacetime gunshot wounds are less problematic when compared to military gunshot wounds due to the lower speed of the projectiles. Therapeutic procedures follow the general rules of open treatment of injuries including prophylaxis against tetanus and botulism as well as systemic antibiotic therapy. In general abdominal and abdomino-thoracic gunshot wounds as well as vascular injuries require immediate surgical procedure. In isolated thoracic injuries a conservative approach may be justified depending on the situation. The same rule applies to fractures caused by gunshots.

5679. Wagner, R., et al. (2020). "Pedestrian hit by a car impacted metal pole: reconstructing the head load." International journal of legal medicine **134**(4): 1403-1408.

Fatal head injuries are frequently seen in pedestrians hit by motorized vehicles. In our case, the pedestrian sustained a devastating head injury with skull splitting in the mediosagittal plane. A car collided with a traffic sign causing a bending of the pole. The metal pole hit a man standing close beside it; the man had a head injury severity that is more commonly due to falling objects than due to traffic accidents. Assuming a head mass of 5 kg, simplified calculations yield maximum contact forces of ca. 36 kN exceeding mean parietal fracture forces which are in the order of magnitude of 12.5 kN. The influences of the effective body mass and the horizontal distance between the pole and the pedestrian on maximum contact forces are investigated. High contact forces in our case can be mainly explained by the comparably high impact velocity and by a partial mass transfer of the total car mass to the pole.

5680. Wahid, F. I., et al. (2011). "Pattern of maxillofacial trauma seen at ENT department of a tertiary care hospital." Pakistan Journal of Medical Sciences **27**(5): 1042-1045.

Objective: To determine the pattern of maxillofacial trauma seen at Dept. of Ear, Nose and Throat Head and Neck Surgery of a tertiary care hospital. Methodology: This descriptive study was conducted at the Department of Ear, Nose, Throat (ENT), Head and Neck Surgery, Postgraduate Medical Institute, Lady Reading Hospital, Peshawar from June 2010 to Dec. 2010. It included 108 cases sustaining maxillofacial trauma. The patients of any age and either sex were

included while patients having trauma to other systems besides maxillofacial trauma were excluded from study. The universal rule of ABC (Airway, Breathing, circulation) regarding managing emergency was adopted for all the patients. After stabilizing the patient necessary surgical procedure was performed and concerned departments were consulted. Results: Our study included 108 cases of maxillofacial trauma constituting 97 male and 11 female, with male: female ratio of 8.8:1. The age of the patients ranged from 08-60 years with mean age of 30.55 + S.D 19.88 years. Most of the cases were from rural area (59.3%) and 75 cases (69.4%) were received in first 8 hours of incidence. Fire arm injuries 42% was on top followed by road traffic accidents 25% (n=27). Majority of cases (90.7%) were homicidal and mandiblular fracture was 49.07% followed by maxillary fractures. Conclusion: It is concluded that homicidal firearm injury is the commonest while road traffic accident is second most common causative factor for maxillofacial trauma. These can be minimized by proper implementation of traffic rules, free education of the people, free availability of essential primary health care, best tertiary care at hospital level and spread of weapon amongst public should be banned.

5681. Wahlig, J. B., et al. (1999). "The role of xenon-enhanced computed tomography in the management of a traumatic carotid-cavernous fistula: case report." The Journal of trauma **46**(1): 181-185.

5682. Wahyudi, et al. (2021). "An extremely rare case: Transorbital penetrating intracranial injury by wooden foreign body. Case report." Annals of Medicine and Surgery **71**.

Introduction and importance: Transorbital Penetrating Intracranial Injury (TOPI) is a rare case, but those caused by Wooden Foreign Body are even challenging that may pose unusual diagnostic and surgical challenges. Case presentation: we presented a TOPI following a wood penetrated to the left temporal fossa region via orbital roof due to struck the tree branches while got a motor vehicle accident. The patient was fully conscious with decreased visual acuity in the left eye and left ophthalmoplegia. Non-contrast CT scan showed the linear-shaped foreign body, air mimicking that penetrated medial orbit plane to the left temporal fossa. Clinical discussion: The surgery was performed with a temporobasal approach and revealed good results with only mild ophthalmologic complications without long-term fatal complications (1-year followed-up). Conclusion: early removal of wooden foreign body that penetrates to the intracranial via transorbital is mandatory and should be involved multidisciplinary approach to get the optimal result and avoid the fatal complication both neurologically or ophthalmologically.

5683. Walcott, B. P., et al. (2014). "Time interval to surgery and outcomes following the surgical treatment of acute traumatic subdural hematoma." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **21**(12): 2107-2111.

Although the pre-surgical management of patients with acute traumatic subdural hematoma prioritizes rapid transport to the operating room, there is conflicting evidence regarding the importance of time interval from injury to surgery with regards to outcomes. We sought to determine the association of surgical timing with outcomes for subdural hematoma. A retrospective review was performed of 522 consecutive patients admitted to a single center from 2006-2012 who underwent emergent craniectomy for acute subdural hematoma. After excluding patients with unknown time of injury, penetrating trauma, concurrent cerebrovascular injury, epidural hematoma, or intraparenchymal hemorrhage greater than 30 mL, there remained 45 patients identified for analysis. Using a multiple regression model, we examined the effect of surgical timing, in addition to other variables on in-hospital mortality (primary outcome), as well as the need for tracheostomy or gastrostomy (secondary outcome). We found that increasing injury severity score (odds ratio [OR] 1.146; 95% confidence interval [CI] 1.035-1.270; p=0.009) and age (OR1.066; 95%CI 1.006-1.129; p=0.031) were associated with in-hospital mortality in multivariate analysis. In this model, increasing time to surgery was not associated with mortality, and in fact had a significant effect in decreasing mortality (OR 0.984; 95%CI 0.971-0.997; p=0.018). Premorbid aspirin use was associated with a paradoxical decrease in mortality (OR 0.019; 95%CI 0.001-0.392; p=0.010). In this patient sample, shorter time interval from injury to surgery was not associated with better outcomes. While there are potential confounding factors, these findings support the evaluation of rigorous preoperative resuscitation as a priority in future study.

5684. Walcott, B. P., et al. (2012). "Bilateral hemicraniectomy in non-penetrating traumatic brain injury." Journal of neurotrauma **29**(10): 1879-1885.

Traumatic brain injury is a heterogeneous entity that encompasses both surgical and non-surgical conditions. Surgery may be indicated with traumatic lesions such as hemorrhage, fractures, or malignant cerebral edema. However, the neurological exam may be clouded by the effects of medications administered in the field, systemic injuries, and inaccuracies in hyperacute prognostication. Typically, neurological injury is considered irreversible if diffuse loss of grey/white matter differentiation or if brainstem hemorrhage (Duret hemorrhage) exists. We aim to characterize a cohort of patients undergoing bilateral hemicraniectomy for severe traumatic brain injury. A retrospective consecutive cohort of adult patients undergoing craniectomy for trauma was established between the dates of January 2008 and November 2011. The primary outcome of the study was in-hospital mortality. Secondary outcomes were ICU length of stay, surgical complications, and Glasgow Outcome Score at most recent follow-up. During the study period, 210 patients undergoing craniectomy for traumatic mass-occupying lesion (epidural hematoma, subdural hematoma, or parenchymal contusion) were analyzed. Of those, 9 met study criteria. In-hospital mortality was 67% (6 of 9 patients). The average ICU length of stay was 12 days. The GOS score was 3 in surviving patients. Bilateral hemicraniectomy is a heroic intervention for patients with severe TBI, but can be a life-saving procedure.

5685. Waldbaur, H. and P. Thierauf (1985). "[Intracranial late abscesses following injuries caused by grenade splinters]." Intrakranielle Spatabszesse nach Granatsplitterverletzungen. **46**(4): 354-359.

On the basis of 6 cases of late cerebral abscesses after lesions caused by shell-splinters treated by us, clinic, diagnostics and therapy of this complication are discussed in detail. In 3 patients there were no direct relations between the splinters and the abscesses so that further factors (age, vascular wall changes, and the like) must play a role in the formation of the abscesses; such vascular wall fibroses were found histologically in 3 of the examined abscess capsules. In 3 cases the bacteriological identification of the pathogens was possible. The treatment was carried out by employing puncture or extirpation or the combination of the two methods.

5686. Walder, B., et al. (2012). "Severe traumatic brain injury in a high income country: A population-based prospective cohort study." Intensive care medicine **38**: S14.

INTRODUCTION. In high income countries only few epidemiological studies on severe traumatic brain injury (TBI) are available, and these few studies have different designs. Severe traumatic brain injury is a high burden for society. OBJECTIVES. To describe characteristics and the outcome of patients with severe TBI in a national cohort of a high income country. METHODS. The study included adults sustaining severe traumatic brain injury (TBI) from blunt or penetrating trauma with an Abbreviated Injury Scale score of the head region (HAIS)>3 admitted to all eleven French and German speaking trauma centres in Switzerland. The follow-up lasted 1 year. Start of inclusion was May 2007; last follow-up was in April 2011. Outcome measures were Glasgow Coma Scale (GCS) at 14 days, mortality, Extended Glasgow Outcome Score (GOSE) and Neurobehavioral rating scale-revised (NBRS-R) at 3, 6 and 12 months. Descriptive statistics were performed. RESULTS. 1012 potential patients were screened for inclusion; 922 patients were included (74.1 % men). The incidence rate was 8.5 per 100,000 population. Median age was 55 years [inter quartile range 33, 71] with two age peaks (20-29.9, 60-69.9 years). Median GCS at scene was 9 [4, 14] and 5 [3, 14] in the emergency department. Both pupils were reactive in 73.7 % at scene and 72.3 % in the emergency department. Among all TBI, 95.7 % were blunt trauma. Injury Severity Score was 25 [20, 34], and 30.7 % of patients had multiple trauma. Falls were the mechanism in 52.6 %, road traffic accidents in 32.3 % (most were car divers, pedestrians and cyclists). Median arrival time (h:min) to the hospital for direct admission was 00:46 [00:35, 01:01], for indirect admission 3:12 [2:15, 4:20]; 44.1 % were intubated on scene. Hematoma evacuation was performed in 23.7 %, intraventricular drainage in 8.0 % and intracranial monitoring in 19.1 %. Median ICU stay was 9 days [4,20], hospital stay was 11 days [6, 21]; SAPS 2 Score 44 [29, 57]. Death rate was 30.3 %; median time to death was 2 days [1,6]; most deaths occurred during early ICU stay. Median GCS of survivors at 14 days was 15 [14, 15]. Median GOSE of survivors at 3 months was 5 [3, 7], at 6 months 6 [4, 8] and at 12 months 7 [5, 8]. Median NBRS-R of survivors at 3 months was 32 [29, 37], at 6 months 31 [28, 35], and at 12 months 30 [27, 35]. CONCLUSIONS. This population-based prospective cohort study included older patients and more falls compared to earlier studies in other European countries. High rates of cyclists and pedestrians with severe TBI were observed in the population with road traffic accidents. Most survivors were conscious at 14 days. GOSE increased slightly over a period of 1 year.

5687. Waldman, H. B. (1996). "Almost 19 million childhood injuries result in 11 thousand deaths." ASDC journal of dentistry for children **63**(1): 54-59.

Details are provided from a series of government and private agency reports on the accidents and related deaths of children and the effectiveness of efforts being made to reduce the incidence of these tragedies. In 1992 there were 83,000 accidental deaths and more than 17 million disabling injuries in the United States costing $399 billion. The death rate was down 10 percent from 1991, and also the lowest recorded in recent years. Included in these statistics are 19 million injured children and 11 thousand dead children. The leading cause of death of children less than ten years of age was an unintentional injury. The author presents details on the accidents and related deaths, as well as the effectiveness of efforts to reduce the incidence of these accidents. From the youngest ages to the teen years, a greater number of males than females are injured and die from accident-related causes. The number of accidental deaths of children, ages five to nine years, almost equalled the number of deaths from natural causes. For children ten to fourteen years old, the number of accidental deaths was one third greater than the number from natural causes. Statistics regarding death and injury from motor vehicles, firearms, consumer products, and poison are presented.

5688. Walid, M. S., et al. (2009). "Penetrating orbital trauma with internal carotid injury." Southern medical journal **102**(1): 116-117.

5689. Walker, M. L., et al. (1990). "Principles of management of shotgun wounds." Surgery, gynecology & obstetrics **170**(2): 97-105.

As an instrument of close range combat, the shotgun has no parallel. At short distances, its destructive capacity parallels that seen from high velocity missile injury. In this study, the history of the shotgun, wound ballistics, principles of initial therapy and special management problems related to shotgun wounds of specific sites are reviewed. An analysis of pooled data on abdominal shotgun wounds is presented. A subset of patients who do not require abdominal exploration exists. Specific problems encountered in defining this subset are enumerated. Three algorithms are presented that summarize our current management approach to shotgun wounds of the torso and extremities.

5690. Walker, P., et al. (2018). "Traumatic Brain Injury in Combat Casualties." Current Trauma Reports **4**(2): 149-159.

Purpose of Review: The purpose of this review is to give an overview of recent updates in the management of traumatic brain injury (TBI) in military settings. Recent Findings: Studies from the recent conflicts in Central and Southwest Asia have demonstrated that appropriate aggressive neurosurgical intervention in austere settings has been associated with improved outcomes. Summary: Modern management of military TBI has evolved from the era of Cushing in WWI to damage control and rapid aeromedical evacuation today. Aggressive management of severe injuries has been shown to increase survival. These interventions have included an emphasis on measures to reduce secondary brain injury—aggressive cranial decompression, addressing intracranial vascular injuries, and aeromedical evacuation to facilities with neurosurgical capability. Additionally, advances in the screening of mild TBI have led to increased awareness of the prevalence of this injury and potential associated long-term effects.

5691. Walker, P. F., et al. (2020). "Outcomes of tranexamic acid administration in military trauma patients with intracranial hemorrhage: a cohort study." BMC emergency medicine **20**(1): 39.

BACKGROUND: Tranexamic acid (TXA) may be a useful adjunct for military patients with severe traumatic brain injury (TBI). These patients are often treated in austere settings without immediate access to neurosurgical intervention. The purpose of this study was to evaluate any association between TXA use and progression of intracranial hemorrhage (ICH), neurologic outcomes, and venous thromboembolism (VTE) in TBI., METHODS: This was a retrospective cohort study of military casualties from October 2010 to December 2015 who were transferred to a military treatment facility (MTF) in the United States. Data collected included: demographics, types of injuries, initial and interval head computerized tomography (CT) scans, Glasgow Coma Scores (GCS), and six-month Glasgow Outcome Scores (GOS). Results were stratified based on TXA administration, progression of ICH, and VTE., RESULTS: Of the 687 active duty service members reviewed, 71 patients had ICH (10.3%). Most casualties were injured in a blast (80.3%), with 36 patients (50.7%) sustaining a penetrating TBI. Mean ISS was 28.2 +/- 12.3. Nine patients (12.7%) received a massive

transfusion within 24 h of injury, and TXA was administered to 14 (19.7%) casualties. Patients that received TXA had lower initial reported GCS (9.2 +/- 4.4 vs. 12.5 +/- 3.4, p = 0.003), similar discharge GCS (13.3 +/- 4.0 vs. 13.8 +/- 3.2, p = 0.58), and a larger improvement between initial and discharge GCS (3.7 +/- 3.9 vs. 1.3 +/- 3.1, p = 0.02). However, there was no difference in mortality (7.1% vs. 7.0%, p = 1.00), progression of ICH (45.5% vs. 14.7%, p = 0.09), frequency of cranial decompression (50.0% vs. 42.1%, p = 0.76), or mean GOS (3.5 +/- 0.9 vs. 3.8 +/- 1.0, p = 0.13). Patients administered TXA had a higher rate of VTE (35.7% vs. 7.0%, p = 0.01). On multivariate analysis, however, TXA was not independently associated with VTE., CONCLUSIONS: Patients that received TXA were associated with an improvement in GCS but not in progression of ICH or GOS. TXA was not independently associated with VTE, although this may be related to a paucity of patients receiving TXA. Decisions about TXA administration in military casualties with ICH should be considered in the context of the availability of neurosurgical intervention as well as severity of extracranial injuries and need for massive transfusion.

5692. Walker, W., et al. (2014). "The influence of penetrating vs closed type of traumatic brain injury on long-term global outcome." Brain injury **28**(5-6): 689.

Objectives: Well-validated predictors of poor global outcome after TBI include advanced age, low education, unemployment, long duration of post-traumatic amnesia (PTA) or coma (LOC) and longer hospitalization. Type of TBI, penetrating vs closed, is also believed important. Higher rates of early mortality, medical and neurologic complications are reported after penetrating TBI as are worse headache density and high seizure rates. However, information is lacking on the effect TBI type has on global long-term outcome. A recent review determined that nearly all studies of prognostic factors within civilian samples either exclude or under-represent patients with penetrating injuries. This study sought to understand the influence of injury type on TBI outcome within the NIDDR-funded TBI Model Systems (TBIMS) whose very large cohort size facilitates examining low frequency conditions. It was hypothesized that penetrating TBI increases the risk of poorer long-term global outcome when adjusting for known risk factors. Methods: Study design was a prospective multi-centre cohort study with retrospective data abstraction. All participants: (1) presented to the TBIMS acute care hospital within 72 hours of injury; (2) received both acute medical and acute rehabilitation care; (3) sustained TBI with at least admission Glasgow Coma Scale (GCS) score<13, LOC>30 minutes, PTA>24 hours or trauma-related intracranial abnormality on neuroimaging; and (4) age>15 years. Penetrating TBI was defined by either gun-shot wound injury mechanism and/or skull fragments on imaging. The final sample with complete data sets was 4982 patients. Outcome measure was the Glasgow Outcome Scale (GOS) 2 years post-injury. Dead and vegetative categories due to very low counts were collapsed into severe disability. A multiple cumulative logistic regression model was built using significant predictors identified on preliminary bivariate analyses. Manual backwards selection ($p<0.05$) was used to reduce the model and identify a parsimonious set of predictors for GOS. All two-way interactions were also considered. Results: Penetrating type TBI was 8.1% of the cohort. The final model identified the following predictors: injury type, age, sex, race/ ethnicity, pre-injury education level and employment, LOS and PTA duration. Injury type also had significant secondary interactions with employment and age. The odds of lower (worse) 2-year GOS were greater for individuals with penetrating TBI who were younger (45 or less) and employed pre-injury. A 20 year old individual employed preinjury is 2-times (95% CI=1.5, 2.8) more likely to have a lower GOS category; a 30 year old employed individual is 1.8-times (95% CI=1.4, 2.2) more likely. Conclusions: Global outcome 2 years after TBI is worse for penetrating compared to closed type, with the largest effect for younger persons employed pre-injury. Prognostication models and counselling should consider differing outcomes for type of TBI.

5693. Walker, W. C., et al. (2012). "Prediction of the functional impact of headache after traumatic brain injury: A longitudinal cohort analysis." PM and R **4**(10): S185.

Objective: Measure the functional impact of headache (HA) after moderate-severe traumatic brain injury (TBI), determine predictors, and assess for change over time. Design: Multicenter longitudinal cohort study. Setting: Subjects were enrolled during acute inpatient rehabilitation hospitalization following TBI. Participants: 450 participants with moderate-severe TBI consecutively enrolled at 7 participating TBI Model Systems (TBIMS) centers. Inclusion criteria were the same as for the TBIMS. Interventions: n/a. Main Outcome Measures:: Functional impact was a 5-level ordinal measure of the degree that HA interfered with activities of daily living (ADL). Results: Data was analyzed using a generalized linear mixed effects model. Sex was the only variable that showed a significant effect of change in ADL limitations from HA over time. At 3 months after TBI sex was not related to outcome, at 6 months there was a nonsignificant trend toward more HA related ADL impairment in females, whereas at 12 months females were

significantly more likely to have HA related ADL impairment (odds ratio 2.64 (P<.05, CI = 1.33, 5.24)). Multiple factors, including skull/facial fractures, penetrating TBI, female gender, and pre-injury HA, were significantly associated with ADL impairment from HA at various time points. However, severity of injury as measured by PTA duration was not predictive of outcome at any time point. Conclusions: These results corroborate past studies in showing that HA after TBI is both unrelated to severity of injury, and is more of a "problem" for females compared to males. Additionally, the current study showed that the influence sex had on ADL limitation from HA changed over time. At early time-points females and males were equally susceptible to having HA that limited ADLs. However, females become increasingly more susceptible to having HA that limits ADLs as the first post-injury year progresses.

5694. Walker, W. C., et al. (2015). "Global Outcome and Late Seizures After Penetrating Versus Closed Traumatic Brain Injury: A NIDRR TBI Model Systems Study." The Journal of head trauma rehabilitation **30**(4): 231-240.

BACKGROUND: If and how much dural penetration influences long-term outcome after traumatic brain injury (TBI) is understudied, especially within the civilian population., OBJECTIVES: Using the large TBI Model Systems cohort, this study assessed and compared penetrating TBI (PTBI) and closed TBI with respect to global outcome and late seizures 2 years after injury., METHODS: After performing unadjusted PTBI versus closed TBI comparisons, multivariate regression models were built and analyzed for both outcomes by including the following additional predictors: length of unconsciousness, posttraumatic amnesia duration, hospital length of stay, age, gender, race, marital status, education level, problem substance abuse, and preinjury employment status., RESULTS: The collapsed Glasgow Outcome Scale model (n = 6111) showed significant secondary effects of PTBI with employment status. When employed before injury, individuals with PTBI were 2.62 times more likely (95% confidence interval, 1.92-3.57) to have a lower Glasgow Outcome Scale category. The final model for late seizures (n = 6737) showed a significant main effect for PTBI. Adjusting for other predictors, individuals with PTBI were 2.78 times more likely (95% confidence interval, 1.93-3.99) than those with closed TBI to be rehospitalized for a seizure., CONCLUSION: This study empirically demonstrates that penetrating injury mechanism has important prognostic implications.

5695. Walker, W. C., et al. (2012). "Predictors of headache density after traumatic brain injury." Brain injury **26**(4-5): 740.

Objective: To determine if a specific set of variables are predictive of headache (HA) density at 3, 6, and/or 12 month post traumatic brain injury (TBI). Methods: Design was a prospective cohort study. The sample was 450 participants from the TBI Model System and HA Module Database admitted to inpatient rehabilitation between February 2008 and June 2009 and receiving a specially designed HA questionnaire. A HA frequency-duration index was created by multiplying frequency of HA and length of HA episode (using the midpoint of the response category) into hours of HA per time period. HA intensity (scale of 0-10) was split into 4 ordinal categories: (1,2), (3,4,5), (6,7,8), and (9,10), in addition to the category of no headache (0). The frequency-duration index was split into 4 ordinal categories and the 16 combinations of frequencyduration and HA intensity were assigned to one of six categories: none, minimal, mild, moderate, severe, and extreme. Thus, the primary outcome measure was the 6-level ordinal HA Density Index that simulated a pain diary summary rating. A generalized linear mixed-effects model was used to model the 6-level ordinal outcome as a function of time, sex, pre-injury history of HA (none, nonmigraine, migraine), limitations due to HA, type of TBI (penetrating, closed), evidence of any skull, spine, or face fractures, and time in post-traumatic amnesia (PTA). Results: At three months post-TBI, history of preinjury HA was the only significant predictor of HA density. The odds of more severe HAs post- TBI were greater for those with a pre-injury history of migraine HAs (odds ratio [OR]=10.38, 95% confidence interval [CI]=1.99, 54.02) or non-migraine HA (OR=4.12, 95% CI=1.62, 10.46) versus with no history of HA. At six months post-TBI, history of pre-injury HA, sex, and type of TBI were significant predictors of HA density. The odds of more severe HAs post-TBI were greater for females versus males (OR=2.59, 95% CI=1.31, 5.13), for those with a pre-injury history of migraine HA (OR=10.11, 95% CI=2.20, 46.54) or non-migraine HA (OR=3.20, 95% CI=1.25, 8.20) versus no history of HA, and for those with penetrating versus closed injuries (OR=4.14, 95% CI=1.13, 15.17). Finally, at twelve months post-TBI, the odds of a more severe HA post-TBI were greater for those with a pre-injury history of migraine HA versus no history of HA (OR=8.66, 95% CI=1.62, 45.96). Conclusion: Sex, pre-injury history of HAs, and TBI type were significant predictors of the severity of post-injury HA density. Females, those with preinjury HAs, and penetrating injuries were at the greatest risk for more severe HAs in the year following TBI.

5696. Walker, W. C., et al. (2013). "Prediction of headache severity (density and functional impact) after traumatic brain injury: A longitudinal multicenter study." Cephalalgia : an international journal of headache **33**(12): 998-1008.

BACKGROUND: Headache (HA) following traumatic brain injury (TBI) is common, but predictors and time course are not well established, particularly after moderate to severe TBI., METHODS: A prospective, longitudinal cohort study of HA severity post-TBI was conducted on 450 participants at seven participating rehabilitation centers. Generalized linear mixed-effects models (GLMMs) were used to model repeated measures (months 3, 6, and 12 post-TBI) of two outcomes: HA density (a composite of frequency, duration, and intensity) and HA disruptions to activities of daily living (ADL)., RESULTS: Although HA density and ADL disruptions were nominally highest during the first three months post-TBI, neither showed significant changes over time. At all time points, history of pre-injury migraine was by far the strongest predictor of both HA density and ADL disruptions (odds ratio (OR) = 8.0 and OR = 7.2, averaged across time points, respectively). Furthermore, pre-injury non-migraine HA (at three and six months post-TBI), penetrating-type TBI (at six months post-TBI), and female sex (at six and 12 months post-TBI) were each associated with an increase in the odds of a more severe HA density. Severity of TBI (post-traumatic amnesia (PTA) duration) was not associated with either outcome., CONCLUSION: Individuals with HA at three months after moderate-severe TBI do not improve over the ensuing nine months with respect to HA density or ADL disruptions. Those with pre-injury HA, particularly of migraine type, are at greatest risk for HA post-TBI. Other independent risk factors are penetrating-type TBI and, to a lesser degree and post-acutely only, female sex. Individuals with these risk factors should be monitored and considered for aggressive early intervention.

5697. Wallace, et al. (2017). "Safety and effectiveness of preoperative endovascular vertebral artery sacrifice." Journal of neurointerventional surgery **9**: A45.

Background and Purpose Endovascular vertebral artery sacrifice is performed to facilitate surgical resection of cervical spine tumors that encase or are in close proximity the vertebral artery, other surgeries that necessitate vertebral artery transection active extravasation or delayed pseudoaneurysm secondary to penetrating trauma or deceleration injury. Herein, we report our experience with this procedure. Materials and Methods Institutional review board approval was obtained to retrospectively review the neurointerventional databases of a tertiary medical center for all cases of endovascular vertebral artery sacrifice performed between January 2003 and December 2016. Demographic information, clinical history, and outcomes were collected from electronic medical records. Procedural details and periprocedural complications were collected from operative reports. Preoperative digital subtraction angiography (DSA) was reviewed for details of vertebral artery anatomy. Results During the study period, 15 unilateral endovascular vertebral artery occlusions were performed. The cohort included 10 men and 5 women with a mean age of 55 years (range, 18-82 years). Indications for the procedure included preoperative vertebral artery sacrifice prior to cervical tumor resection (80%; 12/15), surgical fixation of a C4-C5 fracture subluxation associated with an occlusive vertebral artery dissection, surgical removal of a misplaced central line, and delayed pseudoaneurysm after gunshot trauma. The vertebral arteries were codominant in 73% (11/15) of cases. The non-dominant vertebral artery was occluded in 20% (3/15) of cases. The dominant vertebral artery was occluded in one case in which the contralateral vertebral artery measured 3 mm in maximum diameter. Prior to endovascular occlusion, the vertebral arteries were patent and normal caliber (47%; 7/15), patent but narrowed (47%; 7/15), and occluded in 1 case. Successful endovascular occlusion was achieved in 93% (13/14) of cases performed prior to surgical transection of the target artery. The mean diameter of the occluded vertebral artery segment was 3.3 mm (range, 1.7-5.7 mm). The vertebral arteries were most commonly occluded using coils (53%; 8/15) or a combination of coils and Micro Vascular Plugs (33%; 5/15; Medtronic; Plymouth, MN). One vertebral artery was occluded with a combination of coils and an Amplatzer Vascular Plug (Medtronic; Plymouth, MN) and 42 coils (patient 11), and one was occluded with 5 Micro Vascular Plugs (patient 13). The mean numbers of coils used without and with vascular plugs were 23 (range, 6-33) and 9 (range, 4-13), respectively. The mean number of Micro Vascular Plugs used in combination with coils was 2.9 (range, 1-5). Antecedent temporary balloon occlusion testing to confirm filling of the basilar artery and ipsilateral posterior inferior cerebellar artery from the contralateral vertebral artery was performed in four cases using a 7 × 7 mm (3 cases) or 4 × 7 mm (1 case) HyperForm balloon. In each of these cases the balloon was also used to arrest antegrade flow during occlusion. Five patients (33%; 5/15) received aspirin postoperatively. There were no procedure-related complications. Conclusion Endovascular vertebral artery sacrifice is a safe and effective treatment for minimizing blood loss during surgeries that involve transection of the vertebral artery.

5698. Wallace, M. N. and S. K. Bisland (1994). "NADPH-diaphorase activity in activated astrocytes represents inducible nitric oxide synthase." Neuroscience **59**(4): 905-919.

In paraformaldehyde-fixed sections of healthy brain, glial cells at the light-microscope level do not contain measurable levels of NADPH-diaphorase. However, after a variety of lesions in the mouse brain, some reactive astrocytes express varying amounts of this enzyme. Following stab wounds, activated astrocytes or related glial cells surrounding the lesion, contained moderate to high levels of NADPH-diaphorase in the cerebellum, midbrain, thalamus, striatum, hippocampal formation and neocortex. Double-labelling experiments confirmed that this corresponds to an inducible form of nitric oxide synthase, similar to that found in activated macrophages. Within the lesion there were large numbers of macrophages which also contained NADPH-diaphorase. After 10 min of global hypoxic ischaemia, some reactive astrocytes also contained NADPH-diaphorase. These cells were confined to the dorsal part of the hippocampal formation (the dentate fascia and CA1 areas) and to the anterolateral striatum. More focal ischaemic damage, produced by dividing an arterial branch, also produced a rim of reactive astrocytes containing NADPH-diaphorase, that surrounded the area of necrosis. Low levels of NADPH-diaphorase were induced within one day of a stab wound and the enzyme activity reached near maximal levels by two days postlesion. Moderate NADPH-diaphorase activity was still present at 63 days postlesion, but only a small number of astrocytes were stained in the immediate vicinity of the lesion. These experiments confirm that NADPH-diaphorase activity represents inducible nitric oxide synthase in activated astrocytes and probably in inflammatory macrophages. We conclude that a high proportion of activated astrocytes and a small proportion of invading macrophages are induced to express moderate to high levels of nitric oxide synthase following neuronal damage. Our results indicate that following a variety of lesions reactive astrocytes are synthesizing significant levels of nitric oxide within 24 h. This nitric oxide may be involved in modulating the likelihood of epileptic seizures.

5699. Wallace, P. B. and A. M. Meirowsky (1960). "The repair of dural defects by graft. An analysis of 540 penetrating wounds of the brain incurred in the Korean War." Annals of surgery **151**: 174-180.

5700. Waller, J. A., et al. (1993). "Potential availability of transplantable organs and tissues in fatalities from injury and nontraumatic intracranial hemorrhage." Transplantation **55**(3): 542-546.

Study of all Vermont and urban Rhode Island trauma fatalities for 1987, and all fatalities in these states from nontraumatic intracranial hemorrhage for 1986 and 1987, identified few potential donors for asystole-sensitive organs, such as heart, lungs, liver, pancreas, and kidneys. It is estimated that nationally there is a maximum potential of about 5000 cadavers per year from these two sources that meet screening criteria for age, duration of survival after event, brain death, and absence of organ damage or important disease. This would yield up to 5000 hearts, livers, and pancreases, perhaps 5-6000 lungs, and up to 10,000 kidneys. However, for tissues that have longer postdeath viability it is estimated that annually at least 60,000 eyes, 22,000 heart valve sets, 29,000 donations of 2 or more long bones per cadaver, and 36,000 skin donations are potentially available from these sources.

5701. Waller, S. G., et al. (1993). "Retrobulbar anesthesia risk. Do sharp needles really perforate the eye more easily than blunt needles?" Ophthalmology **100**(4): 506-510.

PURPOSE: Conventional wisdom in ophthalmology is that the force required to perforate an eye during retrobulbar injection is noticeably greater with a specially designed blunt needle than with a standard hypodermic needle. A search of the literature showed no measurements of scleral perforation pressure with specific needle tips. The authors investigated this concept., METHODS: A computerized search for eye perforations of the surgical records over a 5-year period at Wilford Hall United States Air Force Medical Center was conducted. A double-masked trial by experienced ophthalmologists, using preserved eye bank eyes and several commercially available needles, subjectively assessed the force required to perforate the globe. The authors designed and built a portable transducer system to objectively measure the perforation pressure of human globes with the needles. Measurements were done with preserved and unpreserved human cadaver eyes., RESULTS: No globe penetrations or perforations were found in this consecutive series of over 4000 retrobulbar anesthesia procedures. A subjective difference between the hypodermic and blunt needles was detected. Objective measurements showed a significant difference between the hypodermic and blunt needles, and between types of blunt needles. The difference was present with both eye bank eyes and fresh cadaver eyes., CONCLUSIONS: Blunt-tipped needles do require greater force to penetrate the eye. The noncutting edge, blunt-tipped needles have higher scleral perforation pressures than those with cutting edges.

5702. Walter, A., et al. (2022). "Association of White Matter Microstructural Integrity and Short-Term Outcomes After Traumatic Brain Injury." Brain injury **36**(SUPPL 1): 95.

Objectives: Traumatic brain injury (TBI) is a heterogenous disease that can have a wide range of outcomes post-injury. These outcomes can vary both in their presentation and temporal pattern, making effective treatment and rehabilitation challenging. Diffusion tensor imaging (DTI) can characterize the microstructural properties of white matter post-injury however, the precise relationship between DTI abnormalities and outcomes is not fully understood. The aim of this analysis was to identify microstructural abnormalities in neuroanatomically defined brain regions that are most contributing to cognitive and functional outcomes. Methods: Forty-four patients with non-penetrating TBI (mean [SD] age: 35.6 [16.6] years, 80% male, 52% white, median GCS: 15 (IQR: 14-15)) were enrolled within 24 hours of admission to our Level 1 Trauma Center. Participants underwent a research 3 T MRI that included a DTI sequence and symptom and neuropsychological assessment (Glasgow Outcome Scale - Extended (GOSE); Rivermead Post-Concussion Symptom Questionnaire (RPQ); Rey Auditory Verbal Learning Test (RAVLT); Trail Making Test (TMT) A&B) at 14 ± 2 days postinjury. Diffusion weighted images were preprocessed and registered to the JHU-MNI-ss (Eve) atlas. Mean fractional anisotropy (FA), mean diffusivity (MD), radial diffusivity (RD), and axial diffusivity (AD) were calculated in each region of interest (ROI) and 92 white matter ROIs were then grouped into five neuroanatomical categories: Association, Cerebellar, Commissural, Projection, and Superficial White Matter. Least Absolute Shrinkage and Selection Operator (Lasso) regressions, using cross validation and with sex and age a priori selected into the model, were run to identify which region and corresponding DTI metric most contributed to an outcome of interest. Results: Lasso regressions revealed that for functional rating scale outcomes, GOSE was most explained by AD Cerebellar and FA Projection (MSE = 1.151, R2 = 0.141) while RPQ was most explained by FA Projection, AD Superficial White Matter, and AD Cerebellar (MSE = 100.805, R2 = 0.256). For cognitive outcomes, RAVLT was most explained by FA Cerebellar, AD Commissural, and AD Superficial White Matter (MSE = 114.717, R2 = 0.267), TMT-A was most explained by MD Cerebellar, AD Projection, FA Association, and AD Projection (MSE = 115.427, R2 = 0.549), and TMT-B was most explained by FA Cerebellar, RD Cerebellum, and FA Association (MSE = 1905.616, R2 = 0.503). Conclusions: As TBI can lead to variable symptoms and objective deficits in somatic, affective, and cognitive function, a better insight into the underlying physiology of these outcomes is needed. These findings begin to identify regions of the brain that may contribute to distinct negative outcome patterns post-injury. Additionally, the data suggest cognitive outcomes are more explained by microstructural integrity in distinct white matter regions and that microstructural measures beyond FA and MD may be useful in explaining these outcome patterns. Additional work is needed to further elucidate the relationship between regional white matter damage, specific outcome domains, and the temporal evolution of these abnormalities.

5703. Walter, T., et al. (2016). "Positive outcome after a small-caliber gunshot fracture of the upper cervical spine without neurovascular damage." Polish Journal of Radiology **81**: 134-137.

Background: Gunshot wounds to the cervical spine most frequently concur with serious injuries to the spinal cord and cervical vessels and often have a fatal outcome. Case Report: We describe the case of a 35-year-old male with a complex fracture of the C2 vertebra body and a mandibular fracture after a penetration gunshot to the cervical spine. Computed tomography (CT) at admission revealed the exact extent of the fractures and the small caliber bullet lodged next to the C2 vertebra. In this rare and extremely lucky case no collateral vascular or neurological damage was detected. Eighteen months after surgical bullet removal and posterior C1–C3 fusion complete bone healing of the C2 vertebra was achieved and there were no secondary neurovascular deficits. Conclusions: Immediate surgical C1–C3 fixation resulted in an excellent outcome without secondary neurovascular deficits in this rare case of traumatic complex C2 vertebral fracture caused by a gunshot injury.

5704. Walton, D. N. (1981). "Epistemology of brain death determination." Metamedicine **2**(3): 259-274.

5705. Wan, Y., et al. (2019). "Neurosurgical Care of Nonpowder Firearm Injuries: A Narrative Review of the Literature." Emergency medicine international **2019**.

Background. Nonpowder firearms discharge a projectile using compressed gases. Unlike traditional firearms, there is a perception that nonpowder guns do not cause serious injury. However, intracranial injury disproportionally

affects children and can cause significant neurological disabilities and mortality. Management of nonpowder firearm injuries has received little attention in the literature and presents unique surgical challenges. Materials and Methods. We conducted a narrative review of the literature of the management of nonpowder firearm injuries with particular emphasis on intracranial injury. Results. Modern nonpowder firearms have muzzle velocities which are capable of penetrating the skin, eyes, and bone. Direct intracranial injury commonly results from entrance of projectile through thinner portions of the skull. Operative intervention is needed to debride and safely explore the trajectory to remove fragments which can easily cause neurovascular injury. Conclusions. Neurosurgeons play a crucial role in managing serious nonpowder firearm injuries. A multidisciplinary team is needed to manage the direct results of penetrating injury and long-term sequalae.

5706. Wang, A., et al. (2019). "Orbital and intracranial Nocardia farcinica infection caused by trauma to the orbit: a case report." BMC infectious diseases **19**(1): 953.

BACKGROUND: Localized `and disseminated Nocardia farcinica infection is frequently reported in immunocompromised patients. However, orbital nocardiosis is rare, and, to our knowledge, traumatic orbital nocardiosis that affects the brain has never been described. Here, we report a case of traumatic orbital and intracranial N. farcinica infection in an immunocompetent patient., CASE PRESENTATION: A 35-year-old man, who was immunocompetent, to the best of our knowledge and as per the absence of immunodeficiency symptoms, with orbital trauma caused by the penetration of a rotten bamboo branch developed lesions in the orbit and brain. Subsequently, he underwent debridement and received broad-spectrum antibiotic therapy, but orbital infection occurred, with drainage of pus through the sinus tract. The patient then underwent endoscope-assisted local debridement. Bacterial culture of the sinusal pus was positive for N. farcinica, and a combined intracranial infection had developed. The disease was treated effectively by trimethoprim-sulfamethoxazole and ceftriaxone sodium therapy. The patient remained infection free and without complications at the 14-month follow-up., CONCLUSIONS: Traumatic orbital and intracranial infection caused by N. farcinica is a rare infectious disease, and atypical presentations easily lead to misdiagnosis. When a patient presents with an atypical orbital infection that is unresponsive to empirical broad-spectrum antibiotics, along with suspicious neurologic symptoms, Nocardia infection should be considered. Identification by bacterial culture is the gold standard. Complete local debridement and appropriate antibiotic treatment are keys to the treatment of the disease.

5707. Wang, A.-L., et al. (2020). "Bromide Ions Triggered Synthesis of Noble Metal-Based Intermetallic Nanocrystals." Small (Weinheim an der Bergstrasse, Germany) **16**(40): e2003782.

Ordered intermetallic nanomaterials with a well-defined crystal structure and fixed stoichiometry facilitate the predictable control of their electronic structure and catalytic performance. To obtain the thermodynamically stable intermetallic structures, the conventional approaches with high-temperature annealing are still far from satisfactory, because of annealing-induced aggregation and sintering of nanomaterials. Herein, a general wet-chemical method is developed to synthesize a series of noble metal-based intermetallic nanocrystals, including hexagonal close-packed (hcp) PtBi nanoplates, face-centered cubic (fcc) Pd3 Pb nanocubes, and hcp Pd2.5 Bi1.5 nanoparticles. During the synthetic process, Br- ions play two important roles for the formation of ordered intermetallic structures: i) Br- ions can coordinate with the metal ions to decrease their reduction potentials thus slowing down the reduction kinetics. ii) Br- ions can combine with molecular oxygen to generate an oxidative etching effect, hence reconstructing the atom arrangement, which is beneficial for the formation of the intermetallic structure. As a proof-of-concept application, Pd3 Pb nanocubes are used as electrocatalysts for ethanol and methanol oxidation reactions, which exhibit significantly improved electrochemical performance compared with the commercial Pd black catalyst.

5708. Wang, F., et al. (2004). "[Effect of L-arginine on the changes of cerebral microcirculation following craniocerebral missile wound at early stage in cats]." Sichuan da xue xue bao. Yi xue ban = Journal of Sichuan University. Medical science edition **35**(3): 402-405.

OBJECTIVE: To study the alterations of cerebral microcirculation and the effect of L-Arginine after craniocerebral missile wound (CMW) at early stage in cats., METHODS: The CMW animal model in cat was constructed by Carey method. Altogether 12 mongrel cats with either sex were divided into the CMW group and the L-Arginine treatment group. The caliber (D), velocity (V) and blood flow (Q) of pial microvessels and pathological examination of brain tissue at

10 min before CMW and from 5 min to 5 h after CMW were evaluated in each group., RESULTS: 1. In CMW group, although the Da, Va and Qa of pial arteriole decreased from 5 to 20 minutes, Da and Qa elevated at 90 minutes after CMW. There were no significant changes in the Dv of pial venule, but the levels of Vv and Qv were lower at 5 min and 20 min after CMW. Qv increased from 45 min to 3 h after CMW. The pial venules were in congestion situation. 2. In the L-Arginine treatment group, the pial aterioles persistently dilated after CMW. The blood flow of pial aterioles increased at 20 min after CMW and the higher level lasted 5 h. Similarly, the dilation of pial venules was observed, and the blood flow increased at 20 min after the injury, followed by venules constriction temporarily. 3. Petechial hemorrhage, microthrombosis and nerve cell swelling were found in the cortex on the opposite side of the trauma area. The pathological changes were less severe in the L-Arginine treatment group than those in the CMW group., CONCLUSION: At the early stage after CMW, there are obstructions to cerebral microcirculation, which induce brain ischemia, hypoxia and secondary failure of cerebral function. The mechanism by which L-Arginine alleviates the impaired cerebral microcirculation may lie in the vascular activation of L-Arginine-NO system.

5709. Wang, F., et al. (2004). "[Early-stage changes of caliber and blood flow of cat pial microvessels following craniocerebral missile wound]." Di 1 jun yi da xue xue bao = Academic journal of the first medical college of PLA **24**(8): 888-891.

OBJECTIVE: To investigate the early-stage changes of cerebral microcirculation after craniocerebral missile wound (CMW) in cats., METHODS: Twelve mongrel cats of either sex were used for measuring the caliber (D), velocity (V) and blood flow (Q) of the pial microvessels and observing the vital signs 10 min before CMW and from 5 min to 5 h after CMW. The pathological changes of the brain tissue were also examined., RESULTS: After CMW, the D, V and Q of the pial arteriole decreased within the initial 5 to 20 min, followed by elevation of Da and Qa at 90 min. No significant changes were noted in the Dv of the pial venule but its Vv and Qv remained at low levels., CONCLUSION: After CMW, the Q of microvessels may increase progressively in the areas of concussion, contusion and laceration injuries to induce reperfusion injury following ischemia and hypoxia of the brain tissue resulting from microcirculation disorder caused by the wound.

5710. Wang, H. (2021). "1369TiP A dose exploration study of almonertinib for epidermal growth factor receptor (EGFR)-mutant non-small cell lung cancer (NSCLC) patients with newly diagnosed or recurrent brain/leptomeningeal metastasis (ARTISTRY)." Annals of Oncology **32**: S1038.

Background: Approximately 25 to 40% of patients with NSCLC have brain metastases (BM) and 3% to 4% develop leptomeningeal metastases (LM). Prognosis for patients with NSCLC and BM or LM is dismal, which seriously affects the quality of life and survival of patients. Several therapeutic options have been applied to manage BM or LM. However, the efficacy is limited. More recently, EGFR-TKIs have shown potential as a treatment option for BM or LM NSCLC patients. Almonertinib (HS-10296), a third-generation EGFR tyrosine kinase inhibitor (TKI), efficiently penetrates the blood brain barrier. This study aims to explore the efficacy and safety of different doses of almonertinib in the first-line and second-line treatment of BM or LM NSCLC patients. Trial design: The ARTISTRY study (NCT04778800) was a single-arm, three cohort study. NSCLC patients with EGFR mutations who developed CNS progression are eligible for this study. This trial prepared to enroll approximately 60 patients. For cohort 1, the patients had to have measurable brain lesions and undergone no previous treatment with EGFR-TKI or radiotherapy for brain metastases(n=30). And they will receive oral almonertinib 110 mg/d first and receive 160 mg/d with disease progression in the central nervous system for this group. For cohort 2, the patients had to have LMs confirmed by either CSF cytology or brain MRI and have undergone no previous treatment with EGFR-TKI or radiotherapy for brain metastases(n=10). For cohort 3, the patients have measurable brain lesions whose disease had progressed on first or second-generation EGFR-TKI therapy. For cohort 2 and 3, patients will receive almonertinib 110/160/220 mg/d once daily with a dose-escalation phase if no disease progression was observed in twice consecutive assessments. The primary endpoint is intracranial progression-free survival. Secondary endpoints are progression-free survival, overall survival, intracranial objective response rate, disease control rate, intracranial disease control rate, safety and tolerability. Clinical trial identification: NCT04778800; 3 March 2021. Legal entity responsible for the study: Henan Cancer Hospital. Funding: Jiangsu Hansoh Pharmaceutical Co., Ltd. Disclosure: The author has declared no conflicts of interest.

5711. Wang, H., et al. (2008). "Electrocatalytic mechanism and kinetics of SOMs oxidation on ordered PtPb and PtBi intermetallic compounds: DEMS and FTIRS study." Physical chemistry chemical physics : PCCP **10**(25): 3739-3751.

The electrocatalytic activities and mechanisms of PtPb and PtBi ordered intermetallic phases towards formic acid, formaldehyde and methanol oxidation have been studied by DEMS and FTIRS, and the results compared to those for a pure polycrystalline platinum electrode. While PtPb exhibits an enhanced electrocatalytic activity for the oxidation of all three organic molecules when compared to a Pt electrode, PtBi exhibits an enhanced catalytic activity towards formic acid and formaldehyde oxidation, but not methanol. FTIRS data indicate that adsorbed CO does not form on PtPb or PtBi intermetallic compounds during the oxidation of formic acid, formaldehyde and methanol, and therefore their oxidation on both PtPb and PtBi intermetallic compounds proceeds via a non-CO(ads) pathway. Quantitative DEMS measurements indicate that only CO(2) was detected as a final product during formic acid oxidation on Pt, PtPb and PtBi electrodes. At a smooth polycrystalline platinum electrode, the oxidation of formaldehyde and methanol produces mainly intermediates (formaldehyde and formic acid), while CO(2) is a minor product. In contrast, CO(2) is the major product for formaldehyde and methanol oxidation at a PtPb electrode. The high current efficiency of CO(2) formation for methanol and formaldehyde oxidation at a PtPb electrode can be ascribed to the complete dehydrogenation of formaldehyde and formic acid due to electronic effects. The low onset potential, high current density and high CO(2) yield make PtPb one of the most promising electrocatalysts for fuel cell applications using small organic molecules as fuels.

5712. Wang, H.-f., et al. (2013). "Transoral penetrating craniocerebral injury by a bamboo chopstick in a child." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **20**(5): 746-748.

We present a 3-year-old girl with a transoral injury by a bamboo chopstick penetrating the middle skull base. The features of imaging are described and the management is discussed. The potential for injury to the cavernous sinus is emphasized, even if no there is no hemorrhage on the initial CT scan. Early intracranial infection in relation to penetrating injuries is a factor in planning treatment by craniotomy.

5713. Wang, I. K., et al. (2015). "Comparison of Subdural Hematoma Risk between Hemodialysis and Peritoneal Dialysis Patients with ESRD." Clinical journal of the American Society of Nephrology : CJASN **10**(6): 994-1001.

BACKGROUND AND OBJECTIVES: This study compared the risk of subdural hematoma (SDH) and subsequent mortality in hemodialysis (HD) and peritoneal dialysis (PD) patients with ESRD., DESIGN, SETTING, PARTICIPANTS, & MEASUREMENTS: Claims data were obtained from the National Health Insurance Administration Research Database in Taiwan. This retrospective cohort study comprised 10,136 PD patients and 10,136 HD patients with newly diagnosed ESRD from 1998 to 2010. Patients were matched by propensity score and year of dialysis initiation. Incidence rates and hazard ratios of SDH as well as odds ratios of subsequent 30-day deaths from SDH were evaluated from the date of the first dialysis session to the date when SDH was diagnosed, or the date of renal transplantation, death, withdraw from insurance, or the end of the follow-up period (December 31, 2011)., RESULTS: Median (25th percentile, 75th percentile) follow-up times for SDH events were 3.61 years (1.91, 6.33) and 3.33 years (1.83, 5.66) in the HD and PD cohorts, respectively. The overall SDH incidence rate (95% confidence interval [95% CI]) was 61.4% higher in the HD cohort than in the PD cohort (34.7 [95% CI, 31.4 to 35.4] versus 21.5 [95% CI, 20.2 to 22.9] per 10,000 person-years, with an adjusted hazard ratio of 1.62 [95% CI, 1.17 to 2.33]). Approximately 152 of 253 (60%) of SDH events were associated with trauma. Subsequent 30-day SDH-related mortality was not statistically higher in HD patients than in PD patients (29.1% versus 25.3%; adjusted odds ratio, 1.30; 95% CI, 0.70 to 2.41)., CONCLUSIONS: HD patients have a higher risk of developing SDH than PD patients. Both patient groups have a high risk of mortality. Routine education on fall prevention is needed for dialysis patients.

5714. Wang, J. and H. M. Bartkowski (1997). "Early onset of leptomeningeal cyst with severe brain herniation: report of two cases." Neuropediatrics **28**(3): 184-188.

Leptomeningeal cyst as a rare complication of skull fracture in children is well documented. Most cases occur months or years after the original skull fracture, with characteristic roentgenogram findings. The authors report two cases of leptomeningeal cysts in children less than two years old. The association of hygroma, severe brain injury, increased ICP, and early development of leptomeningeal cyst are discussed. Both patients sustained parietal diastatic skull fracture and developed external brain herniation within 10 days after motor vehicle accidents. Clinically they

presented with seizure, hemiparesis, and an enlarging subgaleal mass over the skull fracture. MRI demonstrated severe underlying brain contusion, hygroma around the fracture site, and brain herniation through the skull fracture. Surgical repair of dural laceration and cranioplasty produced good results. The development of hygroma and increased intracranial pressure might account for the early development of leptomeningeal cysts in these two cases.

5715. Wang, J., et al. (2019). "Virtual reality and integrated crime scene scanning for immersive and heterogeneous crime scene reconstruction." Forensic science international **303**: 109943.

Crime scene reconstruction plays a significant role in crime solving by helping to determine the course of events. Non-invasive, high-resolution measurement and increased insight are always the goal of forensic crime scene documentation. However, entire crime scenes cannot be effectively reconstructed with traditional methods. In this study, we present a portable system that consists of a laser scanner, two hand-held structured light scanners and a low-cost virtual reality (VR) headset with a mobile power supply to conduct multi-angle and omnidirectional three-dimensional spatial data collection of crime scenes. To demonstrate practical use, a real case has been analysed to verify the feasibility and effectiveness of the system. The system accurately obtains information on decedent injuries, possible injury-inflicting tools and on-site traces. Various types of evidence from the crime scene can be jointly studied by three-dimensional visualization to develop a cohesive story. The data are presented via immersive VR rather than displayed on computer screens. The relationship between evidence chains enables us to achieve a complete crime scene reconstruction, using the specialized knowledge of experts and computer-aided forensic tools to analyse the causes of damage and identify suspects. The use of three- dimensional imaging techniques allows a more insightful survey and several useful analyses, such as accurate measurement, relative blood source location determination and injury-inflicting tool comparison.

5716. Wang, J., et al. (2013). "Introducing newtechniques for imaging of metal in gunshotwounds with cranial facial injuries-howdoes it affect management?" Emergency radiology **20**(5): 347.

Purpose/Aim: 1. Review the various imaging modalities used to evaluate gunshot wounds (GSW) with cranial facial injuries 2. Review common patterns of injury, with particular attention to bone fracture patterns in exit and entry wounds 3. Review essential CT findings for a surgeon's knowledge prior to surgery (i.e. ballistic wound path and angles) Background: Firearm-related injuries are the second leading cause of injuryrelated deaths in United States. Fourteen percent of all gunshot-related assaults will result inmaxillofacial injuries. Unfortunately, there has been an increase in the incidence of gunshot wounds to the face. Although gunshot-related craniofacial injuries are still not as common as those to other regions of the body, the incidence rate has been increasing, and thus if the trend continues, mortality rate related to fire arms will exceed the mortality associated with motor vehicle collisions (MVC). Currently MVC are the most common cause of death for maxillofacial injury. Thus, it is critical to recognize maxillofacial injuries early to help expedite management efficiently and effectively. Content Organization: -Parameters used in clinical assessment of GSWwith cranial facial injuries -Review imaging modalities available for assessment including radiographs, ultrasound, MRI and angiography with emphasis on MDCT as exam of choice -Characteristic findings on MDCT in the setting of GSW with focus on location of bullet and bone fragments within the skull, intracranial course of the bullet and skull fractures associated with the GSWImaging examples of various patterns of injury of GSW -Examples of new techniques to reduce artifacts from metal on CT (i.e. Iterative reconstruction, Mono-energetic spectral imaging) -Usefulness and limitations ofMDCT in the setting of determining management and the need for surgical exploration Summary/Conclusion: Major teaching points: -There are characteristic patterns of injuries of GSW with cranial facial injuries -New techniques can help to minimize artifacts from metal foreign bodies -MDCT is the imaging modality of choice for determining appropriate surgical interventions.

5717. Wang, J., et al. (2012). "Direct repair of displaced anterior arch fracture of the atlas under microendoscopy: experience with seven patients." European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society **21**(2): 347-351.

INTRODUCTION: In general, bony injuries heal well with immobilization when the fractured segments are well apposed in the cases of stable atlas fracture. Osseous nonunion of the displaced anterior arch fracture of the atlas has been reported in the literature. However, there have been no reports published on the treatment of nonunion of the atlas fractures., OBJECTIVE: The objective of this study is to describe a new technique for direct repair of the displaced

anterior arch fracture of the atlas in a minimally invasive manner., METHODS: Seven patients with the atlas fracture were treated by a minimally invasive approach. Reduction of anterior arch fractures was not performed by skull traction and the displacement of fractures was more than 5 mm. Direct autograft was performed under microendoscope to improve union of the anterior arch fractures. Radiographic and CT evaluation of the atlas fractures were performed at 3, 6 and 12 months postoperatively., RESULTS: Seven cases of the atlas fractures (one old and six new fractures) underwent the surgical procedure smoothly without major complications. Total average displacement of the anterior arch fracture was 5.7 mm (range 5-8 mm) before surgery. Of the seven patients, bony union of the fracture developed in six. At latest follow-up, two patients had neck pain associated with movement and limited range of rotational motion., CONCLUSION: Direct repair under microendoscope is a new technique that improves bony union of displaced anterior arch of the atlas fractures.

5718. Wang, M. L., et al. (1992). "A comparison of visual outcome in open-globe repair: succinylcholine with D-tubocurarine vs nondepolarizing agents." Ophthalmic surgery **23**(11): 746-751.

We compared the visual outcome in patients with ocular perforations who received succinylcholine with d-tubocurarine during anesthesia induction, with the visual outcome of those who did not. No statistically significant differences in visual outcome were detected. No extrusion of intraocular contents occurred during induction in either group.

5719. Wang, P., et al. (2022). "PRELIMINARY PHARMACOKINETIC AND PHARMACODYNAMICS (PK/PD) PROFILE OF PERIPHERALLY ADMINISTRATED ANTI-CD47 ANTIBODIES IN A RAT MODEL OF PTBI." Journal of neurotrauma **39**(11-12): A57.

There remains a lack of therapeutic options for traumatic brain injury (TBI)-induced intracerebral hematoma clearance. CD47 is an antiphagocytic cell surface protein involved in hematoma stability. Preclinical stroke models have demonstrated potential for anti-CD47 antibodies in augmenting hematoma clearance. The objective of this study was to evaluate the pharmacokinetic and pharmacodynamics profile of intravenously (i.v.) administrated anti-CD47 antibody following TBI, and potential neuroprotective effects. Anti-CD47 antibody therapy was administered at varying doses intravenously. Blood, urinalysis and extensive diagnostic necropsy were used to evaluate the safety of this antibody. Anti-CD47 antibody concentration in blood and brain lysates was detected using a customized fluorescence-based spectrophotometric assay. Neurological assessment, cerebral edema measurement and immunohistochemistry were used to determine efficacy on mitigating TBIinduced neuropathology. At 2 hrs post-injury, preliminary results showed that anti-CD47 antibody was detected in plasma at 10.37±0.36 ug/ml and was still present in plasma at 72 hrs post-injury at a concentration of 2.41± 0.52 ug/ml. In addition, 32 ng/ml (contralateral) and 55 ng/ml (ipsilateral) were detected in brain lysates. Neurological assessment revealed no change in neurological deficits following anti-CD47 antibody treatment. Blood test and initial necropsy analysis has demonstrated no severe adverse events but additional evaluation is ongoing. These results provide preliminary evidence that peripherally administrated anti-CD47 antibodies following pTBI did not cause severe adverse events and iswell tolerated. While no improvement of neurological deficits was observed, continued analysis of neuropathology will evaluate potential neuroprotective effects and hematoma clearance.

5720. Wang, P., et al. (2014). "Immunotherapeutic efficacy of recombinant Mycobacterium smegmatis expressing Ag85B-ESAT6 fusion protein against persistent tuberculosis infection in mice." Human vaccines & immunotherapeutics **10**(1): 150-158.

The application of immunotherapy in combination with chemotherapy is considered an effective treatment strategy against persistent Mycobacterium tuberculosis (Mtb) infection. In this study, we constructed a novel recombinant Mycobacterium smegmatis (rMS) strain that expresses Ag85B and ESAT6 fusion protein (AE-rMS). Immunization of C57BL/6 mice with AE-rMS generated mainly Th1-type immune responses by strongly stimulating IFN-gamma- and IL-2-producing splenocytes and increasing antigen-specific cytotoxic T lymphocyte (CTL) activity. To test the immunotherapeutic efficacy of AE-rMS, a persistent tuberculosis infection (PTBI) model was established via tail-vein injection of C57BL/6 mice with 1x10(4) colony forming units (CFU) of Mtb strain H37Rv in combination with concurrent chemotherapy drugs isoniazid (INH) and pyrazinamide (PZA). PTBI mice immunized with AE-rMS showed high levels of IFN-gamma secreted by splenocytes and decreased bacteria loads in lung. Treatment with only the anti-tuberculosis

(anti-TB) drugs RFP and INH (RI), decreased bacteria loads to low levels, with the Th1-type immune response further attenuated. Moreover, AE-rMS, when combined with RI treatment, further reduced the bacteria load as well as the pathological tissue damage in lung. Together, these results demonstrated the essential roles of AE-rMS-induced Th1-type responses, providing an effective treatment strategy by combining AE-rMS and RI for persistent TB.

5721. Wang, Q., et al. (2010). "Fatal facial-intracranial impalement injury in an accidental fall from a height: an autopsy case report with a review of the literature." Forensic science international **200**(1-3): e21-24.

Impalement injury to the face and head is of clinical and forensic pathological significance because of its diagnostic pitfalls. This injury often penetrates the orbital, nasal or oral cavity into the skull, but impaling other sites of facial bone is rare. The present case was a rare type of facial-intracranial impalement injury with a direct cerebral arterial laceration. The victim was a 44-year-old man who fell from a height of about 2.5m onto a broken chair and died 6 days later despite surgical treatment. The clinical diagnosis was a 'small abrasion' of the face and 'traumatic intracerebral hemorrhage with intraventricular and subarachnoid hemorrhages' on computed tomography (CT). At autopsy, a small crescent laceration was seen below the right zygomatic region. Intracranial lesions comprised a perforating skull-base fracture, a subarachnoid hemorrhage with laceration of the posterior communication artery, and a massive intraventricular hematoma that involved cerebral injury connected with the skull-base fracture, which were consistent with penetration by a steel tube from the chair. A review of the literature suggested that such severe intracranial-facial impalement injuries are caused by traffic accidents or falls, and the prognosis was poor due to an injury around the brainstem despite an appropriate clinical diagnosis. Furthermore, the present case suggested the difficulty of clinical diagnosis even using CT; thus, a forensic autopsy was necessary to determine the manner and cause of death.

5722. Wang, Q., et al. (2004). "Alterations of myelin basic protein and ultrastructure in the limbic system at the early stage of trauma-related stress disorder in dogs." The Journal of trauma **56**(3): 604-610.

BACKGROUND: The secondary injury and related complications after trauma are still the focus of trauma research. However, whether the remote effects on the central nervous system could be induced by high-energy missile extremity impact remains unclear. Also, the possible biomarker for brain damage in traumatic stress disorder has not been determined., METHODS: Forty-two healthy adult dogs were divided into three groups: the control group (n = 12), the high-speed trauma group (n = 15), and the low-speed trauma group (n = 15). Bilateral thighs of dogs were wounded with a smoothbore 6.2-mm rifle at a speed of 1,368 m/s (1.03-g steel bullet) for the high-speed trauma group and 625 m/s for the low-speed trauma group. The expression of myelin basic protein (MBP) in cerebrospinal fluid (CSF), hypothalamus and hippocampus of the limbic system, and temporoparietal cortex was investigated by enzyme-linked immunosorbent assay and dot-blot analysis. Also, the ultrastructure of the above areas was observed with light and electron microscopy., RESULTS: Neuronal degeneration and nerve fiber demyelination were seen in the hypothalamus and hippocampus in the high-speed trauma group at 8 hours after impact. The MBP level was markedly increased in the CSF ($p < 0.01$) in the two trauma groups, in the hypothalamus of the low-speed trauma group ($p < 0.05$), and in both the hypothalamus and the hippocampus of the high-speed trauma group ($p < 0.01$). The expression of MBP mRNA was also significantly enhanced in these areas at the same time. The increase of MBP content in the CSF was positively correlated with the elevation of MBP concentration in the hypothalamus and hippocampus., CONCLUSION: The hypothalamus and hippocampus of the limbic system in the central nervous system are vulnerable to damage after high-energy missile extremity impact, indicating that it might be one of the important pathologic bases involved in the development of trauma-related complications. Meanwhile, the MBP level in the CSF may be a sensitive biological indicator for brain damage at the early stage of trauma-related stress disorder.

5723. Wang, S.-H., et al. (2021). "Survival after multiple nail gun injuries to the brain, lung, and heart: a case report and a review of the literature." The Journal of international medical research **49**(10): 3000605211049923.

Most nail gun injuries involve the extremities and result from work-related accidents. Injuries to the brain or thorax are relatively rare, and cases with injuries to both regions are even rarer and often lethal. Initial evaluation, resuscitation, and surgical planning can be challenging for emergency physicians and surgeons. We present the details of a man with multiple nail gun injuries to the brain, lung, and heart following a suicide attempt. The patient presented to the emergency department in shock. After immediate resuscitation, emergent sternotomy, and subsequent craniotomy,

he was discharged without significant morbidity. According to the literature, this is the only reported case involving multiple nail gun injuries to the brain, lungs, and heart. The mortality rate of multiple nail gun injuries involving the head and chest is approximately 20%. Rapid evaluation, immediate resuscitation, and appropriate imaging and surgery are crucial for increasing survival and achieving a good prognosis. Emergency sternotomy for cardiac injury is the foremost priority, and the timing of craniotomy depends on the patient's vital sign status and whether brain injury is evident.A preprint of this article is available online: DOI: 10.21203/rs.3.rs-35448/v1.

5724. Wang, T. C., et al. (2020). "Noise induced hearing loss and tinnitus—new research developments and remaining gaps in disease assessment, treatment, and prevention." Brain Sciences **10**(10): 1-11.

Long-term noise exposure often results in noise induced hearing loss (NIHL). Tinnitus, the generation of phantom sounds, can also result from noise exposure, although understanding of its underlying mechanisms are limited. Recent studies, however, are shedding light on the neural processes involved in NIHL and tinnitus, leading to potential new and innovative treatments. This review focuses on the assessment of NIHL, available treatments, and development of new pharmacologic and non-pharmacologic treatments based on recent studies of central auditory plasticity and adaptive changes in hearing. We discuss the mechanisms and maladaptive plasticity of NIHL, neuronal aspects of tinnitus triggers, and mechanisms such as tinnitus-associated neural changes at the cochlear nucleus underlying the generation of tinnitus after noise-induced deafferentation. We include observations from recent studies, including our own studies on associated risks and emerging treatments for tinnitus. Increasing knowledge of neural plasticity and adaptive changes in the central auditory system suggest that NIHL is preventable and transient abnormalities may be reversable, although ongoing research in assessment and early detection of hearing difficulties is still urgently needed. Since no treatment can yet reverse noise-related damage completely, preventative strategies and increased awareness of hearing health are essential.

5725. Wang, W., et al. (2015). "Complex reconstruction of facial deformity and function after severe gunshot injury: One case report." International Journal of Clinical and Experimental Medicine **8**(1): 1427-1433.

In this report, we described clinical outcomes of a multi-stage surgery integrating multiple techniques in restoration of facial morphology and function of a 17-year-old boy with severe gunshot injuries. This multi-stage surgery was applied in treatment of one rare case of gunshot-caused complicated facial deformities involving most parts of the face (labrum, left nose wing, nasal columella, nasal septum, maxillary alveolar process, hard palate, soft palate, bilateral maxillary bones, left zygoma, suborbital bone defects) and clinical efficacy upon restoring facial form and function were retrospectively evaluated. The patient was diagnosed with massive facial defects and deformities caused by gunshot, which led to feeding difficulty, severe articulation disorders and serious facial disfigurement. To reconstruct facial form and restore functions of mastication and articulation, multiple examinations and surgical procedures including mirror imaging, rapid prototyping technique, porous titanium implants, microscopic surgical technique, dental implants, osteomyocutaneous flap, muscular flap, shifting and repairing of adjacent tissue flaps and free bone graft reconstruction were undertaken. Postoperatively, reconstruction of severe facial disfigurement and restoring basic functions including articulation and feeding for the first time and relatively sound clinical outcomes have been obtained, which may add clinical evidence to the treatment of similar cases of severe facial deformities.

5726. Wang, W., et al. (2018). "Free bone segments preservation in the treatment of mandibular fracture caused by gunshot wound: A report of two clinical cases." Journal of Biomaterials and Tissue Engineering **8**(3): 363-365.

Mandibular gunshot wounds can cause serious complications and it’s important to select adequate methods to fix and reconstruct the mandible. Proper debridement and preservation of the scattered bone segments may be a good choice for preventing the bone defect. Here, two cases were reported to share our successful experiences of free bone preservation in the treatment of mandibular fracture due to the gunshot.

5727. Wang, W., et al. (2017). "Long-Term Follow-Up of Flap Prefabrication in Facial Reconstruction." Annals of plastic surgery **79**(1): 17-23.

BACKGROUND: Flap prefabrication is to turn a random flap into an axial flap by transferring a vascular pedicle., METHODS: In the past 13 years, we have prefabricated 20 flaps in 20 patients by the superficial temporal artery and its

concomitant veins. Typically, a 50- to 800-mL tissue expander was implanted in the donor site. After flap maturation, the prefabricated flap was raised and transferred locally to cover the large defect on the face. All the cases were followed up regularly., RESULTS: The patients' age were between 3 and 27 years, the size of the flaps were between 3.5 x 5.5 cm and 13 x 15 cm, the superficial temporal artery length was between 10 and 15 cm. All flaps were transferred successfully: 10 of the flaps had venous congestion, partial epidermis exfoliation and flap necrosis occurred in 4 flaps. All cases were followed up for at least 1 year, the longest follow-up period was 9 years. Long-term follow-up results showed the prefabricated flap survived in good condition and had a satisfactory outcome., CONCLUSIONS: Because flap prefabrication is practical, and long-term follow-ups have proved its preferable characters and stability, it is a fine method for large area facial reconstructions.

5728. Wang, X., et al. (2017). "Systemic antimiR-337-3p delivery inhibits cerebral ischemia-mediated injury." Neurobiology of disease **105**: 156-163.

Modulation of miRNA expression has been shown to be beneficial in the context of multiple diseases. The purpose of this study was to determine if an inhibitor of miR-337-3p is neuroprotective for hypoxic injury after tail vein injection. We evaluated miR-337-3p expression levels and in brain tissue in vivo before and after permanent middle cerebral artery occlusion (pMCAO) in mice. Subsequently, a custom locked nucleic acid (LNA) antimir-337-3p oligonucleotide was developed and tested in vitro after induction of oxygen glucose-deprivation (OGD) and in vivo by injection into the mouse tail vein for 3 consecutive days before pMCAO. Ischemic lesion volume was measured by TTC staining. We show that systemically administered LNA antimir-337-3p crosses the blood brain-brain-barrier (BBB), penetrates into neurosn, downregulates endogenous miR-337-3p expression and reduces ischemic brain injury. The findings support the use of similar antimir-LNA constructs as novel therapies in neurological disease. Copyright © 2017. Published by Elsevier Inc.

5729. Wang, X., et al. (2013). "Orbital trauma with a large plant foreign body: a case report." Eye science **28**(1): 44-47.

We report a case of a large plant foreign body in the orbit. A 30-year-old male presented to our hospital 6 h after a penetrating orbital injury in his left superior eyelid when he skidded from his motorcycle while riding. When the patient reported to us, he already had an inability to open his left eye and a continuous pain in the left orbit. On examination, there was a large plant foreign body penetrating the nasal orbit through the left upper eyelid. Orbital CT revealed a low density linear foreign body measuring 3.6 x 0.5 cm in the left orbit. An emergency operation was performed to remove the foreign body. The patient's visual acuity did not recover satisfactorily due to optic nerve injury. This case highlights the fact that careful surgical removal of foreign bodies is the treatment of choice and that all patients should receive post-operative antibiotic therapy because of the high incidence of secondary orbital infections. The final outcome and prognosis depend greatly upon the composition and location of the foreign body and whether there are serious complications.

5730. Wang, Y., et al. (2008). "Delayed presentation of grease-gun injury to the orbit." Ophthalmic plastic and reconstructive surgery **24**(2): 154-156.

A 44-year-old man was examined for marked edema and ptosis of the right upper eyelid after grease from high-pressure hydraulic machinery penetrated his right orbit 20 days earlier. The diagnosis of residual grease in the injured orbit was confirmed by CT and MRI, and the clinical presentation. During orbital exploration, the grease was removed completely. Among the wide variety of orbital foreign bodies, grease is rarely reported. We present the sixth case of grease-gun injury to the orbit to be reported in the English language literature since 1964.

5731. Wang, Y., et al. (2014). "The surgical treatment of reinforced steel bar injury penetrating the skull base and maxilla-mandibular area." The Journal of craniofacial surgery **25**(6): e521-523.

Penetrating injuries with reinforced screwed steel bar in the skull base represent a unique challenge for oral maxillofacial surgeons. Management of these injuries is complicated by associated injuries and the proximity to vital neurovascular structures. A 35-year-old man was admitted to our hospital because of injury due to a downward fall upon a reinforced steel rod. Radiologic studies of the skull base revealed that the steel bar traversed the temporomandibular space between the left cervical spine and the mastoid process to the space between the inner side

of the left mandibular ramus and the maxilla. We performed osteotomy of the left mastoid process tip and the left mandibular ramus to take out the steel bar from the maxilla and repaired the left mandible with internal fixation. Appropriate preoperative planning, including three-dimensional computed tomographic images, is integral in the surgical approach for the safe removal of such objects.

5732. Wang, Y., et al. (2022). "Lycopene attenuates oxidative stress, inflammation, and apoptosis by modulating Nrf2/NF-kappaB balance in sulfamethoxazole-induced neurotoxicity in grass carp (Ctenopharyngodon Idella)." Fish & shellfish immunology **121**: 322-331.

All drugs that can penetrate the blood-brain barrier (BBB) may lead to mental state changes, including the widely used anti-infective drug sulfamethoxazole (SMZ). Herein, we investigated whether lycopene (LYC) could ameliorate SMZ-induced brain injury and the postulated mechanisms involved. A total of 120 grass carps were exposed under SMZ (0.3 mug/L, waterborne) or LYC (10 mg/kg fish weight, diet) or their combination for 30 days. Firstly, brain injury induced by SMZ exposure was suggested by the damage of BBB (decreases of Claudins, Occludin and Zonula Occludens), and the decrease of neurotransmitter activity (AChE). Through inducing oxidative stress (elevations of malondialdehyde and 8-hydroxy-2 deoxyguanosine, inhibition of glutathione), SMZ increased the intra-nuclear level of NF-kappaB and its target genes (TNF-alpha and interleukins), creating an inflammatory microenvironment. As a positive feed-back mechanism, apoptosis begins with activation of pro-death proteins (Bax/Bcl-2) and activation of caspases (caspase-9 and caspase-3). Meanwhile, a compensatory upregulation of constitutive Nrf2 and its downstream antioxidative gene expression (NAD(P)H Quinone Dehydrogenase 1 and Heme oxygenase 1) and accelerated autophagy (increases of autophagy-related genes and p62 inhibition) were activated as a defense mechanism. Intriguingly, under SMZ stress, LYC co-administration decreased NF-kappaB/apoptosis cascades and restored Nrf2/autophagy levels. The neuroprotective roles of LYC make this natural compound a valuable agent for prevention SMZ stress in environment. This study suggests that LYC might be developed as a potential candidate for alleviating environmental SMZ stress in aquaculture.

5733. Wang, Y.-x., et al. (2003). "[Restoration of deformities caused by complex fracture of the orbit region and adjacent cranio-maxillofacial fracture]." Zhonghua kou qiang yi xue za zhi = Zhonghua kouqiang yixue zazhi = Chinese journal of stomatology **38**(6): 450-451.

OBJECTIVE: In order to improve the diagnosis and treatment of the complex fracture of the orbit region and adjacent cranio-maxillofacial fracture., METHODS: 73 cases with blowout fracture of the orbit and adjacent cranio-maxillofacial fracture in recent years were retrospectively analyzed and compared with different methods of treatment. All cases had undertaken CT examinations., RESULTS: The positive rate of the CT examinations with blowout fracture of the orbit and adjacent cranio-maxillofacial region were 100%. Operating repositioning, rigid fixation and artificial material placement were used to treat this kind of deformities., CONCLUSIONS: With the progress of modern photographic methods, blowout fracture of the orbit and adjacent cranio-maxillofacial fracture can be diagnosed clearly and help the operation procedure. Operations with reduction, rigid fixation and filling materials can be used to restore this kind of fracture and appearance.

5734. Wani, A. A., et al. (2012). "Management dilemma in penetrating head injuries in comatose patients: Scenario in underdeveloped countries." Surgical neurology international **3**: 89.

BACKGROUND: The optimal management of patients with minimal injury to brain has been a matter of controversy and this is especially intensified when the patient has a poor neurological status. This is important in the regions where neurosurgical services are limited and patient turnover is disproportionate to the available resources. We aimed to determine the effectiveness of aggressive management in coma patients after penetrating missile injuries of the brain., METHODS: All the patients of gunshots or blast injuries were included if they had a Glasgow Coma Scale score of less than 8 after initial resuscitation and had no other injury that could explain their poor neurological status. The indication for emergency surgery was evidence of a mass lesion causing a significant mass effect; otherwise, debridement was done in a delayed fashion. The patients who were not operated were those with irreversible shock or having small intracranial pellets with no significant scalp wounds. The patients who had a Glasgow outcome score of 1, 2, or 3 were classified as having an unfavorable outcome (UO) and those with scores 4 and 5 were classified as having a favorable outcome (FO)., RESULTS: We operated 13 patients and the rest 13 were managed conservatively. The

characteristics of the patients having a favorable outcome were young age (OR = 28, P = 0 .031), normal hemodynamic status (OR = 18, P = 0.08), presence of pupillary reaction (OR = 9.7, P = 0.1), and injury restricted to one hemisphere only (OR = 15, P = 0.07). All of the patients who were in shock after resuscitation died while 25% of the patients with a normal hemodynamic status had a favorable outcome., CONCLUSIONS: In developing countries with limited resources, the patients who are in a comatose condition after sustaining penetrating missile injuries should not be managed aggressively if associated with bihemispheric damage, irreversible shock, or bilateral dilated nonreacting pupils. This is especially important in the event of receiving numerous patients with the same kind of injuries.

5735. Wani, A. A., et al. (2011). "Missile injury to the pediatric brain in conflict zones." Journal of neurosurgery. Pediatrics **7**(3): 276-281.

OBJECT: This study was conducted both prospectively and retrospectively at one center over a period of 8 years. The population consisted of all patients with both an age 18 years or younger and a diagnosed penetrating missile injury (PMI) during the study interval. The authors analyzed factors determining outcome and demographic trends in this population, and they compared them with those in the more developed world., METHODS: Fifty-one patients were the victims of armed conflict, although no one was directly a party to any battle. This mechanism of injury is in strong opposition to data in the literature from developed countries, in which most missile injuries are the result of suicide or homicide or are even sports related. Moreover, all previous studies on the pediatric population have considered only injuries from gunshots, but authors of the current study have included injuries from other penetrating missiles as well., RESULTS: On cross tabulation analysis using the chi-square test, the factors shown to correlate with outcome included the Glasgow Coma Scale (GCS) score, pupillary abnormalities, patient age, hemodynamic status, and bihemispheric damage. On multinomial regression analysis, the two strongest predictors of death were GCS score and pupillary abnormalities. The GCS score and hemodynamic status were the strongest predictors of disability., CONCLUSIONS: There was no difference in the prognostic factors for PMI between developing or more developed countries. Glasgow Coma Scale score, pupillary abnormalities, and hemodynamic status were the strongest predictors of outcome. In conflict zones in developing countries the victims were mostly innocent bystanders, whereas in the more developed countries homicides and suicides were the leading etiological factors.

5736. Wani, A. A., et al. (2011). "Delayed intracerebral hematoma after a bullet injury to brain leading to secondary pulmonary edema." Neurosurgery Quarterly **21**(4): 252-254.

The outcome of brain trauma is determined by the initial injury and the development of secondary problems, such as hematomas, edema, herniation, infections, cerebrospinal fluid leaks, and seizures. The DICH can cause rapid clinical deterioration of the patient and can even lead to fatal outcome. The problem is unusual but not rare. Although first reported in 1895 by Guibert, traumatic intracranial aneurysms (TICA) have received little attention in the literature. Missile TICA's are often seen on a secondary branch of middle cerebral artery and are usually accompanied by a intracerebral hematoma (80%) or by an acute subdural hematoma (26%). TICAs may enlarge in time, and seemingly inoffensive, may rupture and may lead to death. Depending on the patient's status and level of consciousness, angiography followed by the trapping of aneurysm is the treatment of choice. Our case has developed delayed posttraumatic intracerebral hematoma associated with pulmonary edema and subsequent death of the patient.

5737. Wani, A. A., et al. (2017). "Pediatric head injury: A study of 403 cases in a tertiary care hospital in a developing country." Journal of pediatric neurosciences **12**(4): 332-337.

Introduction: Traumatic brain injury (TBI) in children is a significant cause of morbidity and mortality worldwide. Falls are the most common type of injury, followed by motor vehicle-related accidents and child abuse. Aims and Objectives: The aim and objective of this study was to elucidate the various modes of injury, prognostic factors, complications, incidence of various modes of injury, and outcome in TBI in pediatric population. Materials and Methods: Patients with TBI, 18 years or less in age, managed in our Department of Neurosurgery, over a period of 2 years, were studied prospectively. Detailed history, general physical examination, systemic examination, and central nervous system examination including assessment of Glasgow Coma Scale score (GCS) and pupillary size and reaction were noted in every patient. Based on GCS, patients were divided into mild head injury (GCS 13-15), moderate head injury (GCS 9-12), and severe head injury (GCS ≤8) categories. All the patients were subjected to plain computed tomography (CT) scan

head, and CT findings were noted. Patients were managed conservatively or surgically as per the standard indications. The outcome of all these patients was assessed by Glasgow outcome scale and divided into good (normal, moderate disability) and poor (severe, vegetative, dead) outcome. Outcome was assessed in relation to age, sex, GCS, pupil size and reaction, CT scan features, intervention, and associated injuries. Results: A total of 403 patients aged between 1 day and 18 years were included in the study comprising 252 males (63%) and 151 females (37.75%). The common modes of injury were fall 228 (56.6%) followed by road traffic accidents 138 (34.2%), assault 10 (2.5%), and others 27 (6.7%) which include sports injury, hit by some object on head, and firearm injury. Majority of our patients had a GCS of 13-15 (mild head injury), 229 (57.3%), followed by 9-12 (moderate head injury) 119 (29.8%), followed by 8 or less (severe head injury) 52 (13%). In group of patients in the category of GCS ≤ 8, poor outcome was seen in 65.3%, followed by patients in group GCS 9-12 at 2.45% succeeded by group of patients with GCS 13-15 at 2.6%, which was statistically significant (P 0.0001). A total of 354 (87.8%) patients had normal pupils, 37 (9.2%) had anisocoria, and 12 (3%) patients had fixed dilated pupils. Fixed dilated pupil had poor outcome (100%) followed by anisocoria (40.5%) and normal pupils (16%), which was statistically significant (P 0.0001). Conclusion: Majority of children who suffer from TBI do well although it still continues to be a significant cause of morbidity and mortality in them. The outcome is directly related to the neurological status in which they present to the hospital.

5738. Wani, N. A. and A. Q. Khan (2010). "Foreign body within sphenoid sinus: multidetector-row computed tomography (MDCT) demonstration." Turkish neurosurgery **20**(4): 547-549.

Trans-nasal sphenoid sinus foreign body is a rare condition. We report a case of trans-nasal gun bullet within the sphenoid sinus with breach of the floor of the sella turcica. A 42-year-old soldier presented a few weeks after a gun battle with a history of headache. The skull x-ray demonstrated a foreign body in the region of sphenoid sinus and sella. Multidetector-row CT with multiplanar reformats demonstrated a bullet within the sphenoid sinus with its tip penetrating into the sella turcica. A few days later the patient coughed up the bullet as it came out spontaneously without any intervention. This is perhaps the unique occurrence of such a foreign body.

5739. Wankhede, A. G. (2008). "Patterned injuries caused by wooden plank." Journal of forensic and legal medicine **15**(2): 118-123.

Wooden planks of different dimensions are commonly used in construction of buildings, fence of houses, bullock-carts and walls of huts. There is plenty of opportunity for wooden plants to be used as assault implements. Three cases of homicide are reported. In each case a wooden plank was the weapon of offence. The causes of death were respectively anal impalement injury, liver rupture and head injury. Case 1: A 30-year-old man who was beaten by a wooden plank and had it inserted per anum was found alive by a police officer after approximately 48 h. He sustained multiple patterned contused abrasions and death was attributed to purulent peritonitis due to perforation of small intestine by the wooden plank. Case 2: A 50-year-old man working as a security guard at a building construction site was killed by his 21-year-old son by beating him with a wooden plank found around the construction site. The deceased sustained multiple contusions, abrasions, typical patterned contused abrasions and lacerations externally. Death was attributed to shock due to ruptured liver. Case 3: A 13-year-old female was killed by her 19-year-old male paternal cousin with one stroke of a wooden plank over head. At autopsy she was having a lacerated wound to forehead below which there was a patterned fracture of skull. Death was attributed to sub-arachnoid hemorrhage following head injury. We have recorded peculiar patterned abrasions, patterned fracture with wooden fragment and part of impaled wooden plank in abdominal cavity. These types of injuries are rare. The cases emphasise the need for accurate description of these injuries with photographs in order to achieve effective evaluation and recognition of this type of patterned wounds as they correspond to specific weapons.

5740. Wannatoop, T. and W. Slisatkorn (2022). "Endovascular treatment of concomitant innominate and subclavian artery injury with pseudoaneurysms from a gunshot wound in a polytrauma patient." Trauma (United Kingdom) **24**(1): 72-76.

Introduction: Injury of the innominate artery (IA) is associated with high mortality and morbidity, such as a major neurologic event. The aim of this case report was to describe an example of prioritization in polytrauma management by applying endovascular intervention in a difficult case with impending uncal herniation, extensive cerebral infarction, and large pseudoaneurysm from concomitant innominate and right subclavian artery injuries. Case

Report: A 34-year-old woman sustained a gunshot wound to her upper chest that lodged in the anterior triangle of her neck and presented with tension pneumothorax and cardiac arrest, which was successfully resuscitated. Subsequently she developed drowsiness and left hemiparesis, and computerized tomography demonstrated a large right cerebral hemisphere and left cerebellar region infarction with impending uncal herniation and pseudoaneurysms from the IA and proximal right subclavian artery. After emergency craniectomy to avert herniation, endovascular treatment was performed to facilitate vessel repair due to anatomical difficulty and the patient's unstable condition. She was discharged home 3 weeks after operation, and 2 months postoperatively, she was neurologically intact with no evidence of endoleakage or pseudoaneurysm. Conclusion: In such a complex polytrauma case, correct prioritization of interventions is crucial to obtaining the best outcomes, and the Endovascular Resuscitation and Trauma Management protocol can be applied as an alternative treatment protocol with good results.

5741. Ward, J. D., et al. (1994). "Penetrating head injury." Critical care nursing quarterly **17**(1): 79-89.

Penetrating head injuries are a significant public health problem in the United States, with an estimated 33,000 gun-related deaths and many more nonfatal shootings per year. Initial treatment for a penetrating head injury is similar to that of a closed head injury. That is, all efforts must be made to prevent any secondary insults, hypoxia, or ischemia. This translates into the standard methodology of care of the trauma patient. The basic neurologic examination consists of using the Glasgow Coma Score and estimation of pupillary function and some estimation of brain stem function and motor power. The radiologic test of choice for a penetrating head injury is the computed tomography scan. There are several indications for surgery: the patient's condition will be improved or significant neurologic sequelae will be averted; the patient is sufficiently stabilized from any other injuries such that he or she can tolerate surgery; the condition of the patient is not so poor that surgery will have no effect; and the area of penetration is reasonably accessible to surgical intervention. Three main goals of medical management of a penetrating head injury include (1) control of hypertension, (2) maintenance of adequate cerebral circulation oxygenation, and (3) prevention of secondary complications. Outcome after a penetrating head injury is related to the extent of brain tissue damage caused either directly or indirectly by the missile as well as any indirect insults. The most significant indicator, particularly in terms of survival versus death, has consistently been the patient's presenting neurologic status. Some investigators have recommended that a patient presenting with a Glasgow Coma Scale Score of > 5 should not be treated. Others have said that patients with a low coma score and transventricular gunshot wounds should not be treated because of the high mortality. If the patient survives a penetrating head injury, he or she generally goes on to experience a relatively good functional outcome. Only if all components of a good treatment regimen are in place will patients and their families obtain the best possible outcome.

5742. Warden, D. (2006). "Military TBI during the Iraq and Afghanistan wars." The Journal of head trauma rehabilitation **21**(5): 398-402.

Traumatic brain injury (TBI) is an important source of morbidity in the Iraq and Afghanistan wars. Although penetrating brain injuries are more readily identified, closed brain injuries occur more commonly. Explosion or blast injury is the most common cause of war injuries. The contribution of the primary blast wave (primary blast injury) in brain injury is an area of active research. Lessons learned from the sports concussion and civilian mild TBI literature are useful. Individuals with TBI and posttraumatic stress disorder require treatment of both conditions. Families and communities need to be cognizant of the needs of these returning veterans.

5743. Warpeha, R. L. (1981). "Resurfacing the burned face." Clinics in plastic surgery **8**(2): 255-267.

Facial burns cause deformities through the permanent effects of wound contracture and scar hypertrophy; they are related to the depth of the burn. The depth of an acute burn can be accurately ascertained only by observation over a period of time. Facial skin burns that do not heal by three weeks are subject to increasingly permanent deformity with the passage of time. The best defense against wound contraction and hypertrophic scar is early and complete wound closure. Early and late grafting must be completely successful in "take" to avoid unsightly irregular scarring; therefore, the receptor bed must be meticulously prepared for optimal take. Both early and late grafts are patches that flatten normal contour. However, if the skin graft conforms to a position in the facial mosaic (aesthetic unit of the face), or some subunit that is harmonious with normal facial lines, the patch of proper color can give a more aesthetic result. Nonreproducible anatomical structures such as the margins of the lids, lips, and nostrils should be preserved whenever

found to be normal or only partially destroyed. To minimize the distorting effects of wound contracture, pressure therapy of the face and neck, as well as the positional splinting of the neck, must be maintained for many months following grafting and epithelialization until the deleterious wound forces abate. Burns of mobile structures, such as lids and lips, do not lend themselves to control by pressure, and frequently must be managed secondarily by first totally removing scarred tissues and then applying thick skin grafts of the best color match.

5744. Wasicek, P. J., et al. (2021). "Survival Following Self-Inflicted Gunshot Injuries to the Face Using the National Trauma Data Bank." The Journal of craniofacial surgery **32**(6): 2064-2067.

INTRODUCTION: Self-inflicted gunshot wounds to the face frequently result in devastating injuries; however, there is a paucity of large experiences describing determinants of mortality and outcomes., METHODS: Using the National Trauma Databank from 2007 to 2015, patients suffering self-inflicted firearm facial injuries were included., RESULTS: Over 9 years 7869 patients were included: 87.7% were male, 46.4% suffered traumatic brain injury (TBI) and overall in-hospital mortality was 44.7%. The majority (67.8%) of in-hospital mortality occurred within the first 24 hours. Using multiple regression, advanced age (>65 years), presence of TBI, admission hypotension, and decreased Glasgow coma score were each independently associated with increased odds of mortality (all $P < 0.001$). Mandible or combined mandible/midface fracture injury patterns were most likely to survive ($P < 0.001$). Of those surviving to hospital discharge, the median [interquartile range] length of stay was 13 [6, 23] days, 86.6% required an intensive care unit stay with 67% requiring intubation and 42.5% tracheostomy. Among survivors, the combined mandible and midface fracture pattern resulted in the highest rates of tracheostomy (70.5%), gastrostomy tube placement (50.5%), and facial operations (87.0%) with a median [interquartile range] of 5 [3, 7] operative trips (all $P < 0.001$)., CONCLUSIONS: Self-inflicted facial firearm injuries are highly morbid injuries with the majority of in-hospital deaths occurring the first hospital day. Differences including concomitant TBI, facial injury pattern, neurologic status, and presence of hypotension on admission were independently associated with survival/death. More extensive facial injuries (combined mandible and midface fracture patterns) were more likely to survive and required more intensive interventions.

5745. Wasserman, S. M. and J. A. Cohen (1979). "Spontaneous migration of an intracranial bullet fragment." The Mount Sinai journal of medicine, New York **46**(5): 512-515.

5746. Watanabe, O., et al. (1981). "[A case of unusual craniocerebral penetrating injury (author's transl)]." No shinkei geka. Neurological surgery **9**(6): 727-731.

5747. Waters, J. B., et al. (1999). "Development and implementation of clinical pathways for the management of four trauma diagnoses." Journal for healthcare quality : official publication of the National Association for Healthcare Quality **21**(3): 4-11.

Clinical pathways are similar to the production algorithms developed by industry. They are being adapted for use in healthcare to reduce resource utilization, decrease variability, and control expenditures. At Boston Medical Center we identified four trauma diagnoses that we believed to be amenable to the design and implementation of clinical pathways: closed head injury, penetrating wound to the abdomen, penetrating wound to the chest, and penetrating wound to an extremity. Upon implementation of these pathways, appropriate nonoperative, single-system, short-stay trauma patients were enrolled in them. This article details the process by which the four diagnoses were identified and the pathways designed, implemented, and evaluated. Preliminary data demonstrate a significant decrease in resource utilization following implementation of the pathways, without an adverse impact on readmission rates, length of stay, or mortality.

5748. Watkins, F. P., et al. (1988). "Physical effects of the penetration of head simulants by steel spheres." The Journal of trauma **28**(1 Suppl): S40-54.

5749. Watters, W. (1998). "Will's journey: a rebirth. A study of the effects of chronic illness on the human spirit." The Journal of neuroscience nursing : journal of the American Association of Neuroscience Nurses **30**(5): 314-317.

5750. Watts, A. C. and N. Mel (2019). "Acanthamoeba encephalitis in HIV-infected male presenting with headache and tonic-clonic seizures: A case report." Journal of General Internal Medicine **34**(2): S464.

Learning Objective #1: Recognize the radiographic and pathologic features of Acanthamoeba encephalitis Learning Objective #2: Formulate a differential diagnosis for space-occupying brain lesions in immunocompromised patients CASE: A 27-year-old man with Acquired Immune Deficiency Syndrome (with a CD4+ cell count of 5 cells/mm3) presented with tonic-clonic seizures and headache. Physical exam on admission did not reveal focal neurological deficits. Laboratory studies showed a WBC of 4.6 K/mcL (12.7% eosinophils). Magnetic resonance imaging (MRI) demonstrated a right frontoparietal peripherally enhancing lesion with mild surrounding edema and associated mass effect. Cerebrospinal fluid studies demonstrated neutrophil-predominant pleocytosis (WBC 147/mcL with 50% neutrophils) with normal protein and glucose. Broad-spectrum therapy for potential bacterial, viral, and fungal infections was initiated; nonetheless, the patient developed increasing somnolence and new focal neurological deficits. Repeat MRI six days after admission demonstrated new, enlarging edema-tous and peripherally enhancing lesions favored to represent multifocal cerebritis. Craniotomy and open brain biopsy with resection of dura was performed ten days after admission. Pathology revealed lymphohistiocytic inflammation with amoebic necrotizing abscesses. Immunohistochemical and PCR testing confirmed Acanthamoeba infection. Despite multidrug treatment (with miltifosine, flucytosine, pentaminidine, sulfdiazine, flucon-azole, and azithromycin), the patient expired on hospital day 16. IMPACT/DISCUSSION: Acanthamoeba is a pervasive protozoal species found in soil, water, air, and dust; the organism has been associated with three infectious syndromes in humans: amoebic encephalitis, disseminated granulomatous amebic disease, and keratitis (especially in contact lense users). Unlike the fulminant infection caused by Naegleria fowleri, Acanthamoeba causes a subacute encephalitis that progresses over days to months. Acanthamoeba likely causes central nervous system infection in immunocompromised hosts through hematogenous spread after initial pulmonary or skin inoculation and subsequent penetration of the blood-brain barrier. Investigational therapies for Acanthamoeba encephalitis include surgical resection of lesions and combination drug therapy. Conclusion: Amoebic encephalitis is an exceedingly rare cause of central nervous system infection with a mortality exceeding 90%. Various protozoa have been implicated in central nervous system disease, including Naegleria fowleri, Balamuthia mandrillaris, and multiple species of Acanthamoeba. Little data exists regarding the clinical characteristics, radiographic findings, and treatment of Acanthamoeba encephalitis, as fewer than 150 cases have been reported globally since the condition was first described in the 1960s. Acanthamoeba encephalitis should be considered in immunocompromised patients presenting with central nervous system infection, as delayed recognition and treatment contribute to the condition's grave prognosis.

5751. Wearne, M. J., et al. (1998). "Vitreoretinal surgery after inadvertent globe penetration during local ocular anesthesia." Ophthalmology **105**(2): 371-376.

OBJECTIVE: This study aimed to review visual morbidity resulting from inadvertent globe penetration during administration of local anesthetic and to identify the most appropriate management., DESIGN: The records of 20 consecutive patients referred to a specialist vitreoretinal unit over a 2-year period were reviewed., PARTICIPANTS: Twenty eyes of 20 consecutive patients were included., INTERVENTION: Observations included type of local anesthetic administered (e.g., retrobulbar or peribulbar), level of training of person administering the block, type of needle used for the block, and findings at presentation to the vitreoretinal unit. The authors also observed results of B-scan ultrasound evaluation of the retina, interval between the recognition of the complication and referral, as well as nature and timing of subsequent surgical intervention., MAIN OUTCOME MEASURES: Final visual acuity and retinal status (attached versus detached) were measured., RESULTS: The most common presentation was vitreous hemorrhage observed from the first postoperative day. Ten eyes were found to have an associated retinal detachment on initial assessment in the vitreoretinal unit. These eyes generally had a poor visual outcome despite vitrectomy with long-acting gas or silicone oil tamponade. Seven (70%) of the remaining eyes with attached retina at the time of presentation achieved good visual recovery after vitrectomy., CONCLUSIONS: The authors recommend prompt referral for consideration of early vitrectomy in eyes with dense vitreous hemorrhage after inadvertent globe penetration. This management may improve the overall visual prognosis by preventing subsequent retinal detachment.

5752. Weber, J. and A. Czarnetzki (2001). "Brief communication: neurotraumatological aspects of head injuries resulting from sharp and blunt force in the early medieval period of southwestern Germany." American journal of physical anthropology **114**(4): 352-356.

Approximately 10% (33 of 304) of the predominantly male skulls from the 6th through 8th centuries in southwestern Germany exhibit cranial fractures derived from blunt or sharp force trauma. No evidence of fracture healing characterizes 24% (n = 8) of these individuals. All nonhealed fractures were caused by sharp force, and four of these wounds cross the sagittal sinus. The lengths of these straight-edged wounds, produced exclusively by sword blows, measure around 8.0 cm for fatal, and about 5.0 cm for nonfatal wounds. Seventy-six percent (n = 25) of these skulls exhibit some healing, which indicates that these injuries did not lead to immediate death. In this group are all depressed fractures resulting from blunt force blows. Two thirds of the 45 cranial injuries noted on these 33 skulls are located on the left side of these individuals, with a concentration in the frontoparietal region. Bony indications of wound infection occur in four cases (12%). Three crania exhibit circular trepanations in association with fractures. These phenomena are discussed in the context of modern neurotraumatological knowledge. Copyright 2001 Wiley-Liss, Inc.

5753. Weber, M., et al. (2021). "Sharp force trauma with two katana swords: identifying the murder weapon by comparing tool marks on the skull bone." International journal of legal medicine **135**(1): 313-322.

This paper describes the variety of information that a tool mark analysis on human tissue can provide based on a case of multiple sharp violence. The perpetrator attacked the victim with a sharp-edged weapon against the head, leaving several deep wounds on the back of the skull bone. Three of those marks on the skull bone could be used for a forensic tool mark examination. Silicone casts of the marks were compared by light microscopy with casts of test marks of Japanese katana swords found at the crime scene. One of the swords could be identified as the one responsible for the marks. In addition, the marks and the test marks were scanned in 3D and examined in a visual on-screen comparison confirming the results from the light microscopic examination. Furthermore, a mathematical approach in which the signatures of the marks from the skull bone and the test marks from the sword were compared by cross correlation confirms those findings. In addition, the aforementioned results were used to determine the orientation of the sword in relation to the cranial bone at the time of the respective impact.

5754. Webster, J. E., et al. (1946). "Observations on early type of brain abscess following penetrating wounds of the brain." Journal of neurosurgery **3**: 7-14.

5755. Wecht, C. H. and R. P. Smith (1974). "Medical evidence in the assassination of President John F. Kennedy." Legal medicine annual **0**(0): 71-98.

5756. Weedn, V. W. and R. E. Mittleman (1984). "Stud guns revisited: report of a suicide and literature review." Journal of forensic sciences **29**(2): 670-678.

Stud guns (powder-actuated fastening tools) are a commonly used construction tool. Accidental injuries and fatalities are no longer frequent, presumably because of current safety features and practices. A case of an intentional fatal wound (suicide) is described. A literature review of stud gun injuries is also presented.

5757. Wegner-Kempf, L., et al. (1994). "[Intracerebral abscess 48 years after grenade splinter injury]." Intrazerebraler Abszess 48 Jahre nach Granatsplitterverletzung. **34**(11): 671-673.

The case report of a 54-year-old patient with a right frontal intracerebral abscess 48 years after a missile injury is presented. Treatment included surgical evacuation and antibiotic therapy. The patient was discharged without neurological deficit.

5758. Wehrmann, D., et al. (2017). "Penetrating Ocular Trauma from a Bean Bag Gun: A Case Report and Review of Less-Lethal Force and Their Consequences." Missouri medicine **114**(4): 308-310.

Although bean bag guns are considered a "less-lethal" form of law enforcement, these blunt projectiles have risk. The purpose of this study was to perform a literature review of morbidity and mortality associated with less-lethal munitions and present a case report of a bean bag injury leading to a traumatic globe evisceration and skull base fracture. Patients presenting with bean bag gun associated injuries warrant a high clinical suspicion for injury to deeper structures.

5759. Wei, G., et al. (2010). "Intracranial pressure following penetrating ballistic-like brain injury in rats." Journal of neurotrauma **27**(9): 1635-1641.

Penetrating ballistic brain injury involves a leading shockwave producing a temporary cavity causing substantial secondary injury. In response to the prevalence of this type of brain trauma in the military, a rat model of penetrating ballistic-like brain injury (PBBI) was established. This study focuses on cerebral physiological responses resulting from a PBBI, specifically the immediate and delayed changes in intracranial pressure (ICP) and cerebral perfusion pressure (CPP). ICP/CPP was measured continuously in rats subjected to PBBI, probe insertion alone, or sham injury. Immediately following the PBBI, a transient (<0.1 sec) and dramatic elevation of ICP reaching 280.0 +/- 86.0 mm Hg occurred, accompanied by a profound decrease in CPP to -180.2 +/- 90.1 mm Hg. This emergent ICP/CPP response resolved spontaneously within seconds, but was followed by a slowly-developing and sustained secondary phase, which peaked at 24 h post-injury, reaching 37.2 +/- 10.4 mm Hg, and remained elevated until 72 h post-injury. The measured decrease in CPP reached 85.3 +/- 17.2 mm Hg at 3 h post-injury. By comparison, probe insertion alone did not produce the immediate ICP crisis (28.6 +/- 9.1 mm Hg), and only a mild and sustained increase in ICP (13.5 +/- 2.1 mm Hg) was observed in the following 3 h post-injury. Injury severity, as measured by lesion volume, brain swelling, and neurological deficits at 1, 3, and 7 days post-injury, also reflected the distinctive differences between the dynamics of the PBBI versus controls. These results not only reinforced the severe nature of this model in mimicking the ballistic effect of PBBI, but also established cerebral pathophysiological targets for neuroprotective therapies.

5760. Wei, H. H., et al. (2009). "NNZ-2566 treatment inhibits neuroinflammation and pro-inflammatory cytokine expression induced by experimental penetrating ballistic-like brain injury in rats." Journal of neuroinflammation **6**: 19.

BACKGROUND: Inflammatory cytokines play a crucial role in the pathophysiology of traumatic brain injury (TBI), exerting either deleterious effects on the progression of tissue damage or beneficial roles during recovery and repair. NNZ-2566, a synthetic analogue of the neuroprotective tripeptide Glypromate, has been shown to be neuroprotective in animal models of brain injury. The goal of this study was to determine the effects of NNZ-2566 on inflammatory cytokine expression and neuroinflammation induced by penetrating ballistic-like brain injury (PBBI) in rats., METHODS: NNZ-2566 or vehicle (saline) was administered intravenously as a bolus injection (10 mg/kg) at 30 min post-injury, immediately followed by a continuous infusion of NNZ-2566 (3 mg/kg/h), or equal volume of vehicle, for various durations. Inflammatory cytokine gene expression from the brain tissue of rats exposed to PBBI was evaluated using microarray, quantitative real time PCR (QRT-PCR), and enzyme-linked immunosorbent assay (ELISA) array. Histopathology of the injured brains was examined using hematoxylin and eosin (H&E) and immunocytochemistry of inflammatory cytokine IL-1beta., RESULTS: NNZ-2566 treatment significantly reduced injury-mediated up-regulation of IL-1beta, TNF-alpha, E-selectin and IL-6 mRNA during the acute injury phase. ELISA cytokine array showed that NZ-2566 treatment significantly reduced levels of the pro-inflammatory cytokines IL-1beta, TNF-alpha and IFN-gamma in the injured brain, but did not affect anti-inflammatory cytokine IL-6 levels., CONCLUSION: Collectively, these results suggest that the neuroprotective effects of NNZ-2566 may, in part, be functionally attributed to the compound's ability to modulate expression of multiple neuroinflammatory mediators in the injured brain.

5761. Wei, L. A., et al. (2016). "Traumatic orbital encephalocele: Presentation and imaging." Orbit (Amsterdam, Netherlands) **35**(2): 72-77.

OBJECTIVE: Traumatic orbital encephalocele is a rare but severe complication of orbital roof fractures. We describe 3 cases of orbital encephalocele due to trauma in children., METHODS: Retrospective case series from the University of Wisconsin - Madison and Medical College of Wisconsin., RESULTS: Three cases of traumatic orbital encephalocele in pediatric patients were found. The mechanism of injury was motor vehicle accident in 2 patients and accidental self-inflicted gunshot wound in 1 patient. All 3 patients sustained orbital roof fractures (4 mm to 19 mm in width) and frontal lobe contusions with high intracranial pressure. A key finding in all 3 cases was progression of

proptosis and globe displacement 4 to 11 days after initial injury. On initial CT, all were diagnosed with extraconal hemorrhage adjacent to the roof fractures, with subsequent enlargement of the mass and eventual diagnosis of encephalocele., CONCLUSION: Orbital encephalocele is a severe and sight-threatening complication of orbital roof fractures. Post-traumatic orbital encephalocele can be challenging to diagnose on CT as patients with this condition often have associated orbital and intracranial hematoma, which can be difficult to distinguish from herniated brain tissue. When there is a high index of suspicion for encephalocele, an MRI of the orbits and brain with contrast should be obtained for additional characterization. Imaging signs that should raise suspicion for traumatic orbital encephalocele include an enlarging heterogeneous orbital mass in conjunction with a roof fracture and/or widening fracture segments.

5762. Wei, L.-F., et al. (2013). "Surgical therapy for craniocerebral firearm injury." Turkish neurosurgery **23**(4): 491-497.

AIM: The current study aims to explore the clinical characteristics of craniocerebral firearm injury and to improve the diagnosis and treatment of this condition., MATERIAL AND METHODS: Data from 56 patients with craniocerebral firearm injury were analyzed retrospectively for projectile types, traumatic conditions, and treatment approaches., RESULTS: 43 patients exhibited intracranial foreign body residence. Of them, 40 were subjected to complete foreign body removal and 2 to partial removal, leaving 1 without receiving removal treatment. 54 patients (96.4%) survived and 2 (3.6%) died. Of the survivors, 36 (64.3%) recovered well, 15 (26.8%) were moderately disabled, 2 (3.6%) were severely disabled, and 1 (1.8%) lapsed into vegetative state. Patients receiving debridement within 8 h after injury had a significantly higher recovery rate than those receiving such treatment after 8 h (82.1% vs. 26.7%; $P < 0.001$)., CONCLUSION: Craniocerebral firearm injury is characterized by rapid traumatic condition development as well as serious trauma and contamination. Accurately judging the traumatic condition and the ballistic tract, performing complete debridement as early as possible, reasonably deciding on the operative mode and approach for intracranial residing foreign body removal, and increasing vigilance regarding concomitant injuries are the keys to the improvement of the overall treatment of craniocerebral firearm injury.

5763. Wei, R., et al. (2010). "Removal of a foreign body from the skull base using a customized computer-designed guide bar." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **38**(4): 279-283.

BACKGROUND: Foreign bodies located at the base of the skull pose a surgical challenge. Here, a customized computer-designed surgical guide bar was designed to facilitate removal of a skull base foreign body., METHODS: Within 24h of the patient's presentation, a guide bar and mounting platform were designed to remove a foreign body located adjacent to the transverse process of the atlas and pressing against the internal carotid artery., RESULTS: The foreign body was successfully located and removed using the custom designed guide bar and computer operative planning. Ten months postoperatively the patient was free of complaints and lacked any complications such as restricted opening of the mouth or false aneurysm. The inferior alveolar nerve damage noted immediately postoperatively (a consequence of mandibular osteotomy) was slightly reduced at follow-up, but labial numbness persisted., CONCLUSIONS: The navigation tools described herein were successfully employed to aid foreign body removal from the skull base.

5764. Weichel, E. D., et al. (2009). "Traumatic brain injury associated with combat ocular trauma." The Journal of head trauma rehabilitation **24**(1): 41-50.

PURPOSE: To determine the impact of traumatic brain injury (TBI) on visual outcomes in combat ocular trauma (COT) and determine the association between TBI severity and types of ocular injuries., PARTICIPANTS: One hundred fifty-two US casualties sustained 207 globe/oculoplastic combat injuries., METHODS: Retrospective, hospital-based cross-sectional study of US service members injured during Operations Iraqi Freedom and Enduring Freedom were treated by the Ophthalmology Service at Walter Reed Army Medical Center and screened for TBI by the Defense and Veterans Brain Injury Center from August 2004 to October 2006., MAIN OUTCOME MEASURES: The main outcome measure was best-corrected visual acuity (BCVA). Secondary outcome measures included the severity and frequency of TBI with globe, oculoplastic, and/or neuro-ophthalmic injury., RESULTS: The frequency of COT with positive TBI screening was 101 of 152 cases (66%) in comparison with negative TBI screening, which was 51 of 152 (34%) cases. The Defense and Veterans Brain Injury Center found TBI with concomitant ocular trauma in 101 of 474 (21%) consecutive casualties. Explosive fragmentary munitions accounted for 79% of TBI-associated COT. The median follow-up was 185

days. Traumatic brain injury severity did not correlate with worse final BCVA (Spearman coefficient, r = 0.12). The odds that BCVA worse than 20/200 was present with TBI was not statistically significant (OR: 1.5; 95% CI, 0.9-2.6; P = .10). The presence of TBI in COT was not associated with worse visual outcome (Mann-Whitney U test, P = .10). Globe injuries were more common than oculoplastic or neuro-ophthalmic injury. Closed-globe injuries were more likely to have TBI than open-globe injuries (OR: 2.17; 95% CI, 1.12-4.21; P = .03). Traumatic brain injury severity associated with COT included mild TBI (31%), moderate TBI (30%), severe TBI (25%), and penetrating TBI (14%). Severe TBI is more frequently associated with COT., CONCLUSION: Traumatic brain injury occurs in two thirds of all COT and ocular trauma is a common finding in all TBI cases. Closed-globe injuries are at highest risk for TBI while TBI does not appear to lead to poorer visual outcomes. Every patient with COT needs TBI screening. Those service members who are screened TBI positive need a referral to a TBI rehabilitation specialist.

5765. Weil, A. G., et al. (2011). "Low-energy penetrating nail injury through the petrous segment of the ICA." The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques **38**(4): 649-651.

5766. Weinacht, S., et al. (1998). "Optic atrophy induced by an intraorbital wooden foreign body: the role of CT and MRI." Journal of pediatric ophthalmology and strabismus **35**(3): 179-181.

5767. Weisbrod, A. B., et al. (2012). "Long-term outcomes of combat casualties sustaining penetrating traumatic brain injury." The journal of trauma and acute care surgery **73**(6): 1525-1530.

BACKGROUND: Previous studies have documented short-term functional outcomes for patients sustaining penetrating brain injuries (PBIs). However, little is known regarding the long-term functional outcome in this patient population. Therefore, we sought to describe the long-term functional outcomes of combat casualties sustaining PBI., METHODS: Prospective data were collected from 2,443 patients admitted to a single military institution during an 8-year period from 2003 to 2011. PBI was identified in 137 patients and constitute the study cohort. Patients were stratified by age, Injury Severity Score (ISS) and admission Glasgow Coma Scale (aGCS) score. Glasgow Outcome Scale (GOS) scores were calculated at discharge, 6 months, 1 year and 2 years. Patients with a GOS score of 4 or greater were considered to have attained functional independence (FI)., RESULTS: The mean (SD) age of the cohort was 25 (7) years, mean (SD) ISS was 28 (9), and mean (SD) aGCS score was 8.8 (4.0). PBI mechanisms included gunshot wounds (31%) and blast injuries (69%). Invasive intracranial monitoring was used in 80% of patients, and 86.9% of the study cohort underwent neurosurgical intervention. Complications included cerebrospinal fluid leak (8.3%), venous thromboembolic events (15.3%), meningitis (24.8%), systemic infection (27.0%), and mortality (5.8%). The cohort was stratified by aGCS score and showed significant improvement in functional status when mean discharge GOS score was compared with mean GOS score at 2 years. For those with aGCS score of 3 to 5 (2.3 [0.9] vs. 2.9 [1.4], $p < 0.01$), 32% progressed to FI. For those with aGCS score of 6 to 8 (3.1 [0.7] vs. 4.0 [1.2], $p < 0.0001$), 63% progressed to FI. For those with aGCS score of 9 to 11 (3.3 [0.5] vs. 4.3 [0.8], $p < 0.0001$), 74% progressed to FI. For those with aGCS score of 12 to 15 (3.9 [0.7] vs. 4.8 [0.4], $p < 0.00001$), 100% progressed to FI., CONCLUSION: Combat casualties with PBI demonstrated significant improvement in functional status up to 2 years from discharge, and a large proportion of patients sustaining severe PBI attained FI., LEVEL OF EVIDENCE: Epidemiologic study, level III.

5768. Weisman, R. A., et al. (1983). "Computed tomography in penetrating wounds of the orbit with retained foreign bodies." Archives of otolaryngology (Chicago, Ill. : 1960) **109**(4): 265-268.

Penetrating wounds of the orbit can have serious immediate and delayed effects on the eye and the CNS. Infection, vessel erosion, or interference with ocular function necessitates removal of the foreign object. Precise localization of the retained material and its relationship to the globe, extraocular muscles, optic nerve, and brain is essential, when surgery is contemplated. We describe two children with retained foreign bodies that required removal. Computed tomography (CT) was essential in one instance in planning the surgical approach. In the other patient, the retained foreign body and an associated brain abscess were recognized only by CT. The contribution of CT to the assessment of retained foreign bodies is discussed and its present limits are defined. Computed tomography is highly recommended as the single most informative diagnostic modality for this type of injury.

5769. Weisner, Z., et al. (2020). "Association of prehospital hypocarbia and hypercarbia with outcomes with severe traumatic brain injury patients." Critical Care **24**.

Introduction: Hypocarbia and hypercarbia alter cerebral blood flow and intracranial pressure. Both might cause secondary brain injury after traumatic brain injury (TBI). Methods: We performed a retrospective observational study from Jan 2012 to Dec 2017 including adult blunt trauma patients with initial Glasgow Coma Scale (GCS) ≤ 14, clinical suspicion for TBI, endotracheal intubation and continuous capnography. We excluded interfacility transfers, penetrating TBI and cases treated for herniation (management includes hyperventilation). All patients were treated by a single air medical transport service in southwest Pennsylvania. Our primary exposure was depth-duration of EtCO2 <35mmHg (hypocarbia). Secondary outcomes were depth-duration of hypercarbia >45mmHg, and maximum depths of hypocarbia and hypercarbia. Our primary outcome was survival to discharge. Covariates were age, sex, initial GCS, shock index and first prehospital serum lactate. We performed unadjusted and adjusted logistic regression testing relationships between EtCO2 and outcome. Results: Overall, 148 patients were included and 113 (76%) survived. Overall, 104 (70%) were hypocarbic at least once. Median hypocarbia depth was 26 [IQR 18-30] mmHg, median hypocarbia duration was 15 [4 - 28] min, and median depth-duration was 60 [14 - 141] mmHg∗min. Hypercarbia occurred in 56 (38%) patients. Median duration of hypercarbia short (0.5 [0 - 5] min) and median depth duration was only 2 [IQR 0 - 18] mmHg∗min. Neither hypocarbia nor hypercarbia (maximum, duration or depth-duration) were associated with outcome in unadjusted or adjusted models. Age [OR; 0.96, 95% CI 0.94-0.98], initial GCS scores [OR; 1.12, 95% CI 1.01 to 1.25] and shock index [OR; 0.41 95% CI 0.19 to 0.88] were independent predictors of mortality. Conclusions: Among intubated blunt TBI patients, prehospital hyper- and hypoventilation do not appear to worsen outcomes.

5770. Weisner, Z. M., et al. (2020). "Association of prehospital hypocarbia and hypercarbia with outcomes with severe traumatic brain injury patients." Academic emergency medicine **27**: S265-S266.

Background and Objectives: Hypocarbia causes cerebral vasoconstriction and decreases cerebral blood flow. Hypercarbia causes cerebral vasodilation and may increase intracranial pressure. Both may result in secondary brain injury and therefore worsen outcomes after traumatic brain injury (TBI). Methods: We performed a retrospective observational study from January 2012 to December 2017 including adult blunt trauma patients with initial Glasgow Coma Scale (GCS) ≤ 14, documented clinical suspicion for TBI, endotracheal intubation and continuous waveform capnography data available. We excluded interfacility transfers, penetrating TBI and cases treated for herniation (protocol includes deliberate hyperventilation). All patients were treated by a single critical care air medical transport service and transported to a Level 1 trauma center in southwest Pennsylvania. Our primary exposure of interest was depth-duration of EtCO2 45mmHg, maximum depth of hypocarbia and maximum depth of hypercarbia. Our primary outcome of interest was survival to hospital discharge. Covariates were age, sex, initial GCS, shock index and first prehospital serum lactate. We performed unadjusted and adjusted logistic regression testing the relationship between EtCO2 and outcome. Results: Overall, 148 patients were included of whom 113 (76%) survived. Among all patients, 104 (70%) were hypocarbic at least once. Median depth of hypocarbia was 26 [IQR 18-30] mmHg, median duration of hypocarbia was 15 [4 - 28] min, and median depth-duration was 60 [14 - 141] mmHg∗min. Hypercarbia was less common, with 56 (38%) patients hypercarbia at least once. Median duration of hypercarbia exposure was 0.5 min [0 - 5] min and median depth duration was 2 [IQR 0 - 18] mmHg∗min. Neither hypocarbia nor hypercarbia (maximum, duration or depth-duration) were associated with outcome in unadjusted or adjusted models. Age [OR; 0.96, 95% CI 0.94-0.98], initial GCS scores [OR; 1.12, 95% CI 1.01 to 1.25] and shock index [OR; 0.41 95% CI 0.19 to 0.88] were independent predictors of mortality. Conclusion: Among adult intubated patients with blunt TBI, prehospital hyper- and hypo-ventilation may not cause clinically significant secondary brain injury.

5771. Weiss, G. H., et al. (1986). "Predicting posttraumatic epilepsy in penetrating head injury." Archives of neurology **43**(8): 771-773.

Using data derived from a 15-year follow-up study of 520 veterans surviving penetrating brain wounds received in the Vietnam war, we have developed a predictive formula and tables for posttraumatic epilepsy based on time elapsed postinjury and presence of specific clinical and computed tomographic scan risk factors. Such patients remain at some increased risk for epilepsy even ten to 15 years postinjury, although most can be 95% certain of avoiding epilepsy if they have been seizure free for three years posttrauma. Epilepsy onset latency was independent of any risk factors identified.

5772. Weiss, R., et al. (2019). "Patterns of Pediatric Firearm-Related Ocular Trauma in the United States." JAMA ophthalmology **137**(12): 1363-1370.

Importance: Gun violence represents a substantial public health issue, and firearm-related injuries rank second among the causes of injury-related deaths in children aged 0 to 17 years in the United States. Ocular trauma from firearm-related injuries can lead to devastating vision loss, but little is known to date about the specific demographics and characteristics of such injuries in children., Objective: To evaluate the epidemiologic pattern of pediatric firearm-related ocular injuries., Design, Setting, and Participants: This retrospective analysis used deidentified data from the National Trauma Data Bank, the largest national registry of hospitalized trauma cases in the United States. The firearm-related ocular injuries (n = 1972) of pediatric patients (defined as those younger than 21 years) hospitalized between January 1, 2008, and December 31, 2014, were analyzed. Statistical analyses were conducted from July 15, 2017, to June 15, 2019., Exposure: Firearm-related ocular trauma., Main Outcomes and Measures: Pediatric patients with firearm-related ocular injuries were identified using International Classification of Diseases, Ninth Revision, Clinical Modification codes and external causes of injury codes. Patient demographics (age, sex, and race/ethnicity), type of ocular injury, injury intent, geographic location, length of hospital admission, health insurance status, disposition at discharge, Injury Severity Score (ISS), and Glasgow Coma Scale (GCS) score were collected., Results: A total of 8715 firearm-related ocular injuries were identified. Of these injuries, 1972 (22.6%) occurred in pediatric patients, most of whom were male (1678 [85.1%]) and adolescents (1037 [52.6%]), with a mean (SD) age of 15.2 (5) years. Common locations of injury were home (761 [38.6%]) and street (490 [24.8%]). Mean (SD) hospital length of stay was 7.6 (12) days, ISS was 16 (13.1), and GCS score was 11 (5.1). The most common types of firearm-related ocular injuries were open wound of the eyeball (820 [41.6%]) and ocular adnexa (502 [25.5%]), orbital injuries or fractures (591 [30.0%]), and contusion of the eye or adnexa (417 [21.1%]). Patients aged 0 to 3 years had greater odds of unintentional injuries (odds ratio [OR], 4.41; 95% CI, 2.51-7.75; P < .001) and injuries occurring at home (OR, 5.39; 95% CI, 2.81-10.38; P < .001), and those aged 19 to 21 years had greater odds of assault injuries (OR, 2.17; 95% CI, 1.77-2.66; P < .001) and injuries occurring on the street (OR, 1.61; 95% CI, 1.3-1.98; P < .001). Black patients had the greatest odds of having injuries with assault intention (OR, 4.53; 95% CI, 3.68-5.59; P < .001), and white patients had the greatest likelihood for self-inflicted injury (OR, 7.1; 95% CI, 5.92-9.51; P < .001). Traumatic brain injury resulted mostly from self-inflicted trauma (OR, 5.99; 95% CI, 4.16-8.63; P < .001), as did visual pathway injuries (OR, 2.86; 95% CI, 1.95-4.20; P < .001). The inpatient mortality rate was 12.2%., Conclusions and Relevance: This study found that pediatric firearm-related ocular injuries from 2008 through 2014 were predominantly sight-threatening and associated with traumatic brain injury. If the possible risk factors, including sex, age, race/ethnicity, and injury intention, can be confirmed for 2015 through 2019, these findings may be useful in developing strategies to prevent pediatric firearm-related ocular injuries.

5773. Weissman, M. N., et al. (1984). "In-utero gunshot wound to the head. Use of intraoperative ultrasonography for localization of an intracerebral projectile." Surgical neurology **21**(4): 347-350.

Approaching full gestational age, a 1700-g male fetus sustained a penetrating gunshot wound to the left parietal region of the head while in utero. The child was delivered by emergency caesarean section. Initially in profound fetal shock and with almost no neurological function, the child was eventually stabilized. A posttraumatic intracerebral porencephalic cyst developed, with the projectile moving freely within the confines of the cyst cavity. Six weeks after the initial injury, the patient underwent an operation for extraction of the projectile. The Neuro SectOR ATL ultrasound probe was used intraoperatively and was instrumental in determining the exact position of the intracerebral projectile.

5774. Weithoener, D. and U. Klages (1974). "[Determination of the mineral contents of human skulls by x-ray analysis with regard to projectile perforation (author's transl)]." Eine Bestimmung des Mineralgehaltes von menschlichen Schadelknochen aus dem Rontgenbild in Beziehung zu perforierenden Schussverletzungen **75**(3): 171-178.

5775. Welch, R. D. (2001). "Management of traumatically injured patients in the emergency department observation unit." Emergency medicine clinics of North America **19**(1): 137-154.

An EDOU may be an ideal setting for the short-term monitoring and treatment of certain acutely injured patients. The patients choosen for observation, and the diagnostic studies used, will be specific to a particular

institution's availability and expertise. Pathways should be developed in conjunction with all services caring for these patients.

5776. Wellwood, J., et al. (2002). "Neurotrauma: the role of CT angiogram." Neurological research **24 Suppl 1**: S13-16.

Cerebrovascular injuries can occur in blunt or penetrating head and neck trauma. A high index of suspicion based on mechanism of injury and clinical assessment warrants screening for intracranial and extracranial vascular lesions. Conventional angiogram has been and remains the gold standard for diagnosis of these injuries, but computerized tomography angiography offers a fast, noninvasive method of imaging for neurotrauma patients. Advantages and disadvantages of each modality are discussed.

5777. Welter, S. (2014). "Repair of tracheobronchial injuries." Thoracic surgery clinics **24**(1): 41-50.

Tracheobronchial injuries (TBIs) are caused by blunt, penetrating injury or by iatrogenic damage. Most injuries are life threatening and need early and skillful airway management. Bronchoscopy remains the gold standard of diagnosis. Penetrating TBI always needs blunt trauma, and iatrogenic TBI sometimes needs surgical exploration and reconstruction, which is performed after sparing debridement with primary repair and wound closure. Prognosis mainly depends on associated injuries and comorbidities in terms of tracheal membrane laceration.

5778. Welter, S. and W. Essaleh (2020). "Management of tracheobronchial injuries." Journal of Thoracic Disease **12**(10): 6143-6151.

Tracheobronchial injuries (TBI) are a heterogenous group of sometimes life-threatening traumas with different management approaches. Symptoms are mediastinal and subcutaneous emphysema, bloody secretions from the airway or haemoptysis in alert patients, and high air leakage along the cuff or increased ventilatory resistance may be signs for TBI in intubated patients. The necessity of immediate clinical evaluation, CT-scan and bronchoscopic evaluation are essential for prompt diagnosis and classification as well as experienced air way management and treatment, these patients are best managed from interdisciplinary teams including thoracic surgeons. While iatrogenic tracheal membrane laceration from intubation can be treated by lesion bridging with ventilation tube, stent application, open operative repair or endoluminal repair, intraoperative accidental cuts should be repaired by direct suture or with vital tissue coverage in case of local ischemia. The management of blunt or penetrating injury is sequential and needs immediate establishment and maintenance of a secure patent airway to provide adequate oxygenation. The next step is the treatment of life-threatening collateral injuries like major hemorrhage, cranial trauma or major organ damage arranged in the trauma team. The treatment of penetrating injuries to the airway need operative exploration in almost every case with minimal local dissection and debridement followed by direct repair. Muscle flap coverage is useful in case of combined esophageal injury. Damage of the tracheobronchial tree after blunt trauma must be repaired by direct suture or local tissue sparing resection and anastomosis. These lesions can be missed in the initial phase and may become prominent with scar tissue formation, stenosis and atelectasis in the later phases.

5779. Wen, P. Y., et al. (2015). "Ceritinib in ALK1 NSCLC metastatic to brain and/or leptomeninges: The ASCEND-7 study." Neuro-Oncology **17**: v52.

BACKGROUND: The anaplastic lymphomakinase inhibitor (ALKi) crizotinibachieves high responses in patients with ALK-rearranged (ALK+) non-small cell lung cancer (NSCLC). However, disease progression can occur within 1 year and the brain/central nervous system (CNS) is a common site of progression/relapse. Ceritinib is a novel oral ALKi with 20-fold greater potency than crizotinib in enzymatic assays and crosses the blood-brain barrier with good CNS penetration in preclinical studies. In phase 1 and 2 studies, ceritinib was highly active in ALK+ NSCLC patients (regardless of prior crizotinib exposure) and achieved intracranial responses in 31-59% of patients with measurable baseline brain lesions. METHODS: This international, prospective, phase 2, open-label study will evaluate the antitumor activity of ceritinib in patients with ALK+ NSCLC and active brain metastases (BM) or leptomeningeal carcinomatosis (LC), either with or without prior whole brain radiotherapy (WBRT) (ASCEND-7;NCT02336451). Eligible patients must have ALK+ (centrally assessed) NSCLC with active CNS metastases and ≥1 extracranial measurable lesion using Response Evaluation Criteria in Solid Tumors (RECIST) v1.1. Patients must be neurologically stable prior to study drug administration and will

be allocated to 1 of 5 arms: active BM without LC, with prior ALKi exposure, with or without prior WBRT (Arms 1 and 2, respectively); active BM without LC, with no prior ALKi exposure, with or without prior WBRT (Arms 3 and 4, respectively); LC with or without evidence of active lesion at baseline (Arm 5). Oral ceritinib 750 mg/day will be dosed on a continuous schedule. The primary and key secondary objectives are to evaluate overall response rate and disease control rate, respectively. Other secondary objectives include assessment of intracranial and extracranial response for all patients and overall survival and safety for all patients in arms 1-4, including pharmacokinetics for each of arms 1-5. Enrollment is ongoing.

5780. Wendling-Keim, D. S., et al. (2021). "Trauma Scores and Their Prognostic Value for the Outcome Following Pediatric Polytrauma." Frontiers in Pediatrics **9**.

Purpose: The management and prognostic assessment of pediatric polytrauma patients can pose substantial challenges. Trauma scores developed for adults are not universally applicable in children. An accurate prediction of the severity of trauma and correct assessment of the necessity of surgical procedures are important for optimal treatment. Several trauma scores are currently available, but the advantages and drawbacks for use in pediatric patients are unclear. This study examines the value of the trauma scores Injury Severity Score (ISS), Pediatric Trauma Score (PTS), National Advisory Committee for Aeronautics (NACA), and Glasgow Coma Score (GCS) for the assessment of the polytraumatized child. Methods: In a retrospective study, 97 patients aged 0–17 years who presented with polytrauma and an ISS ≥16 in the trauma bay were included in the study. Patient records including radiological studies were analyzed. Pathological imaging findings and emergency surgery were assessed as outcome variables and the predictive value of the trauma scores were analyzed using receiver operator characteristic (ROC) curves. Statistical significance was set at an alpha level of $P \leq 0.05$. Results: In this study, 35 of the 97 studied children had pathological cranial computed findings. These either underwent craniectomy or trepanation or a parenchymal catheter was placed for intracranial pressure monitoring. Abdominal trauma was present in 45 patients, 16 of which were treated surgically. Forty-three patients arrived with thoracic injuries, 10 of which received a thoracic drainage. One child underwent an emergency thoracotomy. Predictive accuracy for emergency surgery calculated using receiver-operator characteristic (ROC) curves was highest for ISS and NACA scores (0,732 and 0.683, respectively), and lower for GCS (0.246) and PTS (0.261). Conclusion: In our study cohort, initial ISS and NACA scores better predicted operative interventions and outcome than PTS or GCS for polytraumatized pediatric patients.

5781. Weppner, J. and H. Asthagiri (2017). "Hyponatraemia in patients with moderate and severe traumatic brain injury: risk factors, prevalence and short-term consequences." Brain injury. Conference: 12th world congress on brain injury of the international brain injury association. United states **31**(6-7): 793.

Objectives: Hyponatraemia, a common electrolyte disorder associated with traumatic brain injuries (TBIs), has been associated with high morbidity and mortality rates. In addition, hyponatraemia is one of the main causes of disability in TBI patients. Mild symptoms of hyponatraemia include irritability, headaches, nausea and poor balance with severe symptoms that include confusion, seizures, coma and even death. The pathophysiology of hyponatraemia in TBI is not completely understood, but in large part is explained by the syndrome of inappropriate secretion of antidiuretic hormone (SIADH) and cerebral salt wasting (CSW). Despite the importance of sodium disorders in TBI, the incidence has been little studied. The aim of this study is to identify the incidence of and risk factors for hyponatraemia in adult persons with moderate-to-severe TBI. Methods: Patients who were admitted to our level one trauma centre with moderate or severe TBI between May 2011 and May 2016 were retrospectively reviewed. Patients admitted with spinal cord injury and TBI were excluded as spinal cord injury could confound the cause of hyponatraemia. The relationships between the occurrence of hyponatraemia and age, sex, type of injury, Glasgow Coma Scale (GCS) score, Glasgow Outcome Scale score at discharge, whether the patient underwent surgery, the presence of cerebral oedema, skull fracture, and intracranial injury were analysed statistically using a chi2 test and multivariate logistic regression analysis. Results: Out of the 3460 subjects retrospectively reviewed for the study (2145 males and 1315 females; age of 45 +/- 13 years), 1214 (35%) suffered from hyponatraemia, which was defined as a serum sodium level <135 mmol/L. Hyponatraemia was associated with longer hospital stay ($p < .001$) and bad outcome, which was defined as a Glasgow Outcome Scale score of severe disability or higher on discharge ($p < .05$). Multivariate analysis indicated that hyponatraemia following TBI was not related to age ($p > 0.05$), sex ($p > 0.05$), or surgical history ($p > 0.05$), but that it was related to the intracranial haemorrhage (odds ratio = 3.11, $p < 0.05$), a GCS score <=8 (odds ratio = 4.25, $p < 0.001$), penetrating head trauma (odd ratio = 5.83, $p < 0.001$), the presence of cerebral oedema (odd ratio = 6.85, $p < 0.001$),

and skull fracture (odds ratio = 5.91, p < 0.001). Conclusions: To increase the understanding of hyponatraemia in persons with TBI, the present study investigated the prevalence and aetiology of hyponatraemia in the setting of TBI. The prevalence of hyponatraemia following TBI was not associated with age, sex, or whether the patient underwent surgery. TBI patients with intracranial haemorrhage, GCS score <=8, presence of cerebral oedema, penetrating head trauma and skull fracture are particularly prone to developing hyponatraemia. These patients require close monitoring of sodium and prompt treatment of hyponatraemia to normalize serum sodium levels to prevent deterioration of their condition.

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5782. Wesley, R. E., et al. (1987). "Management of orbital-cranial trauma." Advances in ophthalmic plastic and reconstructive surgery **7**: 3-26.

Orbital-cranial injuries have the greatest potential for death and disability of any condition treated by the ophthalmologist. An object that penetrates through the orbit into the brain may leave only a small entrance wound. Patients can have normal vision, neurologic exam, and plain x-rays despite trauma that may lead to meningitis, brain abscess, or pneumocephalus. The CT scan greatly aids in both the early and late management of blunt and penetrating orbital-cranial trauma. The detection of pneumocephalus may be the only clue that intracranial penetration has occurred. Blunt trauma can cause vision loss, ophthalmoplegia, ptosis, and intracranial injury. Management of orbital-cranial trauma frequently requires a team approach by the ophthalmologist and neurosurgeon due to the complexity of these injuries.

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5783. Wesley, R. E. and C. D. McCord (1982). "Tension pneumocephalus from orbital roof fracture." Annals of ophthalmology **14**(2): 184-190.

Despite the detection and treatment of an extensive orbitocranial fracture in an 18-year-old man following a motor vehicle injury, the persistent leakage of CSF and trapping of air within the intracranial cavity resulted in fulminant neurologic deterioration due to the mass effect of air when tension pneumocephalus developed. The ethmoidal defect closed spontaneously, and the patient recovered neurologically when the tension pneumocephalus was relieved with a ventriculoatrial shunt. Orbitocranial injuries, which may be unsuspected despite careful orbital, neurologic, and conventional roentgenographic examination, have a considerable mortality. The presence of intracranial penetration. The CT scans, which detect as little as 0.5 mL of intracranial air, can be used to document serial changes in amount or position of air and detect shifts of the brain. tension pneumocephalus following orbitocranial injury and management with ventriculoatrial shunting have not been previously reported.

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5784. Wessberg, G. A., et al. (1979). "Monophase extraskeletal fixation." Journal of oral surgery (American Dental Association : 1965) **37**(12): 892-896.

The monophase appliance for extraskeletal fixation of facial fractures is discussed. The technique for its implementation is presented with a discussion of its indications and considerations. Reports of three cases demonstrate clinical applications of this one-step method of extraskeletal fixation.

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5785. Wessely, P. (1977). "[Epileptic manifestations following head injury (author's transl)]." Epileptische Manifestationen nach Schadelhirntraumen **64**: 1-43.

An analysis is presented of the findings in a group of 300 patients with head injury, aged 15 years or over at the time of the accident, who subsequently developed epileptic manifestations. Early fits (including one case of immediate onset) were found in 33% of the cases (99 patients). In contrast to post-traumatic late epilepsy (PTE), which is a manifestation of a static process, early fits are triggered off by a dynamic process (brain oedema, haemorrhage) and are a sign of cerebral irritation, but do not represent a true form of epilepsy. Early fits are related to the acute traumatic state; the time limit is flexible, but lies in the region of 4 weeks following injury. Conversion of early fits to PTE (with or without a latent interval) occurred in 72% of the cases. This percentage is higher than the average incidence quoted in the literature and presumably arises partly from the selection criteria applied in this study. The time of appearance of early fits following injury is one factor which determines the prognosis. Fits appearing on the first day carry a relatively favourable prognosis and do not proceed to PTE in 41% of the cases, whereas this percentage shrinks to 15% in the case of fits appearing from the second week onwards. Early fits are an isolated occurrence in one third of the cases; progression to PTE is less frequent in these patients than following frequent, repeated convulsions. Furthermore, the

incidence of early fits is dependent, to a large extent, on traumatological and clinical factors: the combination of unconsciousness of over three hours' duration, neurological signs referable to the central nervous system, persistent organic psychotic syndrome and intracranial bleeding leads to a significantly higher incidence of early fits than unconsciousness of less than three hours' duration and absence of neurological signs in patients who, moreover, do not display features of the psychotic syndrome, and shows a greater tendency to early fits even than the combination of depressed fracture of the skull with penetration of the dura. Should, however, early fits occur in spite of a favourable assessment of the traumatological factors involved, then progression to PTE occurs in a higher percentage of such cases than in patients displaying signs of a serious import following injury. The transition to PTE is markedly higher following diffuse cerebral contusion (75% of cases) than in cases displaying signs of local contusion....

5786. Westenbroek, R. E., et al. (1998). "Upregulation of L-type Ca2+ channels in reactive astrocytes after brain injury, hypomyelination, and ischemia." The Journal of neuroscience : the official journal of the Society for Neuroscience **18**(7): 2321-2334.

Anti-peptide antibodies that specifically recognize the alpha1 subunit of class A-D voltage-gated Ca2+ channels and a monoclonal antibody (MANC-1) to the alpha2 subunit of L-type Ca2+ channels were used to investigate the distribution of these Ca2+ channel subtypes in neurons and glia in models of brain injury, including kainic acid-induced epilepsy in the hippocampus, mechanical and thermal lesions in the forebrain, hypomyelination in white matter, and ischemia. Immunostaining of the alpha2 subunit of L-type Ca2+ channels by the MANC-1 antibody was increased in reactive astrocytes in each of these forms of brain injury. The alpha1C subunits of class C L-type Ca2+ channels were upregulated in reactive astrocytes located in the affected regions in each of these models of brain injury, although staining for the alpha1 subunits of class D L-type, class A P/Q-type, and class B N-type Ca2+ channels did not change from patterns normally observed in control animals. In all of these models of brain injury, there was no apparent redistribution or upregulation of the voltage-gated Ca2+ channels in neurons. The upregulation of L-type Ca2+ channels in reactive astrocytes may contribute to the maintenance of ionic homeostasis in injured brain regions, enhance the release of neurotrophic agents to promote neuronal survival and differentiation, and/or enhance signaling in astrocytic networks in response to injury.

5787. Westergren, H., et al. (1991). "Traumatic occlusion of the internal carotid artery in a healthy young male: effects on the regional cerebral blood flow." Acta neurochirurgica **113**(1-2): 91-95.

The effects of acute right internal carotid artery occlusion in a previously healthy young male, was studied over a period of 10 months, with angiography, TransCranial Doppler ultrasonography (TCD) and SPECT-rCBF. A clinically observed inability to meet increased metabolic demand in the right hemisphere was concommitant to a decreased Pulsatility Index (PI) in the right middle cerebral artery (MCA). Autoregulation studies showed almost dilatation of the resistance vessels in the right middle cerebral artery territory, at rest. A decreased blood flow velocity, in the right middle cerebral artery 7 months after the accident, suggesting a decreased rCBF, could not be confirmed by SPECT-rCBF studies. This finding strongly cautions against interpretation of chronical blood flow velocity changes in terms of changes in regional blood flow. The present study shows the benefits in the combined use of angiography, SPECT-rCBF, and TCD.

5788. Whitaker, T. E., et al. (1999). "Orbital 'shanking': A unique prison injury." Orbit **18**(4): 273-279.

The purpose of this paper is to describe orbitocranial penetration due to 'shanking', a common mode of assault in prison facilities. We report the case of a prisoner who presented with orbital apex syndrome 5 days after an assault. He died 9 days after surgical removal of the 'shank' due to a presumed ruptured traumatic aneurysm. Physicians who evaluate prisoners must maintain a high index of suspicion for penetrating injuries. The entrance site is often inconspicuous and the history may be limited in this unique population.

5789. White, M. M. and M. R. Lofwall (2015). "Challenges of the capacity evaluation for the consultation-liaison psychiatrist." Journal of psychiatric practice **21**(2): 160-170.

Assessing medical decision-making capacity is a clinical skill required of all medical professionals, but it is particularly essential for consultation- liaison psychiatrists. Medical decision-making capacity, often confused with competency, is evaluated by assessing 4 standards, which include whether a patient (1) can understand his or her

medical situation, (2) can manipulate the information, (3) can evidence a choice about the proposed treatment, and (4) can appreciate the situation and its consequences. Multiple myths and pitfalls may be encountered during capacity evaluations; many of these can be avoided by proper education and training. We discuss the case of a 71-year-old man who presented to the emergency department by ambulance and was refusing non-emergent neurosurgery after a self-inflicted gunshot wound to the head. He was evaluated for medical decision-making capacity, specifically on whether he had the capacity to refuse neurosurgery and accept intravenous antibiotic treatment. In discussing this case, which illustrates the elements, challenges, and ethical dilemmas of the capacity evaluation, we review several mental illnesses that may prevent individuals from having medical decision-making capacity. Myths and pitfalls of capacity evaluations and possible methods for avoiding them are proposed. Specifically, we emphasize the importance of communication between the primary team and the consultationliaison psychiatry service and describe possible solutions to common communication problems that may arise between services. It is hoped that this case presentation and review will help educate psychiatry residents and other physicians so that they are well prepared to perform a medical decision-making capacity evaluation.

5790. White, R. J., et al. (1983). "Brain death." America **148**(12): 234-236.

5791. Whitlock, R. I. and J. M. Gorman (1978). "Some missile injuries due to civil unrest in Northern Ireland." International journal of oral surgery **7**(4): 240-245.

Some missile injuries are reviewed after nearly 8 years of continuous warfare. A feature of many of these injuries is the early admission to hospital which has had a profound effect on the survival rate and the recovery period. Some examples are given of injuries inflicted by rubber bullets. The effects of wounding by low and high velocity missiles are described and examples given. An injury caused by a missile incorporated in a bomb is also shown.

5792. Widodo, D., et al. (2022). "Combined transcranial and transnasal endoscopic approach in transnasal-penetrating intracranial injury: A rare case report." International journal of surgery case reports **97**: 107422.

INTRODUCTION: Transnasal-penetrating intracranial injuries are rare traumatic brain injuries that can cause serious and fatal brain damage and a high mortality rate and necessitate immediate multidisciplinary surgical management. We describe an uncommon case whereby a patient who presented with an accidental penetrating injury of the brain was found to have a wooden transnasal-penetrating intracranial object., CASE PRESENTATION: A 28-year-old man consulted an ear, nose, and throat (ENT) surgeon after complaints of headache for two days, a history of epistaxis, and vomitus. The right side of the nose had been punctured by wood as a result of falling from a motorcycle. A computed tomography (CT) scan led to diagnosis of a transnasal penetrating intracranial injury. Removal of the transcranial foreign body was carried out jointly by a neurosurgeon and ENT surgeon. Postoperatively, antibiotics were given for 14 days, and the patient was discharged without neurological deficit., CLINICAL DISCUSSION: Early diagnostic procedures, such as CT scan of the skull to assess trajectory and extent of vascular and brain tissue injury, are required for appropriate surgical planning and post-operative treatment of such patients. Surgery was performed by combined transcranial and transnasal endoscopy to identify the skull base, dura mater defect, and brain tissue damage. Removal of the corpus alienum by transnasal endoscopy yielded a good outcome., CONCLUSION: Combined transcranial and transnasal endoscopic approach showed better result than transcranial approach only. The wooden foreign body can be completely eliminated transnasally without active bleeding using this approach. The patient was discharged with good outcome.

5793. Wieck, M. M., et al. (2018). "Direct to operating room trauma resuscitation decreases mortality among severely injured children." The journal of trauma and acute care surgery **85**(4): 659-664.

BACKGROUND: Expediting evaluation and intervention for severely injured patients has remained a mainstay of advanced trauma care. One technique, direct to operating room (DOR) resuscitation, for selective adult patients has demonstrated decreased mortality. We sought to investigate the application of this protocol in children., METHODS: All DOR pediatric patients from 2009 to 2016 at a pediatric Level I trauma center were identified. Direct to OR criteria included penetrating injury, chest injuries, amputations, significant blood loss, cardiopulmonary resuscitation, and surgeon discretion. Demographics, injury patterns, interventions, and outcomes were analyzed. Observed mortality was

compared with expected mortality, calculated using Trauma Injury Severity Score methodology, with two-tailed t tests, and a p value less than 0.5 was considered significant., RESULTS: Of 2,956 total pediatric trauma activations, 82 (2.8%) patients (age range, 1 month to 17 years) received DOR resuscitation during the study period. The most common indications for DOR were penetrating injuries (62%) and chest injuries (32%). Forty-four percent had Injury Severity Score (ISS) greater than 15, 33% had Glasgow Coma Scale (GCS) score of 8 or less, and 9% were hypotensive. The most commonly injured body regions were external (66%), head (34%), chest (30%), and abdomen (27%). Sixty-seven (82%) patients required emergent procedural intervention, most commonly wound exploration/repair (35%), central venous access (22%), tube thoracostomy (19%), and laparotomy (18%). Predictors of intervention were ISS greater than 15 (odds ratio, 14; p = 0.013) and GCS < 9 (odds ratio = 8.5, p = 0.044). The survival rate to discharge for DOR patients was 84% compared with an expected survival of 79% (Trauma Injury Severity Score) (p = 0.4). The greatest improvement relative to expected mortality was seen in the subgroup with penetrating trauma (84.5% vs 74.4%; p = 0.002)., CONCLUSION: A selective policy of resuscitating the most severely injured children in the OR can decrease mortality. Patients suffering penetrating trauma with the highest ISS, and diminished GCS scores have the greatest benefit. Trauma centers with appropriate resources should evaluate implementing similar policies., LEVEL OF EVIDENCE: Diagnostic tests or criteria, level II.

5794. Wiedemayer, H., et al. (2002). "Early seizures following non-penetrating traumatic brain injury in adults: risk factors and clinical significance." Brain injury **16**(4): 323-330.

BACKGROUND: In the literature dissenting data are obtained about risk factors for early post-traumatic seizures and their impact on outcome. This study was conducted to obtain more information about the clinical significance of early seizures and their possible impact on the treatment of traumatic brain injury., METHODS AND RESULTS: A consecutive series of 1868 adult patients with head injury were analysed retrospectively. Demographic data of the patients, characteristics of the injury, and findings on CT scan were recorded. Risk factors for early post-traumatic seizures were identified using univariate statistics. A multivariate logistic regression was performed to look for interaction of different variables. The impact of early post-traumatic seizures on outcome was examined in an analogous way. Chronic alcohol abuse, subdural haematoma and brain contusion were identified as independent risk factors for early post-traumatic seizures. A significant association of early post-traumatic seizures with an unfavourable outcome was observed, but this effect was small compared to other variables., CONCLUSIONS: Early post-traumatic seizures appear to be an acute reaction of the brain to cortical damage with little independent impact on the management of head injury.

5795. Wienand, P., et al. (1992). "Donor conditions and graft survival--a retrospective study." Transplant international : official journal of the European Society for Organ Transplantation **5 Suppl 1**: S151-152.

In a retrospective study (one centre) the influence of donor and recipient factors were evaluated (n = 308). Head injury as the cause of death and anastomotic time less than 35 min were associated with a significantly better graft survival rate (P < 0.05). Although some of the donor factors influence graft survival, a stricter selection of grafts is not advisable, firstly because fewer kidneys would then be offered, and secondly because even comparatively bad graft survival rates are still better than dialysis.

5796. Wigginton, J. G., et al. (2011). "Advances in resuscitative trauma care." Minerva anestesiologica **77**(10): 993-1002.

Over the last two decades, experimental and clinical data have begun to shape a more discriminating approach to intravascular (IV) fluid infusions in the resuscitation of trauma patients with presumed internal hemorrhage. This approach takes into account the presence of potentially uncontrollable hemorrhage (e.g., deep intra-abdominal or intra-thoracic injury) versus a controllable source (e.g. distal extremity wound). This limitation on fluid resuscitation is particularly applicable in the case of patients with penetrating truncal injury being transported rapidly to a nearby definitive care center. Meanwhile, longstanding debates over the type of fluid that should be infused remain largely unresolved and further complicated by recent clinical trials that did not demonstrate support for either hemoglobin-based oxygen carriers or hypertonic saline. However, there is also growing evidence that does support the increased use of fresh frozen plasma as well as tourniquets, and intra-osseous devices. While a more discriminating approach to fluid infusions have evolved, it has also become clear that positive pressure ventilatory support should be limited in the face of potential severe hemorrhage due to the accompanying reductions in venous return. Controversies over prehospital

endotracheal tube placement are confounded by this factor as well as the effects of paramedic deployment strategies and related skills usage. Beyond these traditional areas of focus, a number of very compelling clinical observations and an extensive body of experimental data has generated a very persuasive argument that intravenous estrogen and progesterone may be of value in trauma management, particularly severe traumatic brain injury and burns.

5797. Wijdicks, E. F. M. and E. A. Pfeifer (2008). "Neuropathology of brain death in the modern transplant era." Neurology **70**(15): 1234-1237.

BACKGROUND: Autopsy studies in patients who have been declared brain dead are rare. Total brain necrosis ("respirator brain") has been a common finding in the distant past. The time to brain fixation has been shortened as a result of timely organ transplant protocols, therefore the neuropathologic findings may be different than previously described., METHODS: We reviewed macroscopic and microscopic brain pathology for ischemic neuronal damage in 41 patients who fulfilled the clinical criteria of brain death. Hematoxylin and eosin stained brain tissue slides were retrieved and available wet tissue was additionally stained to complete a series of samples of the hemispheres, brainstem, and cerebellum for each patient. Neuronal ischemic change was semiquantitatively graded for severity (mild 0 to 5%, moderate >5 to 75%, and severe >75%)., RESULTS: After the clinical diagnosis of brain death and terminal cardiac arrest, 12 brains were fixated in less than 12 hours and 29 brains were fixated between 12 and 36 hours. The frontal lobe, temporal lobe, parietal lobe, occipital lobe, and basal ganglia showed moderate to severe ischemic change in 53 to 68% of the cases. Moderate to severe neuronal ischemic change was found in the thalamus in 34%, midbrain in 37%, pons in 41%, medulla in 40%, and cerebellum in 52% of the cases., CONCLUSIONS: No distinctive neuropathologic features were apparent in our series of patients with brain death. Neuronal ischemic changes were frequently profound, but mild changes were present in a third of the examined hemispheres and in half of the brainstems. Respirator brain with extensive ischemic neuronal loss and tissue fragmentation was not observed. Neuropathologic examination is therefore not diagnostic of brain death.

5798. Wilberger, J. E., Jr. and D. Pang (1983). "Craniocerebral injuries from dog bites." JAMA **249**(19): 2685-2688.

Dog bites are a common cause of injury in infants and children, with the face and head frequently involved. While scalp injuries may be extensive and severe, only five cases of compound depressed skull fractures caused by dog bites have been reported, to our knowledge. Four cases are presented to point out the potential risks of cranial penetration and underlying brain injury when infants and children suffer dog bites to the head. The principles for management of these injuries are outlined.

5799. Wilgus, J. and B. Wilgus (2009). "Face to face with Phineas Gage." Journal of the history of the neurosciences **18**(3): 340-345.

We present here a reproduction of a daguerreotype of Phineas Gage that came into our possession more than 30 years ago. It is, as far as we know, the only image of this famous patient. We describe how we identified the subject in the image, describe how daguerreotypes are made and set out our comparisons of the image with the Phineas Gage life mask and tamping iron held in the Warren Anatomical Museum, Francis A. Countway Library of Medicine.

5800. Wilkinson, A. E. (1969). "Injuries of the chest." South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde **43**(35): 1067-1071.

5801. Will, M. J., et al. (2005). "Oral and maxillofacial injuries experienced in support of operation Iraqi Freedom I and II." Oral and maxillofacial surgery clinics of North America **17**(3 SPEC. ISS.): 331-339.

Penetrating, perforating, and avulsive fragmentation injuries present a unique surgical challenge for oral and maxillofacial surgeons in the Iraqi theater of operation. Maxillofacial injuries encountered in Operation Iraqi Freedom I and Operation Iraqi Freedom II have presented injury patterns not encountered previously in other large-scale armed conflicts. Current literature in the field of oral and maxillofacial surgery does not cover adequately the concerns that are inherent to care and treatment planning at an echelon III facility. This article addresses clinical and surgical practice

guidelines that were developed by oral surgeons in theater and from feedback they received from higher echelons of care.

5802. Williams, A. J., et al. (2006). "Penetrating ballistic-like brain injury in the rat: differential time courses of hemorrhage, cell death, inflammation, and remote degeneration." Journal of neurotrauma **23**(12): 1828-1846.

Acute and delayed cerebral injury was assessed in a recently developed rat model of a penetrating ballistic-like brain injury (PBBI). A unilateral right frontal PBBI trajectory was used to induce survivable injuries to the frontal cortex and striatum. Three distinct phases of injury progression were observed. Phase I (primary injury, 0-6 h) began with immediate (<5 min) intracerebral hemorrhage (ICH) that reached maximal volumetric size at 6 h (27.0 +/- 2.9 mm(3)). During Phase II (secondary injury, 6-72 h), a core lesion of degenerate neurons surrounding the injury track expanded into peri-lesional areas to reach a maximal volume of 69.9 +/- 6.1 mm(3) at 24 h. The core lesion consisted of predominately necrotic cell death and included marked infiltration of both neutrophils (24 h) and macrophages (72 h). Phase III (delayed degeneration, 3-7 days) involved the degeneration of neurons and fiber tracts remote from the core lesion including the thalamus, internal capsule, external capsule, and cerebral peduncle. Overall, different time courses of hemorrhage, lesion evolution, and inflammation were consistent with complementary roles in injury development and repair, providing key information about these mediators of primary, secondary, and delayed brain injury development. The similarities/differences of PBBI to other focal brain injury models are discussed.

5803. Williams, A. J., et al. (2006). "Severity level and injury track determine outcome following a penetrating ballistic-like brain injury in the rat." Neuroscience letters **408**(3): 183-188.

Penetrating ballistic brain injury (PBBI) is a high-energy transfer wound causing direct damage to the cerebrum. Outcome is directly related to the ballistic's anatomical path and degree of energy transfer. In this study we evaluated differences in outcome induced by altering the 'projectile' paths and severity levels of a simulated bullet wound using a newly characterized rat model of PBBI. Severity levels (5, 10, and 15%) were compared across three distinct injury paths: (1) unilateral 'frontal', (2) 'bilateral' hemispheric, and (3) unilateral 'caudal' (including cerebellum/midbrain). Outcome was assessed by differences in mortality rate and motor dysfunction (e.g. neurological and balance beam deficits). Results indicated that outcome was dependent not only on the severity level of PBBI ($P<0.001$, $r=0.535$) but also brain regions injured ($P<0.001$, $r=0.398$). A unilateral caudal injury was associated with the highest degree of mortality (up to 100%) and motor dysfunction (64-100% disability). Bilateral hemispheric injuries were also potentially fatal, while the best outcomes were associated with a unilateral frontal injury (no mortality and 14-39% motor disability). These data closely resemble clinical reports of ballistic wounds to the head and further validate the rat PBBI model with the ultimate intent to investigate novel therapeutic approaches for diagnosis and treatment of the neuropathological damage associated with PBBI.

5804. Williams, A. J., et al. (2007). "Acute and delayed neuroinflammatory response following experimental penetrating ballistic brain injury in the rat." Journal of neuroinflammation **4**: 17.

BACKGROUND: Neuroinflammation following acute brain trauma is considered to play a prominent role in both the pathological and reconstructive response of the brain to injury. Here we characterize and contrast both an acute and delayed phase of inflammation following experimental penetrating ballistic brain injury (PBBI) in rats out to 7 days post-injury., METHODS: Quantitative real time PCR (QRT-PCR) was used to evaluate changes in inflammatory gene expression from the brain tissue of rats exposed to a unilateral frontal PBBI. Brain histopathology was assessed using hematoxylin and eosin (H&E), silver staining, and immunoreactivity for astrocytes (GFAP), microglia (OX-18) and the inflammatory proteins IL-1beta and ICAM-1., RESULTS: Time course analysis of gene expression levels using QRT-PCR indicated a peak increase during the acute phase of the injury between 3-6 h for the cytokines TNF-alpha (8-11 fold), IL-1beta (11-13 fold), and IL-6 (40-74 fold) as well as the cellular adhesion molecules VCAM (2-3 fold), ICAM-1 (7-15 fold), and E-selectin (11-13 fold). Consistent with the upregulation of pro-inflammatory genes, peripheral blood cell infiltration was a prominent post-injury event with peak levels of infiltrating neutrophils (24 h) and macrophages (72 h) observed throughout the core lesion. In regions of the forebrain immediately surrounding the lesion, strong immunoreactivity for activated astrocytes (GFAP) was observed as early as 6 h post-injury followed by prominent microglial reactivity (OX-18) at 72 h and resolution of both cell types in cortical brain regions by day 7. Delayed thalamic inflammation (remote from the primary lesion) was also observed as indicated by both microglial and astrocyte reactivity (72 h to 7 days)

concomitant with the presence of fiber degeneration (silver staining)., CONCLUSION: In summary, PBBI induces both an acute and delayed neuroinflammatory response occurring in distinct brain regions, which may provide useful diagnostic information for the treatment of this type of brain injury.

5805. Williams, C. N., et al. (1988). "Immediate and long-term management of gunshot wounds to the lower face." Plastic and reconstructive surgery **82**(3): 433-439.

The steadily increasing level of urban violence and attempted suicides in the recent past has resulted in large numbers of gunshot injuries to the face from small-caliber weapons. Our experience with 35 consecutive cases of civilian gunshot wounds involving primarily the lower face is presented. Initial management included securing of the airway, control of bleeding, and treatment of coexisting injuries. After clinical and radiologic evaluation and conservative debridement of all devitalized tissues, the mandibular fractures were reduced and stabilized appropriately. Large bony defects were treated by stabilization of the mandibular segments followed by secondary bone grafting. Intraoral soft tissues were then repaired with local mucosal flaps or tongue flaps when necessary. Finally, the soft tissues were repaired by primary closure or local flaps. Distant flaps were used only as a secondary procedure. Our results are presented, the differences between civilian and military injuries are discussed, and the principles of gunshot ballistics are described. We conclude that most of these wounds can be treated in a relatively conservative manner immediately after the injury with good functional and cosmetic results.

5806. Williams, J. R., et al. (2014). "Penetrating brain injury after suicide attempt with speargun: case study and review of literature." Frontiers in neurology **5**: 113.

Penetrating cranial injury by mechanisms other than gunshots are exceedingly rare, and so strategies and guidelines for the management of PBI are largely informed by data from higher-velocity penetrating injuries. Here, we present a case of penetrating brain injury by the low-velocity mechanism of a harpoon from an underwater fishing speargun in an attempted suicide by a 56-year-old Caucasian male. The case raised a number of interesting points in management of low-velocity penetrating brain injury (LVPBI), including benefit in delaying foreign body removal to allow for tamponade; the importance of history-taking in establishing the social/legal significance of the events surrounding the injury; the use of cerebral angiogram in all cases of PBI; advantages of using dual-energy CT to reduce artifact when available; and antibiotic prophylaxis in the context of idiosyncratic histories of usage of penetrating objects before coming in contact with the intracranial environment. We present here the management of the case in full along with an extended discussion and review of existing literature regarding key points in management of LVPBI vs. higher-velocity forms of intracranial injury.

5807. Williams, J. R., et al. (2014). "Penetrating brain injury after suicide attempt with speargun: Case study and review of literature." Frontiers in neurology **5 JUL**.

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5808. Williams, R. W., et al. (1974). "Mass casualties in a maximum security institution." Annals of surgery **179**(5): 592-597.

5809. Williamson, T., et al. (2020). "Demographic and Clinical Differences Between Patients Undergoing Craniectomy or Craniotomy for Severe Traumatic Brain Injury." Clinical neurosurgery **67**(SUPPL 1): 170-171.

INTRODUCTION: Approximately 5.5 million people suffer severe traumatic brain injuries (sTBI) annually in the US. Patients with sTBI may undergo craniotomy or craniectomy after the incident, but the reason for selecting one procedure over the other is unclear. METHODS: The Trauma Quality Improvement Program database was retrospectively analyzed to identify adult patients with sTBI who underwent either craniectomy or craniotomy between 2013 and 2015. sTBI was defined as patients who had skull fracture or intracranial injury with a Head Abbreviated Injury Scale 2-5 and Glasgow Coma Scale 3-8. Patients were divided into craniectomy and craniotomy groups, and demographic and clinical characteristics were summarized. RESULTS: Among 47,544 patients with sTBI, 5,952 had either craniectomy (n = 2,092, 35.1%) or craniotomy (n = 3,860, 64.9%). Craniotomy patients were older (median: 45 years vs. 38 years), with a greater proportion of patients >60 years old (27.0% vs. 15.9%). A higher proportion of craniectomy patients were treated in university hospitals (61.3% vs. 54.8%), and a higher proportion of craniotomy patients had inter-hospital transfer (34.9% vs. 23.9%). The craniectomy group had a higher percentage of patients with an Injury Severity Score >24 (61.0% vs. 46.0%). The craniotomy group had a higher proportion of falls (44.2% vs. 31.7%) and lower percentage of transportationrelated injuries (40.3% vs 49.2%). The craniectomy group had a higher percentage of penetrating injury (12.7% vs. 9.0%) and lower percentage of hematoma (72.6% vs. 80.7%). Patients who underwent craniectomy spent more time in the hospital (16 days vs. 13 days), in the ICU (11 days vs. 9 days), and on a ventilator (9 days vs. 6 days). In-hospital mortality was higher among craniectomy patients (37.9% vs. 28.0%), whereas a higher percentage of craniotomy patients were discharged to home (18.8% vs. 8.1%). CONCLUSION: Patients undergoing craniectomy were younger, but suffered a higher proportion of transportation-related injuries, were more severely injured, had a more protracted hospital course, and had higher in-hospital mortality than craniotomy patients. This suggests that sTBI patients with more severe injuries aremore likely to undergo craniectomy than craniotomy.

5810. Willy, C., et al. (2008). "[Patterns of injury in a combat environment. 2007 update]." Kriegschirurgische Verletzungsmuster. UPDATE 2007. **79**(1): 66-76.

BACKGROUND: Epidemiological analysis of injury patterns and mechanisms help in identifying the expertise that military surgeons need in a combat setting and also in adjusting training requirements accordingly. This paper attempts to assess the surgical specialties and skills of particular importance in the management of casualties in crisis areas., METHODS: MEDLINE (1949-2007) and Google search were used. Causes of death among casualties in Afghanistan and the Iraq war were analyzed., RESULTS: The leading causes of injury were explosive devices, gunshot wounds, aircraft crashes, and terrorist attacks. Of the casualties, 55% died in hostile action and 45% in nonhostile incidents. Chest or abdominal injuries (40%) and brain injuries (35%) were the main causes of death for soldiers killed in action. The case fatality rate in Iraq was approximately half as high as in the Vietnam War. In contrast, the amputation rate was twice as high. Approximately 8-15% of the deaths appeared to be preventable., CONCLUSIONS: Military surgeons must have excellent skills in the fields of thoracic, visceral, and vascular surgery as well as practical skills in neurosurgery and oral and maxillofacial surgery. It also is of vital importance to ensure the availability of sufficient medical evacuation capabilities. Furthermore, there is a need for a standardized registration system for all injuries similar to the German Trauma Registry.

5811. Willyerd, F. A. and R. G. Hart (2014). "Traumatic brain injury shifts brain drug transporter levels: Implications for drug therapies." Neurocritical care **21**(1): S152.

Introduction ATP-binding cassette (ABC) transporters function to selectively regulate the brain milieu through active efflux of substrates. Little is known about how traumatic brain injury (TBI) shifts the levels of these transporters and alters microenvironments. Similarly, changes in the expression of ABC transporters after TBI could influence therapeutic drug penetration and outcomes. We hypothesize that quantifiable changes occur in ABC transporter expression after TBI. Methods Adult male Sprague-Dawley rats (n=3/group) underwent moderate TBI midline fluid percussion injury (FPI) then were killed at eight time points post-injury. Tissue from parietal cortex, hippocampus, and thalamus was analyzed via Western blot and compared to sham injured animals (n=4) using student t-test. Results Bcrp decreased ($P< 0.05$) compared to sham at days 5, 7, 14, and 56 post-injury in parietal cortex. Bcrp hippocampal and thalamic expression decreased ($P< 0.05$) at all points except day 3 post-injury. Mrp1 increased ($P< 0.05$) compared to sham at days 1, 2, 7, and 14 post-injury in parietal cortex and thalamus. Mrp1 hippocampal expression increased ($P< 0.05$) at days 7 and 14 post-injury. P-gp increased ($P< 0.05$) compared to sham at days 1,2,3, and 5 post-injury in parietal

cortex but increased (P< 0.05) on days 1 and 2 post-injury in hippocampus. Pgp in thalamic tissue increased (P< 0.05) on day 1 post-injury. Conclusions We found Bcrp decreased significantly at both early and late time point's post-TBI. This could cause decreased efflux of substrates like glutathione and estradiol. We found an increase in Mrp1 and P-gp expression acutely. Increased ABC transporters could cause elevated efflux of substrates like opioids, anti-seizure medication, and prostaglandins. These data could influence clinical care because TBI therapeutic drugs may not reach therapeutic brain levels if administered during a period of overexpression. ABC transporter expression may serve as a biomarker for personalized medicine in tailoring therapeutic delivery to individual patients.

5812. Wilson, B. C., et al. (1988). "Comparison of complications following frontal sinus fractures managed with exploration with or without obliteration over 10 years." The Laryngoscope **98**(5): 516-520.

Two hundred twelve patients were treated for facial or skull trauma at the West Virginia University Hospital between the years 1977 and 1987. Sixty-six of these patients had frontal sinus or nasofrontal duct trauma. Follow-up information was obtained on 64 of these patients through clinic visits, chart review, questionnaires to patients and physicians, and telephone calls to the patients. Follow-up greater than 1 year was obtained on 52 patients. Sixty-four patients were managed either with a frontal sinus obliteration or with an open exploratory procedure. The incidence of complications occurring in the past 10 years after each of these procedures is compared. Because the indications for each procedure vary somewhat, data is presented on fracture etiology, associated injuries, specific fracture location, fracture displacement, severity of injury, and associated cerebrospinal fluid leaks.

5813. Wilson, C., et al. (2021). "Institutional review of the management of type II odontoid fractures: associations and outcomes with fibrous union." Journal of neurosurgery. Spine **34**(4): 623-631.

OBJECTIVE: Type II odontoid fractures may be managed operatively or nonoperatively. If managed with bracing, bony union may never occur despite stability. This phenomenon is termed fibrous union. The authors aimed to determine associations with stable fibrous union and compare the morbidity of patients managed operatively and nonoperatively., METHODS: The authors performed a retrospective review of their spine trauma database for adults with type II odontoid fractures between 2015 and 2019. Two-sample t-tests and Fisher's exact tests identified associations with follow-up stability and were used to compare operative and nonoperative outcomes. Sensitivity, specificity, and predictive values were calculated to validate initial stable upright cervical radiographs related to follow-up stability., RESULTS: Among 88 patients, 10% received upfront surgical fixation, and 90% were managed nonoperatively, of whom 22% had fracture instability on follow-up. Associations with instability after nonoperative management include myelopathy (OR 0.04, 95% CI 0.0-0.92), cerebrovascular disease (OR 0.23, 95% CI 0.06-1.0), and dens displacement >= 2 mm (OR 0.29, 95% CI 0.07-1.0). Advanced age was not associated with follow-up instability. Initial stability on upright radiographs was associated with stability on follow-up (OR 4.29, 95% CI 1.0-18) with excellent sensitivity and positive predictive value (sensitivity 89%, specificity 35%, positive predictive value 83%, and negative predictive value 46%). The overall complication rate and respiratory failure requiring ventilation on individual complication analysis were more common in operatively managed patients (33% vs 3%, respectively; p = 0.007), even though they were generally younger and healthier than those managed nonoperatively. Operative or nonoperative management conferred no difference in length of hospital or ICU stay, discharge disposition, or mortality., CONCLUSIONS: The authors delineate the validity of upright cervical radiographs on presentation in association with follow-up stability in type II odontoid fractures. In their experience, factors associated with instability included cervical myelopathy, cerebrovascular disease, and fracture displacement but not increased age. Operatively managed patients had higher complication rates than those managed without surgery. Fibrous union, which can occur with nonoperative management, provided adequate stability.

5814. Wilson, C. B. and W. Markesbery (1966). "Traumatic carotid-cavernous fistula with fatal epistaxis. Report of a case." Journal of neurosurgery **24**(1): 111-113.

5815. Wilson, E. S. (1977). "Thrombosis of the internal carotid artery following non-penetrating cranio-cervical trauma." The Journal of the Medical Society of New Jersey **74**(8): 685-687.

5816. Winder, M. J., et al. (2008). "Penetrating head injury from nailguns: a case series from New Zealand." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **15**(1): 18-25.

Penetrating head injury from nailguns has become increasingly recognised due to their frequent use in the construction industry and home. We report a New Zealand case series of 12 penetrating nailgun head injuries, the largest of its type, detailing presentation, management, risk factors and outcomes. Recommendations based on these factors are provided, suggesting a minimal surgical approach and an individually case-assessed need for antibiotic prophylaxis and anti-epileptic drugs. Prognostic factors on initial imaging are discussed. The majority of injuries, despite being visually impressive, are associated with minimal neurological impairment.

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5817. Winder, M. J., et al. (2010). "Nailed: the case of 24 self-inflicted intracranial nails from a pneumatic nailgun." The Journal of trauma **68**(4): E104-107.

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5818. Winer, J. W., et al. (1991). "Electroencephalographic activity and serum and cerebrospinal fluid pentobarbital levels in determining the therapeutic end point during barbiturate coma." Neurosurgery **29**(5): 739-732.

Controversy exists regarding the optimal means for monitoring the patient receiving pentobarbital therapy during medical coma. Serum pentobarbital levels have been used traditionally to gauge cerebral penetration and efficacy of the drug. These peripheral levels have been assumed to reflect pentobarbital concentrations in the cerebrospinal fluid (CSF) and, therefore, the physiological effect on the central nervous system. To determine the relative accuracy of serum versus CSF pentobarbital levels, continuous electroencephalographic (EEG) monitoring in 10 consecutive patients was studied prospectively. Each patient received pentobarbital therapy for cerebral protection in the face of a traumatic injury. Simultaneous serum and CSF pentobarbital levels were obtained 1) before and after the initial barbiturate bolus, 2) every 12 hours during constant infusion therapy, and 3) before and after subsequent boluses necessary because of elevated intracranial pressure (ICP) (ICP greater than 15 mm Hg) or loss of burst suppression by continuous EEG monitoring (defined as greater than five bursts per minute). ICP and relevant clinical events were recorded hourly. Serum and CSF levels ranged from 33 to 74 mg/L and 4 to 54 mg/L, respectively. There was poor correlation between serum and CSF pentobarbital levels at any given time, although patients remained in burst suppression 73% of the time during their therapy. The EEG monitoring not only provided dynamic physiological monitoring, but it also permitted the lowest pentobarbital dose to maintain burst suppression for a specific patient's metabolism, reducing the likelihood of toxicity. In conclusion, CSF pentobarbital levels are of no greater accuracy than serum pentobarbital levels in predicting physiological effect.(ABSTRACT TRUNCATED AT 250 WORDS)

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5819. Wing, I. D., et al. (2013). "Development of a miniaturized position sensing system for measuring brain motion during impact." Biomedical sciences instrumentation **49**: 281-288.

Since 2000, the Department of Defense has documented more than 253,000 cases of Traumatic Brain Injury (TBI). A significant portion of these injuries were attributed to explosive events, yet ninety-eight percent were non-penetrating. Understanding the response of the brain to blast events is critical, yet the mechanisms of brain injury from explosive trauma are poorly understood. This knowledge gap has led to an increased research focus on devices capable of investigating human brain response to non-penetrating, blast-induced loading. Furthermore, traumatic brain injury is a major issue for the civilian population as well with over 1.7 million cases of TBI per year in the US, primarily from falls and motor vehicle accidents. Current head surrogates and instrumentation are incapable of directly measuring critical parameters associated with TBI, such as brain motion, during dynamic loading. To this end, a novel sensor system for measuring brain motion inside of a human head surrogate was conceptualized and developed. The positioning system is comprised of a set of three fixed "generator" coils and a plurality of mobile, miniaturized "receiver" coil triads. Each generator coil transmits a sinusoidal electromagnetic signal at a unique frequency, and groups of three orthogonally arranged "receiver" coils detect these signals. Because of the oscillatory nature of these signals, the magnetic flux through the coil is always changing, allowing the application of Faraday's Law of Induction and the point dipole model of an electric field to model the strength and direction of the field vector at any given point. Thus, the strength of the signal measured by a particular receiver coil depends on its position and orientation relative to the fixed position of the generators. These predictable changes are used to determine the six degrees of freedom (6-DOF) motion of the receiver. To calibrate and validate the system, a receiver coil was moved about in a controlled manner, and its actual position

recorded by optical methods. Comparing the known position to the computed position at each time instance, a set of calibration constants were developed for each receiver triad. These constants were then utilized to convert receiver signal data into actual receiver position and orientation. Comparing this test case and several others like it, mean error was determined to be almost always less than 1.0 mm, and less than 0.5 mm >85% of the time. Additionally, high rate validation was conducted to confirm operation of the system in the impact domain. A coil was accelerated to approximately 15 m/sec along a fixed axis by ballistic impact and tracked by high speed video. The computed position was within 1 mm of the actual position 93% of the time and within 0.5 mm 83% of the time. The successful development and calibration of this sensing system now enables the direct measurements of brain displacement due to mechanical insults applied to a human head surrogate. © 2013.

5820. Wing, I. D., et al. (2013). "Development of a miniaturized position sensing system for measuring brain motion during impact - biomed 2013." Biomedical sciences instrumentation **49**: 281-288.

Since 2000, the Department of Defense has documented more than 253,000 cases of Traumatic Brain Injury (TBI). A significant portion of these injuries were attributed to explosive events, yet ninety-eight percent were non-penetrating. Understanding the response of the brain to blast events is critical, yet the mechanisms of brain injury from explosive trauma are poorly understood. This knowledge gap has led to an increased research focus on devices capable of investigating human brain response to non-penetrating, blast-induced loading. Furthermore, traumatic brain injury is a major issue for the civilian population as well with over 1.7 million cases of TBI per year in the US, primarily from falls and motor vehicle accidents. Current head surrogates and instrumentation are incapable of directly measuring critical parameters associated with TBI, such as brain motion, during dynamic loading. To this end, a novel sensor system for measuring brain motion inside of a human head surrogate was conceptualized and developed. The positioning system is comprised of a set of three fixed generator'' coils and a plurality of mobile, miniaturized receiver'' coil triads. Each generator coil transmits a sinusoidal electromagnetic signal at a unique frequency, and groups of three orthogonally arranged receiver'' coils detect these signals. Because of the oscillatory nature of these signals, the magnetic flux through the coil is always changing, allowing the application of Faraday's Law of Induction and the point dipole model of an electric field to model the strength and direction of the field vector at any given point. Thus, the strength of the signal measured by a particular receiver coil depends on its position and orientation relative to the fixed position of the generators. These predictable changes are used to determine the six degrees of freedom (6-DOF) motion of the receiver. To calibrate and validate the system, a receiver coil was moved about in a controlled manner, and its actual position recorded by optical methods. Comparing the known position to the computed position at each time instance, a set of calibration constants were developed for each receiver triad. These constants were then utilized to convert receiver signal data into actual receiver position and orientation. Comparing this test case and several others like it, mean error was determined to be almost always less than 1.0 mm, and less than 0.5 mm >85% of the time. Additionally, high rate validation was conducted to confirm operation of the system in the impact domain. A coil was accelerated to approximately 15 m/sec along a fixed axis by ballistic impact and tracked by high speed video. The computed position was within 1 mm of the actual position 93% of the time and within 0.5 mm 83% of the time. The successful development and calibration of this sensing system now enables the direct measurements of brain displacement due to mechanical insults applied to a human head surrogate.

5821. Winkler, A. M., et al. (2009). "Early trauma induced coagulopathy: A pilot study." Transfusion **49**: 157A.

Background: Approximately 5 million people die worldwide each year from trauma, most commonly as a result of brain injury and hemorrhage. Both traumatic head injuries and massive hemorrhage have been linked to the development of coagulopathy, a major contributor to trauma related mortality. This secondary coagulopathy resulting from dilution and consumption of coagulation factors, acidosis, and hypothermia has been termed “the bloody vicious cycle.” On the other hand, coagulopathy as a primary or early event has become increasingly recognized as an independent predictor of mortality. However, the pathophysiology of this early trauma induced coagulopathy (ETIC) is not entirely understood. Methods: A prospective observational cohort study of consecutive trauma patients who presented to a level I trauma center was conducted from 7/15/08-12/31/08. Patients were included if they met trauma team activation criteria published by the American College of Surgeons Committee on Trauma and modified by our institution. Patients were additionally excluded if known to be taking anticoagulant or anti-platelet medications, or had a personal history of a coagulation or platelet defect. Demographics, injury event and time, fluid and blood administration, vital signs, injury severity score, and presence of head injury were collected from EMS and by observation in the ED from

arrival to time of first blood sample collection. Standard coagulation parameters including prothrombin time (PT), partial thromboplastin time (PTT) were performed. The primary outcome was 28 day mortality. Results: 270 patients met enrollment criteria and had adequate data collection. The cohort was 75.6% male with a mean age of 39 years of which 26% suffered penetrating trauma. The overall mortality was 7.8% and ETIC, defined as a prolonged PT or PTT upon admission, had a prevalence of 19.3%. In univariate analysis, a prolonged PT and PTT were associated with increased mortality ($p = .03$ and $p = .01$, respectively). The association between PT ($p = .02$) and injury severity score ($p < .01$) with mortality was confirmed in multivariate analysis; however the association with PTT ($p = .06$), age ($p = .13$) and positive head CT ($p = .07$) were not associated with mortality. Conclusion: In this pilot prospective cohort study, ETIC was associated with increased mortality. With increased patient data and mechanistic studies, it is envisioned that ETIC can be understood both clinically and physiologically, which will optimally lead to improvement in the survival of trauma patients.

5822. Winkler, B. and J. K. Margerison (2012). "Mechanical properties of the bovine claw horn during lactation." Journal of dairy science **95**(4): 1714-1728.

Claw horn disorders are one of the main causes of lameness in dairy cows globally. This study aimed to develop material testing techniques to assess changes in the mechanical properties of bovine claw horn (BCH) and to compare these mechanical properties with existing methods of assessing claw horn disorders during lactation. Lameness was also measured through locomotion scoring to assess the clinical significance of changes observed in the scoring for lesions. Experiment 1 used 8 claws collected from four 12 to 18 mo old beef heifers, to develop BCH sample storage methods and techniques to test the mechanical properties of BCH (puncture resistance and elastic modulus). The increase in the moisture content of BCH had a significant negative exponential effect on the elastic modulus of the sole and white line claw horn and a linear reduction in the puncture resistance of BCH. Placing BCH samples in sealed plastic bags and storing them either at 2degreeC or by freezing samples at -22degreeC did not alter the dry matter content and, consequently, the mechanical properties of the claw horn tissue. In experiment 2, BCH was collected from 36 lactating dairy cows and mechanical properties were tested using puncture resistance. Puncture resistance of the sole area of the claw horn decreased significantly when hemorrhages in the tested area increased. The puncture resistance of the sole and white line areas decreased at d 160 postpartum when the cows exhibited higher lesion scores and was lower in hind claws that had higher lesion scores when compared with the fore claws. The highest puncture resistance was found at 270 d postpartum, when the animals were at pasture. Puncture resistance was found to be an effective technique for assessing the effect of period of lactation and increasing hemorrhage levels on the mechanical properties and structural strength of bovine claw horn. It was found to be a good method of comparing changes and differences in mechanical properties and structural strength of BCH from the sole and white line areas within each claw and differences between claws. White line BCH consistently had significantly lower puncture resistance compared with the sole. Bovine claw horn with greater levels of hemorrhage or lower puncture resistance, or both, may provide less protection and increase the risk of foreign body penetration, trauma, and secondary infection of the corium of the claw.

5823. Winkler, G., et al. (2005). "[Extraordinary cause of a self-induced focal epilepsy]." Ungewohnliche Ursache einer selbstinduzierten fokalen Epilepsie. **76**(12): 1520-1523.

Epilepsies and psychiatric disorders such as psychoses are known to have reciprocal influence. There are problems in patient compliance and pharmacological interactions between the drugs used for treatment. We report an unusual, self-induced, focal, symptomatic epilepsy in a hitherto unrevealed schizophrenic psychosis. The interdisciplinary treatment of three different departments was necessary. The initial symptom of a diffuse frontal headache and the patient's penetration of his own skull in an attempt at self-treatment led to the development of a frontal abscess around a foreign body and the described focal epilepsy.

5824. Winkler, S. S. and J. F. Sackett (1980). "Explanation of metrizamide brain penetration: a review." Journal of computer assisted tomography **4**(2): 191-193.

The penetration of intrathecally injected metrizamide into brain and spinal cord substance is a phenomenon that has surprised and puzzled radiologists. No suitable explanation has been offered in the radiologic literature. This article reviews the recent literature on the relationship between the cerebrospinal fluid (CSF) space and the extracellular

fluid (ECF) space of the brain. Recent evidence has shown that these spaces are in fact one compartment with no diffusion barrier between them. Thus, penetration of metrizamide into the brain is an expected rather than surprising phenomenon. An explanation is offered as to why metrizamide does not penetrate edematous or infarcted portions of brain on the basis of a pressure gradient between damaged brain ECF and CSF spaces.

5825. Winskog, C. and R. W. Byard (2016). "Decapitation: a rare form of postmortem mutilation." Forensic science, medicine, and pathology **12**(1): 98-100.

5826. Winston, K. R., et al. (2015). "Packing to tamponade severe intracranial hemorrhage in pediatric patients." Pediatric neurosurgery **50**(2): 63-67.

The medical records of all children in whom packing was used to control severe intracranial hemorrhage were reviewed. Eight children, with ages ranging from newborn to 4 years, met the inclusion criteria and all survived. Five were victims of severe closed head trauma, 2 had received penetrating cranial injuries, and 1 developed severe bleeding while undergoing surgery for a malignant tumor in the posterior fossa. Blood loss at the time of removal of the packing was minimal in 7 patients and was surgically controllable in the other. Packing is a simple, efficient, and safe maneuver which can very often halt intracranial bleeding that is considered to be otherwise uncontrollable, and can thereby limit the consequences of prolonged or repeated periods of hypotension and possible exsanguination.

5827. Winter, B., et al. (2017). "Spinal cord injury." Anaesthesia and Intensive Care Medicine **18**(8): 404-409.

With an annual incidence of 13 per million, around 40,000 people in the UK live with spinal cord injury (SCI). The extent of morbidity and mortality and thus quality of life, is highly dependent on meticulous management from the first point of contact with medical services. Treatment is focused on reducing the risk of further cord injury and prevention of secondary (penumbral) damage through avoidable complications. As key members of trauma, theatre, intensive care and pain teams, anaesthetists and intensivists play a crucial role in influencing patient outcome in both the acute setting and in managing patients with chronic SCI presenting for emergency or elective surgical intervention.

5828. Wirth, I., et al. (2008). "[Homicide-suicide by a single gunshot to the head]." Suizid und vorsatzliche Totung durch einmalige Schussabgabe in den Kopf. **221**(1-2): 17-27.

Apart from typical suicides, there are sometimes unusual deaths from gunshots to the head. The presented case is a double death from the autopsy material of the Institute of Legal Medicine in Berlin. The report deals with a murder-suicide of a man, who killed himself and his 2-year-old daughter by a single gunshot. After having administered a tranquilizer to the child, he held her head to his own and fired a contact shot to his right temple so that the bullet passed through both heads.

5829. Wirth, I., et al. (1984). "[Craniocerebral injuries caused by animal anesthesia equipment]." Schadel-Hirn-Verletzungen durch Viehbetaubungsgerate. **45**(3): 169-178.

A consequence of the rareness of bullet injuries in the GDR are the uncertainties in the recognition and assessment of injuries caused by cattle anaesthetising devices which have become evident in connection with the relevant expertises of the respective cases. In view of this situation, the design and the mode of functioning of these devices as well as selected clinical aspects of such injuries are described. Besides the local findings, the computer tomography is of paramount importance in the diagnosis for both the recognition of the typical calvarial bursting and the representation of the shot channel with a demonstration of the imprimatum. Whenever possible, the therapy should consist in an early surgical procedure according to the principles to be applied to open craniocerebral injuries.

5830. Witjes, M., et al. (2019). "The Implementation of a Multidisciplinary Approach for Potential Organ Donors in the Emergency Department." Transplantation **103**(11): 2359-2365.

BACKGROUND: The aim of this study was to evaluate the implementation process of a multidisciplinary approach for potential organ donors in the emergency department (ED) in order to incorporate organ donation into their end-of-life care plans., METHODS: A new multidisciplinary approach was implemented in 6 hospitals in The Netherlands between January 2016 and January 2018. The approach was introduced during staff meetings in the ED, intensive care unit (ICU), and neurology department. When patients with a devastating brain injury had a futile prognosis in the ED, without contraindications for organ donation, an ICU admission was considered. Every ICU admission to incorporate organ donation into end-of-life care was systematically evaluated with the involved physicians using a standardized questionnaire., RESULTS: In total, 55 potential organ donors were admitted to the ICU to incorporate organ donation into end-of-life care. Twenty-seven families consented to donation and 20 successful organ donations were performed. Twenty-nine percent of the total pool of organ donors in these hospitals were admitted to the ICU for organ donation., CONCLUSIONS: Patients with a devastating brain injury and futile medical prognosis in the ED are an important proportion of the total number of donors. The implementation of a multidisciplinary approach is feasible and could lead to better identification of potential donors in the ED.

5831. Wittschieber, D., et al. (2016). "The role of 3DCT for the evaluation of chop injuries in clinical forensic medicine." Forensic science international **266**: e59-e63.

As hatchet blows to the human head frequently cause fatal injuries, the forensic examination of survivors with cranial chop injuries is a rare phenomenon in forensic casework. Besides evaluation of clinical records, photographs, and medico-legal physical examination, the analysis and 3-dimensional reconstruction of pre-treatment computed tomography data (3DCT) must be considered an important and indispensable tool for the assessment of those cases because the characteristics of chopping trauma often appear masked or changed by clinical treatment. In the present article, the role of 3DCT for the evaluation of chop wounds in clinical forensic medicine is demonstrated by an illustrative case report of a young man who was attacked with a hatchet. 3DCT provides additional possibilities for supplementing missing information, such as number and direction of blows as well as weapon identification. Furthermore, 3DCT facilitates demonstration in court and understanding of medical lay people. We conclude that 3DCT is of particular value for the evaluation of survivors of life-threatening head and face injury. An increasing significance of this technique may be expected.

5832. Witzmann, A., et al. (1981). "[Glioblastoma multiforme developing after a gunshot injury of the brain (author's transl)]." Glioblastoma multiforme nach Kopfschuss. **24**(6): 202-206.

We report the case of a 28-year-old male who suffered a frontal penetrating gunshot injury with subsequent bifrontal brain abscess and subdural empyema, and five years later developed a large bifrontal tumour at the precise site of the meningo-cerebral scar and posttraumatic defect. Histological examination showed a glioblastoma multiforme adjacent to the dural scar and, in addition, old suture material was found within the glioma tissue. In spite of combined radiation and polychemotherapy the patient died eleven months after partial tumour resection. The temporal and local association of missile injury with subsequent recurred abscess and scar formation and the malignant glioma is highly suggestive of a causal relationship between trauma and the development of a brain tumour.

5833. Wojcik, K., et al. (2006). "[Brain abscess: analysis of prevalence and clinical course]." Bakteryjne ropnie mozgu jako problem oddzialu zakaznego. **60**(2): 265-271.

The aim of the study was the analysis of the patients with bacterial meningitis and brain abscess who were treated in the Department of Infection Disease and Hepatology of Medical University in Lodz in years 1996-2005. We reviewed their clinical presentation, bacteriology treatment and outcome retrospectively. Among 135 patients who were confirmed cases of bacterial meningitis 16 identified as having brain abscesses. The prevalence rate of brain abscesses significantly increased in years: 2004-2005. The common predisposing factors were otic and teeth infections, sinusitis, penetrating head trauma, and bacterial endocarditis. Solitary abscess was found in 56% of the cases while in 44% of the cases multiple abscess were found. The most common presentation: headache, fever and neurological deficit were present in 37% of the cases. 75% of patients were disqualified from early neurosurgical intervention and antibiotic therapy were recommended. The antibiotic therapy was effective only in 1 patient. The mortality rate was 38% and 56% of the survivors had late neurological defects. The prevalence rate of brain abscesses significantly increased in years 2004-2005. Over all mortality was very high and antibiotic therapy hasn't been effective treatment in brain abscess at

the late stage of its evolution. The early neurosurgical intervention is recommended. Late neurosurgical intervention strongly influences poor outcome in patients with brain abscess.

5834. Wolf, J., et al. (2015). "The phase II ASCEND-7 (CLDK378A2205) trial: Ceritinib in patients (pts) with ALK-rearranged (ALK+) Non-Small Cell Lung Cancer (NSCLC) metastatic to the brain and/or leptomeninges." Oncology Research and Treatment **38**: 138.

Introduction: In pts with ALK+ NSCLC receiving the ALK inhibitor (ALKi) crizotinib (CRZ), disease progression often occurs within 1 year with the brain/central nervous system (CNS) as a common site of progression and relapse. The oral ALKi ceritinib showed a 20-fold greater potency than CRZ in enzymatic assays and crosses the blood-brain barrier with good CNS penetration in preclinical studies. In the pivotal phase I study (NCT01283516) ceritinib was highly active in ALK+ NSCLC pts regardless of prior CRZ exposure and achieved intracranial responses in 7 of 14 pts with measurable baseline brain lesions. Adverse events profile in these pts was similar to that of the full study population. Methods: This prospective phase II study is designed to evaluate the antitumor activity of ceritinib in pts with ALK+ NSCLC metastatic to the brain or leptomeninges. Eligible pts must have investigator assessed ALK+ NSCLC metastatic to the brain and ≥1 extracranial measurable lesion (RECIST v1.1). Pts must be neurologically stable ≥1 week prior to ceritinib and will be allocated to 1 of 5 cohorts: Ceritinib will be dosed 750 mg/day on a continuous schedule; study assessments are consistent across cohorts. Primary and key secondary objectives are whole body overall response rate and disease control rate, respectively. Other secondary objectives include intracranial and extracranial responses for all pts and for each cohort 1-4; overall survival and safety for all pts and for each cohort 1-5; and ceritinib pharmacokinetics in all pts. (Table Presented).

5835. Wolf, S., et al. (2017). "Nostra III-an ongoing phase 3 registration study in moderate and severe traumatic brain injury (TBI)." Neurocritical care **27**(2): S86.

Introduction TBI remains the leading cause of death and disability in young adults in the US and Europe. Thus far, pharmacological and non-pharmacological intervention studies did not confirm benefits on functional outcomes. Methods The inducible enzyme Nitric Oxide Synthase (iNOS) is upregulated in response to brain injury, causing excessive production of NO, a key driver of secondary injury after TBI. The antipterin VAS203 is a structural analogue of the endogenous NOS cofactor and a potent in-vivo selective inhibitor of iNOS. A randomized, placebo-controlled Phase 2 study examined 3 dose levels of VAS203 in 32 patients with acute moderate or severe TBI. Cerebral microdialysis showed pharmacologically relevant drug concentrations close to the injury and a tendency for VAS203 to increase the arginine/citrulline ratio, an indirect marker of NOS inhibition (Stover et al., J Neurotrauma 2014). VAS203 conferred a significant benefit on the extended Glasgow Outcome Scale Interview (eGOS-I) at 6 and 12 months after injury. No changes in systemic blood pressure or partial brain oxygen pressure were noted. A recent pharmacokinetics and pharmacodynamics study further corroborated the selective iNOS inhibition by VAS203. Results The confirmatory NOSTRA Phase 3 trial (EudraCT no. 2013-003368-29; ClinicalTrials.gov identifier NCT02794168) was initiated in 2016. Adult patients with a non-penetrating head trauma, GCS > 3 and requiring intracranial pressure monitoring, are randomized 1:1 to VAS203 or placebo, administered in addition to standard of care, as intravenous continuous infusion for 48 hours, starting between 6 and 18 hours post TBI. The primary efficacy endpoint is eGOS-I at 6 months post injury. Additional endpoints include the daily therapy intensity level and TBI-specific quality of life measures. Continuous safety monitoring is performed by an independent committee. Conclusions NOSTRA III, the only ongoing registration study in acute moderate and severe TBI, is sponsored by vasopharm GmbH, and plans to recruit 232 patients by Q3 2018.

5836. Wolford, L. M. and D. B. Rodrigues (2011). "Autogenous grafts/allografts/conduits for bridging peripheral trigeminal nerve gaps." Atlas of the oral and maxillofacial surgery clinics of North America **19**(1): 91-107.

Nerve repairs and grafting techniques have been around for many years. Autogenous nerve grafts have worked reasonably well in the right circumstances but are associated with difficulties in achieving a proper donor-host match and with postsurgical sequelae at the donor site. Vein grafts seem to work almost as well as autogenous nerve grafts in digital nerve repairs that require a graft less than 3 cm in length. Currently, the most promising nerve graft materials are the polyglycolic acid tubes and processed decellularized allografts, which have shown good results without the morbidity of autogenous nerve grafts. However, more research studies using these materials for TN repairs are essential to validate the superiority of these procedures.

5837. Wolpin, S. B. (1991). "Missile localization in a gunshot wound victim." Oral surgery, oral medicine, and oral pathology **72**(3): 380.

5838. Wolstenholme, C. R., et al. (2006). "The endoscopic management of a penetrating injury of the anterior skull base." Otorhinolaryngologist **1**(1): 43-45.

Intranasal foreign bodies are common and can penetrate the skull base. Transnasal endoscopic management of cerebrospinal fluid (CSF) leaks has become the treatment of choice for most anterior cranial CSF leaks. We present the endoscopic management of a transnasal penetrating injury of the anterior skull base. This has not previously been described in the literature.

5839. Wong, H., et al. "Strategies for use of blood products for major bleeding in trauma." (4).

This is a protocol for a Cochrane Review (Intervention). The objectives are as follows:, The objective of this review is to assess the effects and safety of blood product transfusion strategies started in the first 24 hours after injury for trauma patients of all ages with major bleeding.

5840. Wong, K. and J. Petchell (2005). "Severe trauma caused by stabbing and firearms in metropolitan Sydney, New South Wales, Australia." ANZ journal of surgery **75**(4): 225-230.

BACKGROUND: Stabbing and firearm trauma causing severe injuries (injury severity score (ISS) >15) and death is uncommon in Australia. The present study describes the experience with stabbings and firearm trauma causing severe injuries at a major Australian urban trauma centre., METHODS: Data from a prospectively generated trauma registry regarding all patients presenting to Royal Prince Alfred Hospital (RPAH), Sydney, Australia with penetrating trauma causing severe injuries from July 1991 to June 2001 was retrospectively analysed., RESULTS: Of all patients presenting to RPAH with stabbing and firearms wounds over the 11 year study period, 28% received an ISS >15. One hundred and forty patients were identified. 94% were male. The mean age was 34 years (15-82 years). The number of cases/year has not shown an increasing trend. Thirty per cent of patients sustained firearm related injuries, with the remainder mainly caused by knives or machetes. Fifteen per cent of injuries were self inflicted. The most common location of injury was on a public street. Fifty-two per cent of patients were injured in more than one anatomical region, with the abdomen being the most common site of injury (53%). On hundred and seventy-four operations were performed - laparotomies (43%), thoracotomies (26%), craniotomies (5%) and orthopaedic, vascular, wound explorations and other procedures (26%). Twenty-eight per cent of patients suffered at least one complication during their admission, with coagulopathy being the most common complication (20%). Mean length of stay was 10.4 days (1-107 days). The total mortality rate for the severely injured patients was 21%, with gun-related injuries having a higher mortality rate than stabbing injury (36%vs 15%). Sixty per cent of deaths were related to exsanguination., CONCLUSIONS: Stabbings and firearm trauma are associated with significant morbidity, mortality and utilization of hospital resources in metropolitan Sydney. Overall mortality rates are similar to institutions with higher volumes of penetrating trauma.

5841. Wong, S. C. K., et al. (2002). "Penetrating injury of the temporal fossa with a screwdriver with associated traumatic optic neuropathy." The Journal of trauma **52**(6): 1189-1191.

5842. Wong, V., et al. "Acupuncture for acute management and rehabilitation of traumatic brain injury." (3).

Background, Traumatic brain injury (TBI) can be life threatening depending on the severity of the insult to the brain. It can also cause a range of debilitating sequelae which require cognitive, motor, communication, emotional, or behavioral rehabilitation of varying intensity and duration. A number of studies conducted and published in China have suggested that acupuncture may be beneficial in the acute treatment and rehabilitation of TBI., Objectives, To determine the efficacy and safety of acupuncture in the acute management or rehabilitation (or both) of patients with a TBI, including cognitive, neurological, motor, communication, emotional, or behavioral complications, or a combination of such complications., Search methods, We searched the Cochrane Injuries Group Specialised Register, Cochrane

Central Register of Controlled Trials (The Cochrane Library), MEDLINE, EMBASE, CINAHL, AMED, PsycINFO and others. We also searched the Chinese Acupuncture Studies Register, the Studies Register of the Cochrane Complementary Medicine Field, NCCAM, and NIH Clinical Studies Database. Three major Mainland Chinese academic literature databases (CNKI, VIP and Wang Fang Data) were also searched using keywords in simplified Chinese. We searched all databases through December 2009, and some searches have been updated to October 2012., Selection criteria, Randomized controlled studies evaluating different variants of acupuncture and involving participants of any age who had suffered a TBI. Included trials compared acupuncture with placebo or sham treatment, or acupuncture plus other treatments compared with the same other treatments. We excluded trials that only compared different variants of acupuncture or compared acupuncture alone against other treatments alone, as they did not yield the net effect of acupuncture., Data collection and analysis, Two review authors identified potential articles from the literature search and extracted data independently using a data extraction form. We performed methodological assessment of included studies using the Cochrane Collaboration's tool for assessing risk of bias. We were unable to perform quantitative data analysis due to insufficient included studies and available data., Main results, Four RCTs, including 294 participants, reported outcomes specified by this review. Three investigated electro-acupuncture for TBI while one investigated acupuncture for acute TBI. The results seem to suggest that acupuncture is efficacious for these indications, however the low methodological quality of these studies renders the results questionable. No adverse effects of acupuncture were reported in any of the studies., Authors' conclusions, The low methodological quality of the included studies does not allow us to make conclusive judgments on the efficacy and safety of acupuncture in either the acute treatment and/or rehabilitation of TBI. Its beneficial role for these indications remains uncertain. Further research with high quality trials is required.

5843. Woo, X., et al. (2022). "Accidental Low-Velocity Penetrating Brain Injury by Glass Marble." Asian journal of neurosurgery **17**(1): 116-119.

Penetrating brain injury from marble is rare. Marbles, commonly known as "guli" among locals, is a popular children's traditional game in Malaysia. This study discusses two cases of intracranial marble injury, both accidentally shot by children with home-made air guns during the period of Movement Control Order with one elderly patient who passed away. While the diagnosis was uneventful, the management was not straightforward. Strategies of prehospital, operative, postoperative management, and rehabilitation are discussed, including prognostic factors. Because of its rarity, the management of such injuries is complex and nonstandardized. Copyright Asian Congress of Neurological Surgeons. This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (https://creativecommons.org/licenses/by-nc-nd/4.0/).

5844. Woodbury, S. C., et al. (1998). "Options for immediate reconstruction of the traumatized temporomandibular joint." The Journal of cranio-maxillofacial trauma **4**(2): 22-21.

The management of condylar fractures is one of the most controversial topics in the repair of the maxillofacial skeleton. An extensive volume of literature exists describing the various indications for a specific treatment of this injury. This article outlines the absolute and relative indications for an open procedure and describes three different modalities for the immediate reconstruction of the temporomandibular joint system. Three different case reports are used to illustrate the respective procedures--replacement of the temporomandibular joint with autologous rib graft, replacement of the temporomandibular joint with an alloplast, and vertical ramus osteotomy for repositioning of the condylar stump. The discussion section reviews the findings and preferences of various treatment modalities described in the literature, along with the advantages and disadvantages.

5845. Woodruff, G., et al. (2022). "Nine years of pediatric gunshot wounds: A descriptive analysis." Preventive Medicine Reports **28**.

Pediatric firearm violence carries significant morbidity and mortality. Studies targeting children ≤14 years are limited. Our goal was to study the distribution and determinants of GSWs in the pediatric population. We performed a retrospective review of children ≤14 years presenting with GSWs at this level 1 trauma center. This cohort was split into younger children, 0–12 years, and older children, 13–14 years. Summary and bivariate statistics were calculated using Stata v10. 142 patients (68.3% black, 76.7% male) were identified. Injuries more often occurred at home (39.6%) by

family or friends (60.7%). Older children often suffered handgun injuries (85.5%) and more often were sent immediately to the OR on presentation (29.2%). Younger children more often suffered from air-gun (50%) and pistols (40%). Younger children more commonly had blood transfusions (9.4%) compared to exploratory laparotomy in older children (13.5%). The most common disposition from the ED was home (36.2%). Descriptive data entailing incident specifics such as time of injury and CPS involvement were frequently missing in the healthcare record. Older children were more likely to be injured by strangers, have longer lengths of stay especially associated with surgical operations, and have a disposition of immediate arrest compared to their younger cohort. Consequently, this group may benefit from interventions typically aimed at older patients such as violence intervention programs. When available, differences in demographics and outcomes were identified which could shape novel prevention strategies for firearm injury.

5846. Woodworth, B. A., et al. (2006). "Sphenoid sinus cerebrospinal fluid leaks." Operative Techniques in Otolaryngology - Head and Neck Surgery **17**(1): 37-42.

There are a number of special considerations regarding endoscopic repair of cerebrospinal fluid (CSF) leaks and encephaloceles occurring in the sphenoid sinus. The sphenoid sinus is formed by the anterior and middle cranial fossae, is in close proximity to the internal carotid artery and optic nerve, and may have extreme lateral pneumatization that limits accessibility via normal endoscopic routes. Although CSF leaks and encephaloceles can occur anywhere within the sphenoid sinus, they are generally divided into a medial, perisellar type and a lateral, sphenoid recess type. The diverse etiologies of sphenoid sinus CSF leaks make it essential to have a thorough understanding of the underlying pathophysiology, and treatment principles and treatment options to achieve excellent outcomes. The specific surgical approach for a sphenoid sinus skull base defect is dependent on the exact site of the defect within the sphenoid sinus. Once an appropriate endoscopic approach with wide local exposure is obtained, reconstruction of the skull base is dependent on the etiology of the leak and other factors, including the underlying intracranial pressure. This article will highlight the surgical techniques and perioperative care relevant to sphenoid CSF leaks and encephaloceles.

5847. Workman, M. J., et al. (2002). "Treatment of trapped CCF by direct puncture of the cavernous sinus by infraocular trans-SOF approach: Case report and anatomical basis." Interventional Neuroradiology **8**(3): 299-304.

We present a case of recurrent carotid-cavernous fistula after prior ipsilateral carotid artery ligation. Due to lack of endovascular access, embolization was performed by direct puncture of the cavernous sinus via a transorbital approach. Operative technique and an anatomical basis for treatment are described.

5848. Worley, G., et al. (1995). "18-Fluorodeoxyglucose positron emission tomography in children and adolescents with traumatic brain injury." Developmental medicine and child neurology **37**(3): 213-220.

Twenty-two previously normal children and adolescents who suffered a severe, non-penetrating traumatic brain injury had PET during rehabilitation at a median of 1.5 months after the injury. Outcome was assessed at a median of 25 months after brain injury. 16 subjects had CT or MRI within 24 days of PET and 11 subjects had a second PET at the point of outcome (median 28 months after first PET). The PET score (obtained by adding the score of 15 brain regions: normal metabolism = 1; reduced = 0) was significantly associated with the clinical outcome measure. PET earlier than 12 weeks after head trauma correlated with outcome, but later PET did not. PET scores improved significantly between rehabilitation and outcome for the 11 subjects who had two PETs, but improvement was not associated with improvement in clinical condition. PET score did not add to the amount of variance explained in the last regression model for prediction of outcome when the results of contemporaneous CT/MRI and clinical condition were taken into account. The data suggest that routine PET during rehabilitation is no more useful than contemporaneous CT or MRI for prediction of outcome.

5849. Wozniak, K., et al. (2009). "[Postmortem CT examination with 3D reconstruction in gunshot and post explosion injuries]." Posmiertne badania obrazowe TK z rekonstrukcja 3D u ofiar postrzalow z broni palnej i eksplozji ladunkow wybuchowych. **59**(2): 85-92.

The authors presented the results of postmortem examinations of four cases related to gunfire and post explosion injuries. Prior to "classic" forensic autopsies, the corpses were examined using CT imaging. The findings

(injuries and foreign bodies) are presented in the table and in images: 3D reconstructions contrasted with actual autopsy specimens. The enclosed CD includes 3D animations.

5850. Wozniak, K. and J. Pohl (2003). "[Suicidal single intraoral shooting by a shotgun--risk of misinterpretation at the crime scene]." Samobojcze postrzaly z broni srutowej po wprowadzeniu lufy do ust a ryzyko blednej oceny na miejscu ujawnienia zwlok. **53**(4): 347-355.

The authors presented two cases of suicidal single intraoral shooting by a shotgun. The first case relates to a victim found near the peak of Swinica in the Tatra mountains. When the circumstances could have suggested fatal fall from a height and minute, insignificant external injuries were found, the pistol found at the scene has been the most important indicator leading to the actual cause of death. The second case relates to a 38-year-old male found in this family house in a village. Severe internal cranial injury (bone fragmentation) was diagnosed at the scene. A self-made weapon was previously removed and hidden from the scene by a relative of the victim. Before regular forensic autopsy X-ray examination was conducted which revealed multiple intracranial foreign bodies of a shape of a shot. After the results of the autopsy the relative of the deceased indicated the location of the weapon.

5851. Wozniak, K. and E. Rzepecka-Wozniak (2003). "[Routine examination of cervical spinal cord and spinal column during forensic autopsies]." Rutynowe badanie odcinka szyjnego rdzenia kregowego i kregoslupa podczas sekcji sadowo-lekarskich. **53**(2): 91-107.

Examination of the cervical spinal cord is a rare additional autopsy technique applied in forensic autopsies. Injuries of the neck region are fatal in a considerable number of cases. However, such technique is neglected especially while a different cause of death is found. Research on 316 autopsy cases (about 10% of all cases during that time) was undertaken. Groups of "possible trauma" (gross anatomy and microscopic examination of the cervical spinal cord) and "possible non-trauma" (gross anatomy examination) cases were investigated. There were 68 gross anatomy and 61 microscopic (blood suffusions) "positive" findings. There were about 40% gross anatomy and about 46% microscopic (blood suffusions) changes giving evidence of trauma of that region in groups of victims of traffic accidents. Techniques of examination of the cervical spinal cord and spinal column with the addition of microscopy in selected cases can prove the cause and mechanism of death. While neglected, especially in obscure autopsy cases, could give the reason that possible medical malpractice occurred.

5852. Wright, J. W., Jr. and C. E. Taylor (1972). "Facial nerve abnormalities revealed by polytomography." Archives of otolaryngology (Chicago, Ill. : 1960) **95**(5): 426-430.

5853. Wright, M. S. (1995). "Update on pediatric trauma care." Current opinion in pediatrics **7**(3): 292-296.

Injuries are responsible for more deaths in the pediatric age group than all other causes combined. Care of the injured child, with attention to the way in which patterns of injury and therapeutic responses differ from adults, is a fundamental tenet of pediatric trauma care. As appropriate resource utilization is increasingly mandated, those involved in the care of traumatized children are investigating the efficient application of laboratory and radiologic resources for the evaluation of the pediatric trauma patient and the differential use of hospital resources by various treatment strategies. Familiar diagnostic modalities are put to new uses in the care of the trauma patient. Finally, the alarming increase in violent injury of children and adolescents is bringing a change in the epidemiology of injuries observed in pediatric trauma centers.

5854. Wright, P. J. and R. J. Murray (1989). "Penetrating craniocerebral airgun injury. Anaesthetic management with propofol infusion and review of recent reports." Anaesthesia **44**(3): 219-221.

Low velocity cerebral missile injuries inflicted by air guns frequently cause little primary neurological damage, but the patient often suffers severe later deterioration which has been classified as a type of 'talk and die' head injury. The anaesthetic management of a penetrating air rifle missile injury using an infusion of propofol is described.

5855. Wu, A., et al. (2021). "Pediatric evidence-based imaging guidelines for adult trauma providers significantly reduces radiation exposure to children." Trauma (United Kingdom).

Introduction: Evidence suggests that stand-alone pediatric trauma centers outperform adult and combined adult/pediatric trauma centers in limiting radiation exposure to injured children. We sought to determine the impact of implementing evidence-based guidelines for pediatric imaging at a combined adult (level 1) and pediatric (level 2) center. The initiative focused on trauma/critical care surgeons as the pediatric surgeons did not participate in the resuscitation and initial evaluation of injured children. Methods: Imaging guidelines were developed from existing clinical studies. After 3 months of education, guidelines were implemented, and regular feedback was given to providers regarding compliance. Data were collected from the trauma registry for all pediatric patients (aged less than 15 years), in calendar years 2017 (pre-guideline) and 2019 (post-guideline). All admissions were analyzed, with subgroup analysis of children with multisystem trauma admitted to the trauma surgery service. Results: Following guideline implementation, mean computed tomography (CT) scans per injured child fell by over 50% (.93 vs.45). For patients admitted to the trauma service, the mean fell by 58% (1.82 vs 0.76). The number of patients receiving more than 1 CT significantly decreased for all children (26% vs 10%), and particularly those admitted to the trauma service (52% vs 17%). During this time, there was only one injury missed at the initial admission, which was clinically insignificant (non-displaced skull fracture). Conclusions: Implementation of evidence-based guidelines for imaging eliminates disparity in practices between a combined adult/pediatric trauma center and stand-alone pediatric trauma centers.

5856. Wu, Q., et al. (2012). "Low-level laser therapy for closed-head traumatic brain injury in mice: effect of different wavelengths." Lasers in surgery and medicine **44**(3): 218-226.

BACKGROUND AND OBJECTIVES: Traumatic brain injury (TBI) affects millions worldwide and is without effective treatment. One area that is attracting growing interest is the use of transcranial low-level laser therapy (LLLT) to treat TBI. The fact that near-infrared light can penetrate into the brain would allow non-invasive treatment to be carried out with a low likelihood of treatment-related adverse events. LLLT may treat TBI by increasing respiration in the mitochondria, causing activation of transcription factors, reducing inflammatory mediators and oxidative stress, and inhibiting apoptosis., STUDY DESIGN/MATERIALS AND METHODS: We tested LLLT in a mouse model of closed-head TBI produced by a controlled weight drop onto the skull. Mice received a single treatment with continuous-wave 665, 730, 810, or 980 nm lasers (36 J/cm(2) delivered at 150 mW/cm(2)) 4-hour post-TBI and were followed up by neurological performance testing for 4 weeks., RESULTS: Mice with moderate-to-severe TBI treated with 665 and 810 nm laser (but not with 730 or 980 nm) had a significant improvement in Neurological Severity Score that increased over the course of the follow-up compared to sham-treated controls. Morphometry of brain sections showed a reduction in small deficits in 665 and 810 nm laser treated mouse brains at 28 days., CONCLUSIONS: The effectiveness of 810 nm agrees with previous publications, and together with the effectiveness of 660 nm and non-effectiveness of 730 and 980 nm can be explained by the absorption spectrum of cytochrome oxidase, the candidate mitochondrial chromophore in transcranial LLLT.

5857. Wu, R., et al. (2018). "Management of Penetrating Brain Injury Caused by a Nail Gun: Three Case Reports and Literature Review." World neurosurgery **112**: 143-147.

BACKGROUND: Penetrating brain injury (PBI) caused by a nail gun is an extremely rare neurosurgical emergency that poses a challenge for neurosurgeons because of its rarity and complexity., CASE DESCRIPTION: Here we present 3 cases of PBI caused by a nail gun. In the first case, the nail entered through the right parietal bone and lodged in the right parietal lobe and basal ganglia. In the second case, the nail entered through the right occipital bone and lodged in the right occipital lobe. In the third case, the nail entered through the right parietal bone and lodged in the right frontal and parietal lobes. All patients underwent surgical removal of the nail. The first patient presented with reduced left-side strength, whereas the second and third patients were neurologically intact on presentation., CONCLUSIONS: PBI caused by a nail gun can present with differing clinical manifestations, and most cases require immediate surgery. A rational management strategy should provide a good postoperative prognosis with minimal neurologic deficits in these patients.

5858. Wu, W., et al. (2011). "Endoscopic transorbital approach for repair of cerebrospinal fluid leakage following removal of an orbito-cranial foreign body." Clinical & experimental ophthalmology **39**(4): 375-377.

5859. Wu, X., et al. (2014). "Removal of orbital-maxillary sinus-pterygopalatine fossa foreign body with external and endoscopic combined approach." The Journal of craniofacial surgery **25**(4): 1547-1549.

Craniofacial trauma involving the pterygopalatine fossa region is reported to be rare. We present a case of a foreign body involving the orbit, maxillary sinus, and pterygopalatine fossa in a 4-year-old boy. The object was a reed shaft. Three-dimensional computed tomographic scans and magnetic resonance imaging were done to make a correct diagnosis and to apply the best surgical treatment. The Caldwell-Luc approach combined with endoscopic approach was applied to remove all the fragments of the foreign body, which had been decayed in the human body. One month later, the patient showed satisfactory aesthetic and functional results.

5860. Wu, X., et al. (2019). "Synthesis and evaluation of novel PD-L1-targeted small molecules for 18F-labeling and PET imaging." Journal of Nuclear Medicine **60**.

Objectives: The immune checkpoint pathways play important roles for vertebrates to control the immune response. However, cancer cells also exploit these checkpoint pathways to evade antitumor immune responses, and hence immune checkpoint pathways are viable target for anti-cancer therapies and attracted much attention in recent years. At present, several immune checkpoint blocking antibodies have been approved by the U.S. Food and Drug Administration and used as effective treatment against metastatic melanoma, non-small-cell lung cancer (NSCLC) and renal cell carcinoma in the clinic. It is also important to measure the expression of immune checkpoint associated proteins before the applications of immune checkpoint blocking antibodies to optimize and predict the anti-cancer therapeutic effects. Though radiolabeled proteins/antibodies have been reported as promising PD-L1 imaging agents, the disadvantages of protein-based and antibody-based imaging agents, i.e., slow clearance rate, low brain penetration (for primary/metastatic lesions in brain), call for small molecule-based PD-L1 imaging agents. Based on the structures revealed by Bristol-Myers-Squibb (BMS), we synthesized a small library of fluorine-containing PD-L1 ligands, to identify suitable PET tracers with high affinities to human PD-L1, and reasonable logP values for brain penetration. Methods: A total of 20 compounds were prepared from commercially available starting materials, using methods adapted from literatures with slight modifications. All the target compounds in this investigation were readily prepared using Mistunobu reaction or Buchwald-Hartwig cross coupling reactions as key steps to get the biphenyl intermediates, followed with sodium cyanoborohydride-mediated reductive amination or cesium carbonate-promoted O-alkylation before the reductive amination. Homogeneous Time-resolved Fluorescence (HTRF) human PD1/PD-L1 Binding Assay was performed to evaluate the IC50s of the newly synthesized PD-L1 ligands. Compound 9 showed most potent inhibitory and its organotin precursor was synthesized from the corresponding brominated analog using palladium catalyst. Results and Discussion: All compounds were successfully synthesized in 4-5 steps with overall yields ranging from 24%-35%, and the organotin precursor was also synthesized via bromo intermediate. Compound 9 showed the most potent activity with IC50 being 4 nM, which is followed by compound 10 (9 nM), compound 7 (10 nM) and compound 11 (10 nM). Structure activity relationship analysis showed the influences of various substituents at the 1, 3, 4 and 6 position of the 'core ring' of the lead compound from the BMS patent (see Figure). Studies indicate that the modification of R1 will slightly increase the activity, and the introduction of pyridine at the 3position (R3) of the benzene ring will also slightly increase the activity. Introduction of bromide at 6 position (R4) did not improve the biochemical potencies, but the chiral six membered substituent at 4 position (R2) showed good bioactivities. Importantly, the substitution with fluorine at the 6 position of the core ring did not significantly influence the binding affinity. And this allows for the radiofluorination to generate radiotracers for PET imaging. Conclusions: To develop small molecule-based PD-L1 PET imaging probes, we designed and synthesized a library of fluorinated PD-L1 ligands based on the biphenyl pharmacophore. In vitro binding assay showed that several of the compounds possess nano-molar affinities to human PD-L1, and are potential PD-L1 PET imaging probe candidates. The radiolabeling and in vitro and in vivo pharmacology and pharmacokinetics studies of these PET tracers are under the way. Figure 1. The structure of the lead compound and the regions for SAR.

5861. Wu, Y., et al. (2020). "Orbitocranial Penetrating Injury With Multiple Vessel Invasion in an Infant: A Case Report and Literature Review." Frontiers in neurology **11**.

Orbitocranial penetrating injury (OPI) with multiple vascular invasions is a rare occurrence. To our knowledge, experience with its clinical treatment is rather limited, especially for infants. This case report describes an infant who fell

from a 0.5 m high bed and landed on a toy with a keen-edged plastic rod. The fractured end of the rod was noted at the medial aspect of the left eyelid, and she was experiencing impaired consciousness. Computed tomography showed that the foreign body penetrated the cavernous sinus with internal carotid artery involvement, and compressed the transverse sinus through the cerebellum. Emergency surgery was performed with temporal occlusion of the left common carotid artery. The rod was removed from the orbital side, and bleeding from cavernous sinus region was effectively controlled under direct inspection via a sub-temporal approach. The patient was successfully treated and recovered consciousness after 17 days. This is the first report of successful management of OPI combined with multiple vascular injury in an infant. Herein, we highlight the anatomical imaging features of the injuries and also the individualized strategy concerning vascular invasion.

5862. Wu, Y., et al. (2021). "Trans-base and trans-vault low-velocity penetrating brain injury: A retrospective comparative study of characteristics, treatment, and outcomes." Chinese journal of traumatology = Zhonghua chuang shang za zhi **24**(5): 273-279.

PURPOSE: Low-velocity penetrating brain injury (LVPBI) caused by foreign bodies can pose life-threatening emergencies. Their complexity and lack of validated classification data have prevented standardization of clinical management. We aimed to compare the trans-base and trans-vault phenotypes of LVPBI to help provide guidance for clinical decision-making of such injury type., METHODS: A retrospective study on LVPBI patients managed at our institution from November 2013 to March 2020 was conducted. We included LVPBI patients admitted for the first time for surgery, and excluded those with multiple injuries, gunshot wounds, pregnancy, severe blunt head trauma, etc. Patients were categorized into trans-base and trans-vault LVPBI groups based on the penetration pathway. Discharged patients were followed up by outpatient visit or telephone. The data were entered into the Electronic Medical Record system by clinicians, and subsequently derived by researchers. The demography and injury characteristics, treatment protocols, complications, and outcomes were analyzed and compared between the two groups. A t-test was used for analysis of normally distributed data, and a Mann-Whitney U test for non-parametric data. A generalized linear model was further established to determine whether the factors length of stay and performance scale score were influenced by each factor., RESULTS: A total of 27 LVPBI patients were included in this analysis, comprised of 13 (48.1%) trans-base cases and 14 (51.9%) trans-vault cases. Statistical analyses suggested that trans-base LVPBI was correlated with deeper wounds; while the trans-vault phenotype was correlated with injury by metal foreign bodies. There was no difference in Glasgow Coma Scale score and the risk of intracranial hemorrhage between the two groups. Surgical approaches in the trans-base LVPBI group included subfrontal (n = 5, 38.5%), subtemporal (n = 5, 38.5%), lateral fissure (n = 2, 15.4%), and distal lateral (n = 1, 7.7%). All patients in the trans-vault group underwent a brain convex approach using the foreign body as reference (n = 14, 100%). Moreover, the two groups differed in application prerequisites for intracranial pressure monitoring and vessel-related treatment. Trans-base LVPBI was associated with higher rates of cranial nerve and major vessel injuries; in contrast, trans-vault LVPBI was associated with lower functional outcome scores., CONCLUSION: Our findings suggest that trans-base and trans-vault LVPBIs differ in terms of characteristics, treatment, and outcomes. Further understanding of these differences may help guide clinical decisions and contribute to a better management of LVPBIs.

5863. Wulffeld, S., et al. (2017). "The effect of CT scanners in the trauma room - an observational study." Acta anaesthesiologica Scandinavica **61**(7): 832-840.

BACKGROUND: A CT scanner incorporated in the trauma resuscitation bay may benefit trauma patients by fastening work-up times; however, evidence in the area is still sparse. We assessed if time from admission to first CT scan was lower after incorporation of a CT scanner in the resuscitation bay., METHODS: We included trauma patients admitted in two 1-year periods, before and after a major rebuilding of the trauma room. Beforehand, one CT scanner was located in an adjacent room. After the rebuilding, two mobile CT scanners were placed in the resuscitation bays, where a moving gantry was combined with a trauma resuscitation table. Subgroup analyses were performed on severely injured and patients with traumatic brain injury., RESULTS: We included 784 patients before and 742 patients after the reconstruction. Case-mix differed between study periods as there was a higher proportion of severe injuries, traumatic brain injury and penetrating trauma in the after period. We found a minor increase in time to CT in the after period (20 vs. 21 min, P = 0.008). In a multivariate regression analysis adjusted for differences in case-mix and with time to CT as outcome, period was an insignificant explanatory variable [beta (before vs. after): 0.96 min 95% CI: 0.9-1.02, P = 0.3]. In

both subgroups, we found no significant difference in time to CT., CONCLUSION: We found no reduction in time to CT scan, when comparing a period with mobile CT scanners incorporated in the resuscitation bay to an earlier period with a CT scanner next to the trauma room. Copyright © 2017 The Acta Anaesthesiologica Scandinavica Foundation. Published by John Wiley & Sons Ltd.

5864. Wullenweber, R., et al. (1977). "[A computer-tomographical examination of cranial bullet wounds (author's transl)]." Computertomographische Untersuchungen bei Schadel-Schuss-Verletzungen. **80**(3): 227-246.

The report covers the computer-tomographical examination of six patients with acute cranial bullet injuries and fifteen patients suffering from the sequels of such injuries. The diagnostic and prognostic significance of this method of examination in the case of acute injuries is described. The extent of cerebral defects in the case of sequels can be documented during this process by means of x-ray. The computer-tomography therefore offers an objective basis for the assessment of this type of sequela.

5865. Wyatt, E. A. and M. E. Davis (2017). "Breast cancer brain metastasis (BCBM) model for determination of therapeutic brain penetration." Cancer Research **77**(13).

Purpose Brain metastases are presenting an increasing problem in the clinic, and especially in treatment of patients with human epidermal growth factor receptor-2 (HER2)-amplified breast cancer. Although extracranial metastases respond well to HER2 inhibitors, human clinical data shows brain metastases hide behind an intact blood-brain barrier (BBB) and are largely untreatable. Many current preclinical models lack this barrier integrity, limiting their utility in understanding delivery of drugs to the brain. We present here the development of a new model suitable for evaluating therapeutic brain penetration in addition to efficacy. Experimental procedures Human HER2-amplified BT-474 breast cancer cells were inoculated intravenously (tail vein) in female Rag2-/-;Il2rg-/- mice (2 million cells/mouse) to induce multiorgan metastasis. Formation of metastatic brain lesions was monitored by magnetic resonance imaging (MRI). For comparison, BT-474 cells were inoculated intracranially for direct brain tumor implantation (50,000 cells/mouse). Response to a suite of HER2-targeted therapies known not to appreciably cross an intact BBB (trastuzumab, lapatinib, etc.) was monitored by MRI for both metastatic and implanted brain tumors. Mice were sacrificed following signs of prolonged distress or loss of >20% body weight. Organs were collected for standard histological and immunohistochemical analysis, as well as for CLARITY tissue clearing and large-scale 3D macromolecule mapping. Results Intravenous inoculation of BT-474 cells into Rag2-/-;Il2rg-/- mice consistently reproduced the full metastatic profile seen in humans, with metastases in the lung, bone, liver, ovary, lymph, and brain tissues. Brain metastases were detected in >90% of mice inoculated intravenously. Histological analysis of metastatic brain tumors showed different morphologies and invasive characteristics compared to those intracranially implanted. Additional differences in vasculature between metastatic and implanted brain tumors were identified by CLARITY. Importantly, HER2-targeted therapy markedly delayed progression of implanted brain tumors, but failed to control metastatic brain tumor growth, recapitulating the clinical situation. Conclusions These data, together with ongoing efforts to further characterize therapeutic transport to these brain tumors, suggest that intracranial inoculation disrupts the BBB and creates artificial routes for therapeutics to reach implanted brain lesions, resulting in anomalous tumor response. In contrast, this new metastatic model reproduces the discordant effects of HER2-targeted therapy in patients, and offers a platform for studying the efficiency of therapeutic delivery across an intact BBB as well as antitumor activity, both of which are critical to effective clinical translation.

5866. Wyler, A. R. and G. E. Chatrian (1972). "Positive bursts (14- and 6-per second positive spikes) in a patient with a penetrating wound of the brain." Electroencephalography and clinical neurophysiology **32**(3): 317-321.

5867. Wynne, R. D. and C. J. Saldanha (2004). "Glial aromatization decreases neural injury in the zebra finch (Taeniopygia guttata): influence on apoptosis." Journal of neuroendocrinology **16**(8): 676-683.

Emerging evidence suggests a neuroprotective role for oestrogens following damage to the vertebrate brain. Aromatase (oestrogen synthase) is rapidly transcribed and translated in glial cells around areas of neural damage in several vertebrates. However, the potential neuroprotection afforded by locally up-regulated glial aromatase immediately surrounding the injury remains to be tested. Towards this end, individual birds sustained penetrating

mechanical injuries via a needle that contained either vehicle or the aromatase inhibitor fadrozole into contralateral hemispheres. Seventy-two hours later, the size of neural injury (as assessed by the extent of necrotic tissue) and the number of apoptotic cells around the injuries were evaluated. The size of injury in the hemisphere injected with fadrozole was significantly larger than the injury caused by vehicle injection. Furthermore, a greater number of apoptotic nuclei were found around the fadrozole-associated lesion relative to vehicle. Finally, constitutively expressed, neuronal aromatase close to the injury site did not differ between hemispheres. We conclude that local inhibition of glial aromatase immediately around the site of injury plays a neuroprotective role in the songbird brain and this protection involves apoptotic pathways. Local up-regulation of glial aromatase may play a pivotal role in the limitation of secondary damage and/or the acceleration of restorative processes following injury to the vertebrate brain.

5868. Xia, X., et al. (2012). "Stab wound with lodged knife tip causing spinal cord and vertebral artery injuries: case report and literature review." Spine **37**(15): E931-934.

STUDY DESIGN: Case report and literature review., OBJECTIVE: To report the case of a young patient who sustained a penetrating wound with a knife tip retained in his cervical vertebrae and to review the literature., SUMMARY OF BACKGROUND DATA: Stab wound with foreign body retained, associated with spinal cord injury and vertebral artery injury, is not commonly reported. The timing and approach of surgical intervention are still controversial., METHODS: A 17-year-old boy with a wound in the neck presented with diminishing feeling and dysfunction of the left leg and arm. Radiographs demonstrated a foreign body at the C4 level, and possible spinal cord and vertebral artery injuries were detected by computed tomography. Digital subtracted angiography showed a small lateral opening of the injured artery, which was successfully embolized. The knife tip was removed from the original wound without severe cerebrospinal fluid leakage or bleeding,, RESULTS: The patient achieved immediate improvement after the operation., CONCLUSION: Cases of simultaneous spinal cord injury and vertebral artery injury in which the foreign body is retained are uncommonly reported. Digital subtracted angiography is necessary for cervical penetrating wounds and surgical approach should be individualized.

5869. Xiang, W. Z., et al. (2002). "Clinical observation on hemophilia A treatment by cadaveric spleen transplantation." Transplantation proceedings **34**(5): 1929-1931.

5870. Xiao Hong, C., et al. (2020). "Retained haemodialysis-catheter guidewire in the head and neck: a multidisciplinary team approach." BMJ case reports **13**(10).

Penetrating foreign body in the head and neck can be catastrophic from injury to the constellation of vascular and neural structures in the neck. Early recognition and prompt surgical intervention is imperative to save lives. Herein, we present an unusual case of iatrogenic foreign body-a coiled guidewire embedded in the deep neck space. The complications, radiological investigation and multidisciplinary surgical management are further discussed. Copyright © BMJ Publishing Group Limited 2020. No commercial re-use. See rights and permissions. Published by BMJ.

5871. Xie, D., et al. (1995). "The oligodendroglial reaction to brain stab wounds: an immunohistochemical study." Journal of neurocytology **24**(6): 435-448.

Myelin/oligodendrocyte specific protein was compared to glial fibrillary acidic protein and 2'3'-cyclic nucleotide 3'-phosphodiesterase expression in normal rat brains and following stab wounds to the cerebral cortex, corpus callosum and hippocampus. Animals with stab wounds were allowed to recover for 5, 15, 28, 45 and 70 days post-operation before fixation by perfusion. Sections were reacted with antibodies against myelin/oligodendrocyte specific protein, glial fibrillary acidic protein and 2'3'-cyclic nucleotide 3'-phosphodiesterase, and observed by light and electron microscopy. Normal cerebral cortex had very few myelin/oligodendrocyte specific protein-positive and 2'3'-cyclic nucleotide 3'-phosphodiesterase-positive cells, but some glial fibrillary acidic protein-positive cells. The myelinated fibres of the corpus callosum were heavily stained for myelin/oligodendrocyte specific protein but unstained by glial fibrillary acidic protein or 2'3'-cyclic nucleotide 3'-phosphodiesterase antibodies. Some immunopositive cells were present in the corpus callosum and hippocampus with all three antibodies. After stab wound myelin/oligodendrocyte specific protein-positive reactive cells had more and longer processes and stained more intensely than equivalent cells in normal brain. These cells were distributed along the wound track, including within the cerebral cortex. The numbers of these cells increased

until 28 days post-operation and then decreased so that very few were found at 70 days post-operation except in the corpus callosum. Where demyelination occurred myelin/oligodendrocyte specific protein-staining was lost. Staining for 2'3-cyclic nucleotide 3'-phosphodiesterase revealed a similar pattern. Glial fibrillary acidic protein-positive reactive cells, which were also more robust than the normal cells, were more widely distributed. They increased in number throughout the time periods studied and gliosis was evident on the contralateral side. The glial fibrillary acidic protein-positive astrocytes were also different from the myelin/oligodendrocyte specific protein-positive and 2'3'-cyclic nucleotide 3'-phosphodiesterase-positive oligodendrocytes in terms of cell shape. With electron microscopy myelin/oligodendrocyte specific protein-positive cells showed features typical of immature oligodendrocytes. We conclude that the injury caused a numerical increase in oligodendrocytes and that myelin/oligodendrocyte specific protein is a good marker for the oligodendroglial response and demyelination in pathological conditions.

5872. Xie, H. and S. Chen (2013). "Ocular siderosis." Eye science **28**(2): 108-112.

Ocular siderosis refers to intraocular iron deposition in ocular tissues caused by the long-time retention of penetrating iron-containing foreign bodies, commonly leading to a series of characteristic alterations and severe disorder of visual function. Ocular siderosis, rarely seen in the clinic, can cause irreversible retinal injuries and visual function damage and can even affect the appearance of the eyeballs. These effects significantly decrease the quality of life of patients and lead to poor prognosis. This study summarizes ocular siderosis with respect to pathogenesis, clinical manifestations, diagnosis, treatment, and sequelae, with the aim of assisting clinicians in the diagnosis and treatment of ocular siderosis.

5873. Xie, Y., et al. (2022). "PtBi-beta-CD-Ce6 Nanozyme for Combined Trimodal Imaging-Guided Photodynamic Therapy and NIR-II Responsive Photothermal Therapy." Inorganic chemistry **61**(18): 6852-6860.

Combined photothermal/photodynamic therapy is a promising strategy to achieve an enhanced anticancer effect. However, hypoxia is one of the representative characteristics of the microenvironment of solid tumors, which not only attenuates the therapeutic effects but also promotes tumor invasion and metastasis. Herein, a PtBi-beta-CD-Ce6 nanoplatform for the generation of sustained O2 was constructed for more effective tumor therapy. In detail, the catalase (CAT)-like nanozyme, PtBi, which could decompose H2O2 to produce O2, was modified with beta-cyclodextrin (beta-CD). O2 would be converted into 1O2 by PtBi-beta-CD-Ce6 for enhanced photodynamic therapy (PDT) under 650 nm laser irradiation. In addition, by reason of excellent absorption in the near-infrared-II (NIR-II) region, PtBi-beta-CD-Ce6 was used for photoacoustic imaging (PA) and photothermal imaging (PT)-guided photothermal therapy (PTT) in the NIR-II biowindow. Furthermore, PtBi-beta-CD-Ce6 could be elected to serve as a contrast agent for X-ray computed tomography (CT) imaging due to the apparent X-ray attenuation capability of the Pt and Bi elements themselves. Therefore, by integrating the advantages of overcoming the hypoxia function and photothermal effect into a single nanoplatform, PtBi-beta-CD-Ce6 showed an immense possibility in multimodal imaging-guided combined PDT/PTT.

5874. Xiong, C. K., et al. (2011). "A 10-year profile (2001 to 2010) of trauma admissions caused by interpersonal violence: A major trauma centre's experience." Annals of the Academy of Medicine Singapore **40**(7): S16-S17.

Introduction: This study aims to characterise trauma admissions caused by interpersonal violence. Methods: This is a retrospective study of patients who were presented to the Tan Tock Seng Hospital Emergency Department during the 10-year period from 1 January 2001 to 31 December 2010 for injuries caused by interpersonal violence. Data were obtained from the Trauma Registry, case notes and electronic records for descriptive analysis. Results: Four hundred and forty-four patients were admitted in total (99.1% males, 9.9% females). Average age was 36.6 years (range, 14 to 83). Though Chinese (53.4%) was the most common ethnic group, Indians (20.7%), Malays (17.1%) and Others (8.78%) experienced a disproportionately higher burden of interpersonal violence. Of the patients, 77.3% were Singaporeans. There was an increase from 10 to 96 cases annually in the first 8 years, followed by a decrease in the last 2 years (55 in 2010). Time of injury was predominantly from 0000 to 0559 (72.3%). Injury type was mainly blunt (58.3%). Mechanism was mostly sharp/blunt instruments (78.6%). Females more commonly experienced interpersonal violence at home, and males at public places. Interpersonal violence most commonly occurred in public sites (88.7%). Average GCS was 13.5 (range, 3 to 15) and 73 (16.4%) had moderate/ severe brain injury. Average ISS was 13.5 (range, 1 to 75) and 155 (34.9%) were major trauma cases. There were 6 deaths (ISS of ≥26) which were mostly associated with penetrating trauma (83.3%) and public sites (83.3%). Conclusion: A better understanding of the epidemiology, injury characteristics and

outcomes of interpersonal violence was achieved. It is hoped that these data will prompt further research, leading to formulation of preventive strategies.

5875. Xu, F., et al. (2013). "The surgical management of a penetrating orbitocranial injury with a bakelite foreign body reaching the brain stem." Brain injury **27**(7-8): 951-956.

BACKGROUND: Penetrating orbital injuries constitute a significant threat to ocular and cerebral structures. The incidence of central nervous system damage from orbital injury is related to the orbital anatomy and the characteristics of the penetrating object. Penetrating orbital injuries involving the brain stem are extremely rare., OBJECTIVES: To present an uncommon case of penetrating orbital injury and to discuss surgical management., CASE STUDY: A patient suffered from a penetrating injury by a Bakelite comb which extended from his left orbit through the cavernous sinus to the pons. Complete occlusion of the left cavernous segment of the internal carotid artery was detected and a frontotemporal craniotomy with lateral superior orbitotomy was performed to remove the object. A delayed asymptomatic carotid-cavernous fistula was identified 1 year later., CONCLUSION: Surgical treatment remains the mainstay of intervention for penetrating orbitocranial injuries. The rationale of surgical removal of a foreign body should focus on safe exposure and removal of the object at the earliest without inflicting further injuries. Close follow-up for a delayed carotid-cavernous fistula is necessary.

5876. Xu, G., et al. (2018). "Prediction of potential for organ donation after circulatory death in neurocritical patients." The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation **37**(3): 358-364.

BACKGROUND: The success or failure of donation after circulatory death depends largely on the functional warm ischemia time, which is closely related to the duration between withdrawal of life-sustaining treatment and circulatory arrest. However, a reliable predictive model for the duration is absent. We aimed to compare the performance of the Chinese Donation after Circulatory Death Nomogram (C-DCD-Nomogram) and 3 other tools in a cohort of potential donors., METHODS: In this prospective, multicenter, observational study, data were obtained from 219 consecutive neurocritical patients in China. The patients were followed until circulatory death after withdrawal of life-sustaining treatment., RESULTS: The C-DCD-Nomogram performed well in predicting patient death within 30, 60, 120 and 240 minutes after withdrawal of life-sustaining treatment with c-statistics of 0.87, 0.88, 0.86 and 0.95, respectively. The DCD-N score was a poor predictor of death within 30, 60 and 240 minutes, with c-statistics of 0.63, 0.69 and 0.59, respectively, although it was able to predict patient death within 120 minutes, with a c-statistic of 0.73. Neither the University of Wisconsin DCD evaluation tool (UWDCD) nor the United Network for Organ Sharing (UNOS) criteria was able to predict patient death within 30, 60, 120 and 240 minutes after withdrawal of life-sustaining treatment (UWDCD tool: 0.48, 0.45, 0.49 and 0.57; UNOS criteria: 0.50, 0.53, 0.51 and 0.63)., CONCLUSION: The C-DCD-Nomogram is superior to the other 3 tools for predicting death within a limited duration after withdrawal of life-sustaining treatment in Chinese neurocritical patients. Thus, it appears to be a reliable tool identifying potential donors after circulatory death.

5877. Xu, J., et al. (1993). "Variation with age in the labelling of amoeboid microglial cells in rats following intraperitoneal or intravenous injection of a fluorescent dye." Journal of anatomy **182 (Pt 1)**: 55-63.

Amoeboid microglial cells (AMC) in the corpus callosum were selectively labelled following a single intraperitoneal (i.p.) injection of the fluorescent dye, rhodamine isothiocyanate (RhIc) into postnatal rats. The frequency of RhIc-labelled cells varied with age, with the largest number occurring in 7-d-old animals. Thereafter, the labelled cells declined drastically in number and fluorescence and were barely detectable in 12-d-old injected rats. Labelled cells were absent in 13-d or older rats given an RhIc injection. When the injected RhIc was followed over a time course sequence, it was first detected in the cerebral blood vessels and their lining endothelia within 5 min after the injection. A variable number of AMC emitting a weaker fluorescence were closely adherent to the outer walls of the blood vessels. With time, the fluorescence in the AMC was progressively enhanced, but that in the blood vessels showed a concomitant reduction. In the rats that received an intravenous (i.v.) injection of RhIc, the labelling pattern of AMC, both in terms of its variation with age and in temporal sequence, paralleled that in rats given i.p. injections. In 12-d-old rats subjected to a stab wound coupled with an i.p. injection of RhIc, a considerable number of AMC not normally labelled at this age were activated. The cells exhibited an intense fluorescence and expressed MHC surface antigen immunoreactivity. It is

concluded from this study that when injected i.p. or i.v., RhIc is readily circulated to the cerebral vessels, where it enters brain tissue by transendothelial transport.(ABSTRACT TRUNCATED AT 250 WORDS)

5878. Xu, J., et al. (2013). "Foreign body retained in liver long after gauze packing." World journal of gastroenterology **19**(21): 3364-3368.

This case report describes a foreign body retained in the liver long after perihepatic gauze packing. A 64-year-old female patient had suffered a rib fracture and liver rupture during a traffic accident in 1973. She discovered a mass in her right hypochondrium. Her hepatic ultrasonography showed a round mass (20.3 cm x 17.3 cm x 16.0 cm in size) with fluid echogenicity in the right lobe of her liver, and a hepatic cystic-solid mass (19.7 cm x 18.5 cm x 15.6 cm in size) was identified in an abdominal computerized tomography scan. Several pieces of gauze were extracted, and brown pus from the hepatic mass was suctioned during her exploratory laparotomy. Histology documented gauze remnants with necrotic material inclusions and fibrotic capsules. To our knowledge, this patient's case represents the longest time for which a foreign body has been retained in the liver. In addition, we conducted a comprehensive literature review of foreign bodies retained in the liver. Foreign bodies may be introduced into the liver via penetrating trauma, surgical procedures or the ingestion of foreign bodies (which then migrate from the gut). Thus, they can be classified into the following three categories: penetrating, medical and migrated foreign bodies. The details of the case are thoroughly described.

5879. Xu, L., et al. (2020). "The Surgical Strategies and Techniques of Transorbital Nonmissile Brain Injury." World neurosurgery **144**: e856-e865.

OBJECTIVE: This study aimed to summarize the experience with the management of transorbital brain injury (TOBI) at our institution that may help inform surgical decision-making., METHODS: Four adults with TOBIs were admitted to our hospital and received surgical treatment. The patients' clinical manifestations, physical findings, imaging data, surgical treatment, and postoperative outcome were prospectively collected and subject to retrospective analysis., RESULTS: All patients were male. In 2 patients, the entry point of the cranium was the superior orbital fissure, whereas in the other 2, the entry point was the orbital roof. Thorough physical examination and comprehensive diagnostic imaging were performed preoperatively in all patients for careful assessment of the foreign body and its surrounding important structures. In collaboration with our multidisciplinary trauma team, individualized surgeries were successfully designed and performed in the 4 patients to remove the foreign bodies along the path of their trajectories. Three patients had uneventful postoperative courses, whereas 1 patient died because of severe cerebral ischemia and refractory brain swelling after decompressive craniectomy., CONCLUSIONS: A comprehensive understanding of the regional anatomy of the trajectory is the cornerstone for surgical management of TOBIs. Adequate preoperative imaging examinations are essential for the evaluation of surgical risks and for making a tailored management strategy. Early surgical exploration through multidisciplinary collaboration is highly recommended for achieving a favorable outcome.

5880. Xu, M., et al. (2018). "Detection of plastic BBs on CT scanning of the orbit." Canadian journal of ophthalmology. Journal canadien d'ophtalmologie **53**(4): e148-e149.

5881. Xu, M., et al. (2015). "A rare self-injurious case of multiple penetrating brain injury by nails in a young patient with depressive disorder." Acta neurologica Belgica **115**(4): 767-769.

5882. Xue, H., et al. (2020). "Transorbital nonmissile penetrating brain injury: Report of two cases." World journal of clinical cases **8**(2): 471-478.

BACKGROUND Penetrating brain injury (PBI) is an uncommon emergency in neurosurgery, and transorbital PBI is a rare type of PBI. Reasonable surgical planning and careful postoperative management can improve the prognosis of patients CASE SUMMARY The first case is a 68-year-old male patient who was admitted to the hospital because a branch punctured his brain through the orbit for approximately 9 h after he unexpectedly fell while walking. After admission, the patient underwent emergency surgical treatment and postoperative anti-infection treatment. The patient was able

to follow instructions at a 4-mo follow-up review. The other case is a 46-year-old male patient who was admitted to the hospital due to an intraorbital foreign body caused by a car accident, after which the patient was unconscious for approximately 6 h. After admission, the patient underwent emergency surgical treatment and postoperative anti-infection treatment. The patient could correctly answer questions at a 3-mo follow-up review. CONCLUSION Transorbital PBI is a rare and acute disease. Early diagnosis, surgical intervention, and application of intravenous antibiotics can improve the prognosis and quality of life of patients.

5883. Xue, H., et al. (2020). "Transorbital nonmissile penetrating brain injury: Report of two cases." World journal of clinical cases **8**(2): 471-478.

BACKGROUND: Penetrating brain injury (PBI) is an uncommon emergency in neurosurgery, and transorbital PBI is a rare type of PBI. Reasonable surgical planning and careful postoperative management can improve the prognosis of patients., CASE SUMMARY: The first case is a 68-year-old male patient who was admitted to the hospital because a branch punctured his brain through the orbit for approximately 9 h after he unexpectedly fell while walking. After admission, the patient underwent emergency surgical treatment and postoperative anti-infection treatment. The patient was able to follow instructions at a 4-mo follow-up review. The other case is a 46-year-old male patient who was admitted to the hospital due to an intraorbital foreign body caused by a car accident, after which the patient was unconscious for approximately 6 h. After admission, the patient underwent emergency surgical treatment and postoperative anti-infection treatment. The patient could correctly answer questions at a 3-mo follow-up review., CONCLUSION: Transorbital PBI is a rare and acute disease. Early diagnosis, surgical intervention, and application of intravenous antibiotics can improve the prognosis and quality of life of patients.

5884. Yadav, Y. R., et al. (2006). "Supratentorial to infratentorial and antigravity migration of intracranial bullet." Neurology India **54**(4): 453-454.

5885. Yadav, Y. R., et al. (2013). "Modified twist drill technique in the management of chronic subdural hematoma." Turkish neurosurgery **23**(1): 50-54.

AIM: Burr-hole craniostomy is the most efficient and safe choice for surgical drainage of chronic subdural hematoma (CSDH). Although the twist-drill drainage is also relatively safe and time-saving, it carries the risk of inadequate drainage, brain penetration and hematoma formation. Our modified technique helps in avoiding bleeding and brain penetration., MATERIAL AND METHODS: The preferred sites for twist drill were the most curved parts on the cranium. Normal drilling at about 90 degree angle was done on the most curved surfaces while it was at about 60 degree angles on flat surface. This angled drilling and the curved guide wire (hooked in the distal blind end of infant feeding tube), helped to guide infant feeding tube in the hematoma cavity. Dura matter was coagulated using insulated wire., RESULTS: There was no procedure related hematoma, brain penetration and mortality in any of the 50 patients managed by the modified technique. Infant feeding tube was properly positioned in all the cases. Burr hole evacuation was done in 7 cases (14%) due to inadequate evacuation of the hematoma after TDC., CONCLUSION: Our modified technique of twist drill drainage is inexpensive, simple, safe and effective alternative technique in the treatment of CSDH.

5886. Yadollahi, M., et al. (2015). "Epidemiologic study of trauma patients admitted to a level 1 trauma center in Shiraz: One year survey." Razavi International Journal of Medicine **3**(4).

Background: Traumatic injuries exert significant burden on human populations around the world. Iran as a developing country is at top 5 deadliest countries regarding injuries; however, few studies have examined the descriptive epidemiology of trauma in Iran. Objectives: To describe injuries regarding age, gender and injury mechanism and also time trend in emergency departments of Shahid Rajaee Trauma Center affiliated to Shiraz University of Medical Sciences. Patients and Methods: This descriptive cross-sectional study was carried out on all trauma patients (n = 21542) admitted to Shahid Rajaee Trauma Hospital (level I trauma referral center in Shiraz) between March 2011 and March 2012. Data were analyzed separately by age, gender, month of admission, and injury mechanisms (motorcycle collision, car-pedestrian accidents, car-car accidents, fall from height, stab wounds and gunshot injuries). Results: With a mean

age of 36.0 ± 17.2 years, a total number of 21542 patients were visited, 16524 (76.7%) of whom were male. The male to female ratio was 3.3:1 with injured men being significantly younger than women (mean age 33.7 + 16.6 and 43.6 ± 19.2 years, respectively). There were 1492 trauma victims older than 60 years accounting for the smallest proportion of the population (6.92%). On admission, 1699 patients (7.9%) required cardiopulmonary cerebral resuscitation (CPCR) with a sex ratio of 2:1. Among those requiring CPCR, falling down was the major cause (45.24%) of injury in elderly (patients over 60 year) and car accident in those under 60 year (43.94%). Conclusions: Injuries affect all age groups; however, the disproportionately at risk population is the productive youth. Preventive strategies should focus on reducing trauma incidence among young men at population level. Considering the higher number of incidents occurring in mid spring and late summer, authorities should devise preventive plans mainly through alteration of traffic rules in this period.

5887. Yagmur, Y., et al. (1999). "Looking at trauma and deaths: Diyarbakir city in Turkey." Injury **30**(2): 111-114.

There were 329 trauma related deaths in Diyarbakir in 1997. Of these 226 were male (69%) and 103 were female (31%). The median age was 20 years old (range 1-82 years). Of the deaths, 30.5% were under 10, 51% were under 20 and 67% were under 30 years old. Two hundred and eleven deaths occurred in the hospital while 118 deaths occurred prehospital. Seventy-seven percent of hospital deaths (191) occurred in the first day. The most common cause of death was multiple injuries (151, 46%). Head injuries were the main reason for 128 deaths (46%). The most common mechanism of death was motor vehicle accident (131, 40%). The second was falls from a residential building (117, 33.7%).

5888. Yahalom, R., et al. (1994). "Very-low-velocity gunshot wound to the facial structures: report of a case." Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons **52**(4): 411-413.

5889. Yajima, Y., et al. (2005). "Concentrations of toluene in the body killed by an injury to the head shortly after ingesting thinner." Forensic science international **147**(1): 9-12.

An autopsy was conducted on a male showing leather-like skin damage, revealing the cause of death to be an injury to the head. Thinner was found scattered around the scene of death, and stomach and intestine contents smelled strongly of solvent. Toxicological analysis was conducted to determine whether or not the solvent was of a lethal level. Using gas chromatography, peaks of toluene, xylene, and ethylbenzene were detected in the blood and gastric contents. No toluene was detected in the urine, and therefore it was concluded that the decedent died of a severe head injury shortly after solvent ingestion. In the literature, toluene concentrations in blood and lung samples were determined as both fatal and non-fatal but clear differences in the fatality of toluene in solid organ samples, namely, the brain, liver and kidneys were shown. The brain is especially useful in postmortem analysis. In this case, the concentration of toluene in the brain was 20.0 microl/g, which was considered as a non-lethal level.

5890. Yakirevich, I. and A. Popov (2012). "Aircraft medevac by medical modules of emercom of Russia." Journal of Emergency Medicine **43**(5): 919.

Objective: During elimination of medical consequences of emergencies, the issues concerning victims' mass evacuation to a specialized hospital are constantly brought up. At the disposal of the Central Airmobile Rescue Service of EMERCOM of Russia there are two types of medical modules. Medical Airplane Module (MMS) is used for medical evacuation of 4 victims aboard an Ilyushin 76 aircraft. Medical Helicopter Module (MMV) is used for medical evacuation of 2 victims aboard an MI-8 helicopter. MMS and MMV ensure mobility and versatility. Methods: From December 2008 until now, 37 medical evacuations were carried out using MMS aboard an Iluyshin 76 aircraft: traffic accident victims, terrorism act victims, and victims of man-made catastrophes. In total, 272 patients were evacuated (including 16 children); 68 victims with artificial lungs ventilation (ALV). Medical evacuation of severely injured victims from regional hospitals to Moscow specialized hospitals to provide efficient and modern medical aid was carried out using MMV. In total, 27 patients were evacuated, 5 with ALV. The majority of victims were in severe and extremely severe condition with associated multi-system trauma. Closed craniocerebral injury was observed in 75% of victims, with mass affection of locomotor apparatus, mine and explosion trauma, gunshot wounds, burn shock, and burn disease. Constant monitoring, oxygen therapy, ALV, analgesia and sedation, intensive and anti-shock care were carried out in flight.

Condition was evaluated according to Glasgow, APACHE II and SOFA scales. Results: MMS and MMV application in case of mass evacuation in flight ensures spared victims' transportation, total monitoring, and treatment continuity. It enables caregivers to carry out anesthetic and resuscitation treatment, intensive care, monitoring and treatment of all the victims. Conclusions: The quality of mass medical evacuation of extremely injured victims has considerably improved, and the time of transportation from emergency area to specialized hospitals to render them efficient medical aid has decreased.

5891. Yakirevich, I. and A. Popov (2012). "Mass evacuation of victims from emergency areas by medical modules aboard the aircraft of EMERCOM of Russia." Critical Care **16**: S171-S172.

Introduction During elimination of medical consequences of various emergencies the issues concerning victims' mass evacuation to a specialized hospital base are constantly brought up. The physicians of the Central Airmobile Rescue Service of EMERCOM of Russia and the specialists of Kazan Helicopter Plant 'Zarechye' developed two types of modules. The Medical Airplane Module (MMS) is used for medical evacuation of four victims aboard Ilyushin 76 aircraft. The Medical Helicopter Module (MMV) is used for medical evacuation of two victims aboard an MI 8 helicopter. MMS and MMV advantages are: mobility - the possibility of installation in various aircraft cabins types; and versatility - the possibility of any required equipment installation for the treatment of victims with various trauma severity, safe fixation of medical equipment straight on the module, equipment operation off- line as well as using the aircraft power supply network. Methods From December 2008 until now 28 medical evacuations were carried out using MMS aboard Iluyshin 76 aircraft: traffic accident victims, terrorism act victims and manmade catastrophes. In total, 198 patients were evacuated (including 12 children), 55 victims with artificial lung ventilation (ALV). Medical evacuation of severely injured children and adults from regional hospitals to Moscow specialized hospitals in order to provide efficient and modern medical aid was carried out using MMV. In total, 27 patients were evacuated (including five children), five patients with ALV. The majority of victims were in severe and extremely severe conditions with associated multisystem trauma. Closed craniocerebral injury was observed in 75% of victims with mass affection of locomotor apparatus, mine and explosion trauma, gunshot wounds, burn shock and burn disease. Constant monitoring, oxygen therapy, ALV, analgesia and sedation, intensive and anti-shock care as well as wound dressing were carried out in flight. The victims' general condition was evaluated according to the Glasgow Coma Scale, APACHE II and SOFA scales. Results MMS and MMV application in case of mass evacuation in flight ensures spare victims' transportation, total monitoring and treatment continuity. It enables one to carry out anesthetic and resuscitation treatment, intensive care, monitoring and treatment of all the victims. Conclusion The quality of mass medical evacuation of extremely injured victims has considerably improved and the time of transportation from emergency area to specialized hospitals to render them efficient medical aid has reduced.

5892. Yalin, S. F., et al. (2015). "Persistent hoarseness following catheter placement in a renal transplant recipient." The journal of vascular access **16**(4): e79.

5893. Yalnda-Öztürk, N. and E. Aksu (2014). "Is it the scythe or the medicine? A case calling caution for contrast imaging and empiric nephrotoxic antibiotherapy." Pediatric Critical Care Medicine **15**(4): 165.

Background and aims: Contrast imaging became an integral part of medicine to assist with a diagnosis, and antibiotics are essential for treatment of complicated infections. Both can be harmful if not chosen wisely. Results: Six year old boy presented with multi system organ failure due to septic shock. He had a history of penetrating trauma via a scythe to his right eye with resultant orbital cellulitis and endophthalmitis. His perforated cornea was sutured, and he received empiric broad spectrum antimicrobial therapy (meropenem, vancomycin and gentamycin, amphotericin B). His orbit was imaged with 2 contrast computed tomographies and a magnetic resonance imaging before his admission to the PICU. There was questionable orbital abscess in the images, but no surgical intervention was performed. He had generalized edema, especially on his face and neck. He was intubated due to respiratory failure and started on continuous venovenous hemodiafiltration (CVVHDF) secondary to acute anuric kidney injury and received inotropic support. Laboratory investigations revealed anemia, thrombocytopenia and leukocytosis, and elevated inflammation markers. He was on CVVHDF for a week, extubated one day later and discharged two weeks after enucleation of his right eye. With the help of supportive therapy, timely initiation of CRRT, careful antibiotic usage with daily adjustments per calculated glomerular filtration rate and proper surgical intervention the patient survived with normal renal functions.

Conclusions: The decision for imaging with contrast media and the choice of empiric antibiotics deserves special consideration in sick children. Physicians need to be very careful, since both may deteriorate renal functions as in our patient.

5894. Yamada, K., et al. (1974). "[Shotgun pellet embolus of the left middle cerebral artery via the common carotid artery; case report (author's transl)]." No shinkei geka. Neurological surgery **2**(1): 81-84.

5895. Yamamoto, I., et al. (1985). "Unusual craniocerebral penetrating injury by a chopstick." Surgical neurology **23**(4): 396-398.

The case of a 53-year-old man who attempted suicide by introducing a wooden chopstick through his nostril into his brain is reported. The importance of computed tomography is stressed in the diagnosis of intracranial wooden foreign bodies.

5896. Yamamoto, Y., et al. (2017). "Prediction of cerebral morphine concentration in paediatric traumatic brain injury (TBI) with the rat physiologically based pharmacokinetic (PBPK) model." Child's Nervous System **33**(10): 1832-1833.

OBJECTIVE:Several acute neurosurgical conditions use various therapeutic drugs but our understanding of how these enter the brain is limited. In paediatric traumatic brain injury (pTBI) analgesia and sedation are essential but evidence-based regimens are lacking and a better understanding of drug distribution in the brain is needed. A pharmacokinetic (PBPK) model using rat physiological data for describing pharmacokinetics (PK) at cerebral locations (brain extracellular fluid [ECF] and cerebrospinal fluid [CSF]) was developed. We aimed to determine the feasibility of using a humanised version of this model to predict cerebral morphine drug concentrations. MATERIAL-METHODS:Participants included children with severe TBI (GCS≤8) who underwent cerebral microdialysis monitoring. ECF from themicrodialysis catheter was collected hourly for chemistry analysis and remnant fluid was stored.Morphine concentrations in the ECF and blood were measured using liquid chromatography mass spectrometry, and compared to the rat PBPK model that was translated by replacing system-and drug-specific parameters. RESULTS:Eight patients (median age 8 [2.8-13] years, median weight 24 [14.5-55] kg) received morphine infusions [10-40 mcg/kg/hour] and underwent microdialysis monitoring. The rat PBPK model was translated by scaling up the drug transport clearance at the blood brain barrier (brain weight) and the brain drug diffusion rate (brain and CSF volume). The humanised model predicted morphine concentrations within the 90% prediction interval in 97% of plasma samples, and in ECF samples from normal-appearing brain tissue. CONCLUSIONS:Cerebral morphine drug recovery with microdialysis is feasible in pTBI. The rat PBPK model can be translated to adequately predict paediatric brain morphine PK in normal appearing tissue. These pilot data suggest that combining pharmacokinetic modelling with data from microdialysis may contribute to developing evidence-based pharmacotherapy in pTBI. Further validation is ongoing but this may be an important foundation for future studies of cerebral drug penetration generalisable to other conditions.

5897. Yaman, F., et al. (2012). "Evaluation of mandibular fractures in children during five years' in a dental school." HealthMED **6**(2): 654-658.

Mandibular fractures are rarely encountered among the pediatric population, and when they do present, their clinical features differ from those in adults. This retrospective study looked at the age, sex, type and cause of fracture, treatment method and associated injuries and complications in 260 cases of mandibular fracture in children under age 16. Among the most significant findings: Fracture incidence had a 3:5 male:female ratio; 52% of all mandibular fractures involved condyle/subcondyle fractures and 50.7% involved symphysis/ parasymphysis fractures; the most common treatment method was intermaxillary fixation; in no cases were severe complications observed during the healing period.

5898. Yamasaki, F., et al. (2013). "[Transorbital penetrating intracranial injury by a chopstick: a case report and review of the literature]." No shinkei geka. Neurological surgery **41**(11): 1001-1009.

This 4-year-old girl fell while holding plastic chopsticks and a chopstick penetrated her left eye. The chopstick was removed immediately by herself. Conventional CT and MR images showed a penetration track from the orbital roof

to the basal ganglia. On susceptibility-and diffusion-weighted images the track and surrounding cytotoxic edema were visualized more clearly. Although antibiotics were started at the time of admission to prevent intracranial infection, she developed meningitis. Subsequent treatment with carbapenem antibiotic-and vancomycin therapy was curative and she was discharged home 4 weeks after the injury. In our review of the literature on intracranial penetrating injuries via the orbita we compared the injury patterns inflicted by and the clinical observations reported on damage induced by wooden-, plastic-, and metal chopsticks. We also evaluated diagnostic CT and MR images in patients with intracranial penetrating injuries caused by chopsticks and documented the advantage of susceptibility-and diffusion-weighted imaging over conventional CT-and MR imaging.

5899. Yamashita, M., et al. (1998). "[Suicide attempt by introducing 2 nails in the head. Case report]." Tentativa de suicidio pela introducao de dois pregos na cabeca. Relato de caso. **56**(2): 317-319.

Case report of a 39 years old male patient who attempted suicide by introducing two nails in the midline of the head. He was successfully submitted to an extensive paramedian bifrontotemporal craniotomy, and survived without motor deficits.

5900. Yamashita, T., et al. (2007). "Transorbital intracranial penetrating injury from impaling on an earpick." Journal of neuro-ophthalmology : the official journal of the North American Neuro-Ophthalmology Society **27**(1): 48-49.

An inebriated 86-year-old man impaled himself on a wooden earpick that penetrated through the superior orbital fissure into the prepontine cistern. The patient underwent surgery immediately by a lateral suboccipital approach, and the earpick was pulled out through the wound with control of hemorrhage from the cavernous sinus. He survived this event with no neurologic deficits apart from complete ipsilateral ophthalmoplegia and ptosis. Prompt imaging and surgical intervention allowing direct visualization of the foreign body and prevention of intracranial complications are part of proper management of this problem.

5901. Yan, H.-J. (2007). "Epidural hematoma following use of a three-point skull clamp." Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia **14**(7): 691-693.

We report an unusual case of epidural hematoma secondary to the use of a three-point skull-fixation device. Initially, a posterior-fossa brain tumor with hydrocephalus was diagnosed in a 15-year-old boy. Midline suboccipital craniectomy was performed with the patient placed in the prone position. A Mayfield (Ohio Medical Instrument Co., Cincinnati, OH, USA) skull clamp was used for fixation of the head during the surgical procedure, following which, a huge epidural hematoma developed within 6 hours of surgery, due to skull penetration and fracture at one of the clamp's pin sites located proximate to the coronal suture.

5902. Yan, S. C., et al. (2015). "The Assassination of Abraham Lincoln and the Evolution of Neuro-Trauma Care: Would the 16th President Have Survived in the Modern Era?" World neurosurgery **84**(5): 1453-1457.

Abraham Lincoln was the 16(th) President of the United States of America. On April 14, 1865, shortly after his re-election and the conclusion of the Civil War, Lincoln was shot and killed by John Wilkes Booth. Although numerous physicians tended to the President shortly after his injury, he passed away the next morning. Today, we recognize Lincoln as one of the greatest Presidents in American history. His assassination profoundly influenced the future of the United States, especially as the country was coming back together again following the Civil War. Testaments to his lasting legacy can be seen in many places, from the stone carving of him on Mount Rushmore to his image gracing the $5 bill. What if the President had survived his injury? Would he have had a different outcome utilizing current critical care treatment? Neurotrauma care in 1865 was not yet developed, and head wounds such as the one Lincoln sustained were almost always fatal. The medical attention he received is considered by historians and physicians today to be excellent for that time. We look at the evolution of neurotrauma care during the last 150 years in the US. Particular focus is paid to the advancement of care for penetrating brain injuries in modern trauma centers.

5903. Yang, G. L., et al. (2022). "The Effects of the COVID-19 Pandemic on Penetrating Neurotrauma at a Level 1 Trauma Center." Clinical neurosurgery **68**(SUPPL 1): 72.

INTRODUCTION: The COVID-19 pandemic forced the implementation of social distancing guidelines to minimize spread of the coronavirus. However, it is not yet understood what effects these precautions had on the rates of penetrating neurotrauma. METHODS: We retrospectively analyzed neurotrauma data from our institutional trauma registry from distinct periods defined as pre-COVID-19 (March 2019-September 2019) and COVID-19 (March 2020-September 2020). Demographics, injury characteristics, mechanisms of trauma, and past medical history (including psychiatric diagnosis) were collected. Data were analyzed for between-group differences and presented as odds ratios. RESULTS: We observed a significant rise in the number of neurotrauma cases in 2020 (558 vs. 630, OR 1.129 [1.0071, 1.2657]). There was a decrease in the proportion of male victims (71.3% vs. 68.6%, p = 0.03). There were significant differences noted in the mechanism of injury between groups. Patients in 2020 were less likely to present with falls (42.3% vs. 34.3%, OR 0.7119 [0.5627, 0.9005]) and more likely to present with GSW (4.48% vs. 7.78%, OR 1.7981 [1.0951, 2.9523]). Of the patients with penetrating cranial injuries, the most common motive was assault (56.7% vs. 60.0%), followed by self-inflicted (13.3% vs. 20.0%) and accidental (20.0% vs. 18.3%) with a significant difference between years (p = 0.0043). The presence of comorbid psychiatric illness or substance abuse did not confer an increased odds of presenting with penetrating injuries. No significant differences were noted in mean arrival or discharge GCS or injury severity as measured by ISS. However we did observe significant increases in patients presenting with bilaterally reactive pupils (48.3% vs 59.3%, p = 0.0025), patients discharged home (27.6% vs 37.3%, p = 0.0002), and survival at 6 months (41.4% vs. 54.2%, p = 0.0188). CONCLUSION: We observed a higher rate of penetrating neurotrauma while social distancing measures were in place. It is unclear if the psychosocial effects of quarantine and social distancing had a causative relationship with the increased rates of assault and self-inflicted penetrating injuries.

5904. Yang, G. L., et al. (2022). "The Effects of the COVID-19 Pandemic on Penetrating Neurotrauma at a Level 1 Trauma Center." World neurosurgery **164**: e530-e539.

BACKGROUND/OBJECTIVE: The COVID-19 pandemic has had a profound impact on the global delivery of health care. Recent data suggest a possible impact of the pandemic on patterns of neurotrauma. The aim was to assess the impact of the pandemic on the incidence of neurotrauma, with a focus on cranial gunshot wounds (cGSWs) at a large Midwestern level 1 trauma center., METHODS: We conducted a retrospective review of our trauma registry from March through September 2020 and compared it to the same months in 2019. Odds ratios were utilized to assess for differences in patient demographics, injury characteristics, rates of neurotrauma, and rates of cGSWs., RESULTS: A total of 1188 patients presented with neurotrauma, 558 in 2019 and 630 in 2020. The majority of patients were male (71.33% in 2019; 68.57% in 2020) and Caucasian (78.67% in 2019; 75.4% in 2020). Patients presented with cGSWs more frequently in 2020 (n = 49, 7.78%) than in 2019 (n = 25, 4.48%). The odds of suffering a cGSW in 2020 was 73.6% higher than those in 2019 (95% confidence interval = [1.0871, 2.7722]; P = 0.0209). The etiology of such injury was most commonly assault (n = 16, 21.62% in 2019; n = 34, 45.95% in 2020), followed by self-inflicted injury (n = 4, 5.41% in 2019; 12, 16.22% in 2020)., CONCLUSIONS: Despite the government-mandated shutdown, we observed an increase in the number of neurotrauma cases in 2020. There was a significant increase in the incidence cGSWs in 2020, with an increase in assaults and self-inflicted injuries. Further investigation into socioeconomic factors for the observed increase in cGSWs is warranted.

5905. Yang, H.-S. and D.-E. Oh (2011). "A case of delayed oculocardiac reflex induced by an intraorbital foreign body." Ophthalmic plastic and reconstructive surgery **27**(1): e2-4.

A 56-year-old male presented with a history of left periorbital pain, nausea, vomiting, dyspnea, sweating, and pallor. His left eye was injured by a bomb explosion approximately 40 years ago. Evisceration was performed. There were no cardiopulmonary and gastroenterological findings except mild bradycardia (54/min). CT evaluation revealed a 4-cm-sized, sharp, metallic, intraorbital foreign body in the left orbit. After the removal of the foreign body, the symptoms completely resolved with a normal heart rate (69/min). The authors present a case of delayed oculocardiac reflex induced by an old intraorbital foreign body.

5906. Yang, H. Y., et al. (1997). "A subpopulation of reactive astrocytes at the immediate site of cerebral cortical injury." Experimental neurology **146**(1): 199-205.

We have identified an early-appearing intermediate filament-associated protein (IFAP-70/280 kDa) in radial glia and their immediate derivatives. This IFAP is absent in the adult CNS. In this study, we examined the reexpression of this early glial differentiation trait in rat reactive astrocytes induced by stab injury of the cerebrum. Double-label immunofluorescence microscopy demonstrated that by 36 h postlesion, IFAP-70/280 kDa was present in a few GFAP-positive astrocytes in the area adjacent to the wound. As the gliotic reaction progressed, the number of IFAP-positive reactive astrocytes increased and by 5-6 days postlesion, IFAP-70/280 kDa was present in most of the hypertrophied astrocytes in tissue immediately adjacent to the wound. By 8 days postlesion, while the number of IFAP-negative reactive astrocytes away from the wound diminished, the IFAP-containing reactive astrocytes close to the wound persisted. Concurrently, they began to change from a stellate form to an elongated shape, with their longitudinal axes radiating from the wound. The immunoreactivity of this IFAP started to diminish at 20 days postlesion, and by 30 days postlesion, it was not observed in the remaining gliotic cells. These results demonstrate that reactive astrocytes induced by stab-wound injury can be divided into two subtypes: persistent IFAP-70/280 kDa-containing cells which are close to the wound in the area of the glial scar and transient IFAP-70/280 kDa-negative cells which are farther from the wound. The reappearance of IFAP-70/280 kDa also suggests that some reactive astrocytes have the capacity to recapitulate early developmental stages.

5907. Yang, L. and L. S. Benardo (2000). "Valproate prevents epileptiform activity after trauma in an in vitro model in neocortical slices." Epilepsia **41**(12): 1507-1513.

PURPOSE: Epileptogenesis is a hallmark of severe cortical trauma, with up to approximately 80% of patients experiencing seizures in the first 24 hours after penetrating head injury. An in vitro model of traumatic brain injury was developed to investigate hyperexcitability and epileptogenesis and their prevention. We determined whether sodium valproate would prevent epileptiform activity in this experimental model., METHODS: Rat cortical slices were prepared and maintained in vitro using standard methods. Trauma was effected by removing the superficial 450-500 microm of slices. Traumatized slices were exposed to valproate at various time points. Intracellular and extracellular recordings were used to assess evoked activities., RESULTS: In untreated traumatized deep segments, hyperexcitability was manifested by depressed inhibition and often (54%) by epileptiform activity. Preparations exposed to valproate at 30 minutes or later after trauma showed abnormal activity similar to control traumatized slices. Epileptogenicity in deep segments was significantly reduced when slices were exposed to valproate (a) continuously immediately after trauma, (b) after a 20-minute delay, or (c) immediately after trauma for 1 hour and then returned to physiological solution. Finally, slices that were exposed to valproate or pentobarbital beginning 20 minutes after trauma for only 1 hour and then returned to physiological medium showed a significant reduction in abnormal activity. Valproate was found to enhance fast gamma-aminobutyric acid(A)-ergic inhibitory strength., CONCLUSIONS: Valproate significantly reduces epileptiform activity after trauma to the neocortex, likely by restoring the excitation-inhibition balance, perhaps through augmentation of gamma-aminobutyric acid transmission. The timing of this action may have implications for mechanisms of seizure genesis and may suggest a role for rapid treatment.

5908. Yang, Q.-T., et al. (2012). "The therapeutic efficacy of endoscopic optic nerve decompression and its effects on the prognoses of 96 cases of traumatic optic neuropathy." The journal of trauma and acute care surgery **72**(5): 1350-1355.

BACKGROUND: Traumatic optic neuropathy (TON) is an important cause of severe loss of vision due to blunt or penetrating head trauma. The pathogenesis of TON remains unclear, and there are several potential causes for the observed loss in vision. Endoscopic optic nerve decompression (EOND) has been reported to improve the visual prognosis in TON cases, but its efficacy remains controversial. It is important to investigate the therapeutic efficacy of EOND in the treatment of TON and to evaluate the relevant prognostic factors., METHODS: A retrospective study was conducted to analyze the clinical characteristics and prognoses of 96 TON cases. The chi(2) test and multiple logistic regression analyses were used to evaluate potential prognostic factors., RESULTS: : The overall rate of EOND effectiveness was 40.6% (39 of 96). A significantly higher effective rate (83.3%) was observed for patients with light perception compared with those without light perception (26.4%, $p < 0.05$). Univariate and multiple logistic regression analyses identified three variables (no light perception, undergoing EOND 3 days after trauma, and hemorrhage within the ethmoid and/or sphenoid sinus) that were significantly associated with unrecovered visual acuity. Age, loss of consciousness, optic canal fracture, preoperative steroid megadose treatment, and optic nerve sheath incision were all factors that showed no significant correlation with therapeutic efficacy. However, patients with fractures in a single medial wall of the optic canal appeared to have better prognoses than patients with multiple fractures or those with a

single fracture in a lateral wall., CONCLUSIONS: The overall therapeutic efficacy of EOND for the treatment of TON is far from satisfactory, especially for patients without light perception. The factors that impact TON prognoses are complex and may be interrelated. The indication for EOND must be individualized., LEVEL OF EVIDENCE: III, epidemiological study.

5909. Yang, R., et al. (2011). "Free flaps for pediatric facial reconstruction: The Maryland experience." International journal of oral and maxillofacial surgery **40**(10): 1044.

Introduction: The advances of microsurgical techniques have made the use of free tissue transfer in the pediatric population a viable reconstructive option. Objective: The purpose of this abstract is to review the use of free tissue microvascular transfer in the pediatric population with head and neck defects at the University of Maryland, Department of OMS. Patients and methods: A retrospective chart audit of the past 10 years was performed. All patients 18 years and younger who received a microvascular reconstruction for a head and neck defect were included in this review. Results: There were 12 patients requiring 13 flaps. One patient with a gunshot injury required 2 flaps. The average age at surgery was 15 years (range 12-18). The reasons for reconstruction were as follows: benign tumor (9), malignant tumor (2), and trauma (2). The defects were mostly osseous mandible (10) with only 3 soft tissue reconstructions. Flap selection included 10 fibulas (w or w/o skin), 2 radial forearms, and 1 anterolateral thigh. There were no immediate flap complications and one minor wound complication. Average length of hospital stay was 7 days (5-10). Conclusion: In many ways children constitute an ideal patient population for microsurgical reconstruction despite rare indications. In general the pediatric patient has pristine anatomy, no complications of chronic disease, as well as an excellent healing capacity. Consideration should be given however to future growth at both the recipient and donor site as well as tissue available in the skeletally immature patient.

5910. Yang, S., et al. (2018). "Management of gunshot wound injuries to the lateral skull base." Journal of Neurological Surgery, Part B: Skull Base **79**.

Background: Gunshot wounds (GSWs) to the lateral skull base can involve several critical neurovascular structures and present dilemmas in management. Chicago and its neighboring suburbs are experiencing a wave of gunshot victims. We review our experience at a Level 1 Trauma Center in the western suburbs of Chicago over the past 10 years of GSW to the temporal bone and lateral skull base and discuss their presentation, management, and patient outcomes. Objective: To review the incidence and presentation of patients with GSW to the temporal bone and lateral skull base. To discuss nonsurgical and surgical management as well as patient outcomes. Methods: Retrospective review of all patients who presented with GSW to the temporal bone and lateral skull base from August 2007 to present at the Loyola University Medical Center. Patients were identified using the ICD-9 diagnosis codes for GSW to the auricle, ear, and head and chart review was performed to identify those patients with involvement of the temporal bone. IRB approval was obtained prior to the start of the study. Results: Data are currently being collected. A total of seven patients were identified, all of whom were male. The average age at presentation was 27 years. Six out of the seven patients denied any prior medical history. One patient reported a history of depression and anxiety disorder. One of the seven injuries was self-inflicted. All GSW involved the temporal bone; the squamous segment was involved in 43% of cases, tympanic segment in 57%, mastoid segment in 71%, and petrous segment in 29%. The otic capsule was involved in four of seven patients and four of seven patients had complete facial paralysis (House-Brackmann's scale of 6) at presentation. Additional presenting injuries included cerebrospinal fluid (CSF) leak (four of seven), intracranial injury (five of seven), facial fractures (three of seven), and optic nerve injury (two of seven). Fifty-seven percent of patients underwent surgical intervention, which include facial nerve decompression, lateral temporal bone resection, labyrinthectomy, and facial nerve neurorrhaphy for management of GSW to temporal bone. Average time from presentation to surgery was 20 days. Of the patients with complete facial paralysis at presentation who underwent surgical intervention, one patient had HB 6 at 1-month follow-up and the other had HB 3 at 5-month follow-up. None of the patients had audiograms performed at initial presentation. All patients with involvement of the otic capsule had profound sensorineural hearing loss on follow-up. Postoperative complications occurred in two out of seven patients; one patient had a CSF leak and infected carotid pseudoaneurysm and the other had an intracranial abscess and osteomyelitis. One of the seven patients died due to GSW injury. Conclusion: GSW to the temporal bone can have varying presentations depending on the site involved. Injury to facial nerve and otic capsule are common and can have lasting sequelae. Surgical management depends on site of injury and presenting symptoms.

5911. Yang, Z., et al. (2019). "Serum-Based Phospho-Neurofilament-Heavy Protein as Theranostic Biomarker in Three Models of Traumatic Brain Injury: An Operation Brain Trauma Therapy Study." Journal of neurotrauma **36**(2): 348-359.

Glial fibrillary acidic protein (GFAP) and ubiquitin C-terminal hydrolase (UCH-L1), markers of glial and neuronal cell body injury, respectively, have been previously selected by the Operation Brain Trauma Therapy (OBTT) pre-clinical therapy and biomarker screening consortium as drug development tools. However, traumatic axonal injury (TAI) also represents a major consequence and determinant of adverse outcomes after traumatic brain injury (TBI). Thus, biomarkers capable of assessing TAI are much needed. Neurofilaments (NFs) are found exclusively in axons. Here, we evaluated phospho-neurofilament-H (pNF-H) protein as a possible new TAI marker in serum and cerebrospinal fluid (CSF) across three rat TBI models in studies carried out by the OBTT consortium, namely, controlled cortical impact (CCI), parasagittal fluid percussion (FPI), and penetrating ballistics-like brain injury (PBBI). We indeed found that CSF and serum pNF-H levels are robustly elevated by 24 h post-injury in all three models. Further, in previous studies by OBTT, levetiracetam showed the most promising benefits, whereas nicotinamide showed limited benefit only at high dose (500 mg/kg). Thus, serum samples from the same repository collected by OBTT were evaluated. Treatment with 54 mg/kg intravenously of levetiracetam in the CCI model and 170 mg/kg in the PBBI model significantly attenuated pNF-H levels at 24 h post-injury as compared to respective vehicle groups. In contrast, nicotinamide (50 or 500 mg/kg) showed no reduction of pNF-H levels in CCI or PBBI models. Our current study suggests that pNF-H is a useful theranostic blood-based biomarker for TAI across different rodent TBI models. In addition, our data support levetiracetam as the most promising TBI drug candidate screened by OBTT to date.

5912. Yang, Z., et al. (2018). "PNF-H as theranostic biomarker in three models of traumatic brain injury: An operation brain trauma therapy study." Journal of neurotrauma **35**(16): A192.

Glial fibrillary acidic protein (GFAP) and ubiquitin C-terminal hydrolase (UCH-L1), markers of glial and neuronal cell body injury respectively, have been previously selected by the Operation Brain Trauma Therapy (OBTT) pre-clinical therapy and biomarker screening consortium as drug development tools. However, traumatic axonal injury (TAI) also represents a major consequence and determinant of adverse outcomes following traumatic brain injury (TBI). Thus, biomarkers capable of assessing TAI are much needed. Neurofilaments (NFs) are found exclusively in axons. Here, we evaluated phospho-neurofilament-H (pNF-H) protein as a possible new TAI marker in serum and CSF across three rat TBI models in studies carried out by the OBTT consortium, namely, controlled cortical impact (CCI), parasagittal fluid percussion (FPI) and penetrating ballistics-like brain injury (PBBI). We indeed found that CSF and serum pNF-H levels are robustly elevated by 24 h post injury in all three models. Further, in prior studies by OBTT, levetiracetam showed the most promising benefits, while nicotinamide showed minimal benefit only at high dose (500mg/kg). Thus, serum samples from the same repository collected by OBTT were evaluated. Treatment with 54mg/kg IV of levetiracetam in the CCI model and 170mg/kg in the PBBI model significantly attenuated pNF-H levels at 24 h post-injury as compared to respective vehicle groups. In contrast, nicotinamide (50 mg/kg or 500 mg/kg) showed no reduction of pNF-H-levels in CCI or PBBI models. Our current study suggests that pNF-H is a useful theranostic blood-based biomarker for TAI across different rodent TBI models. In addition, our data support levetiracetam as the most promising TBI drug candidate screened by OBTT to date.

5913. Yang, Z. R., et al. (2006). "Hemostatic effects of a self-designed rapid-hemostatic-dressing on bleeding of partially ruptured superior sagittal sinus in dogs." Academic Journal of Second Military Medical University **27**(10): 1131-1133.

Objective: To evaluate hemostatic effects of a self-designed rapid-hemostatic-dressing (RHD) on bleeding of the partially ruptured superior sagittal sinus in dogs. Methods: Bleeding models of the partially ruptured superior sagittal sinus were established in 15 dogs by gunshot and surgery. The 15 model dogs were divided into 2 groups: RHD group (n=10) and control group (treated with surgicel, n=5). The survival time, blood loss, and other hematological parameters were measured over a 1-hour period. Results: The bleeding models of the partially ruptured superior sagittal sinus were successfully established in dogs. There were no significant differences in the baseline parameters of dogs compared with those 60 minutes after RHD treatment. The survival time in RHD group was significantly longer than that in control group and the blood loss was significantly lower than that of the control group (both $P<0.05$). Conclusion: RHD has satisfactory hemostatic effects on partially ruptured superior sagittal sinus in dogs, indicating it is an excellent hemostatic dressing.

5914. Yano, H., et al. (1995). "An intracranial wooden foreign body without neurological findings: case report." The Journal of trauma **38**(5): 830-832.

We encountered an unusual case of an intracranial wooden stick penetrating through the frontal bone, without remarkable neurological findings. That foreign body was shown to be a low-density area similar to an intracranial air pocket by a standard computed tomogram. Here we discuss the potential hazards of intracranial wooden foreign bodies and emphasize the necessity for special attention to them during radiologic examination.

5915. Yao, C., et al. (2009). "The effect of selective brain cooling on hemeoxygenase-1 (HO-1, HSP 32) expression following penetrating ballistic-like brain injury in rats." Journal of neurotrauma **26**(8): A71.

Hypothermia has been acknowledged as a powerful neuroprotective method in treating acute brain injuries. The mechanisms through which hypothermia protects the injured brain can be multifactorial, but one of its major benefits is to reduce injury-induced brain edema and consequently decrease elevated intracranial pressure (ICP). Recently we demonstrated that selective brain cooling (SBC) therapy by means of extraluminal cooling of bilateral carotid arteries could ameliorate intracerebral hemorrhage (ICH), brain edema, and elevated ICP in an experiment model of penetrating ballistic-like brain injury (PBBI) in rats. Other studies have shown that hemoxygenase-1 (HO-1) protein is implicated in hemorrhage induced brain edema. In order to understand the possible role of HO-1 in PBBI-induced ICH, we investigated the time course of HO-1 changes following PBBI in rats and evaluated the effect of SBC on PBBI-induced HO-1 changes. Rats received unilateral 10% frontal PBBI or sham surgeries immediately followed by 2h SBC which reduced the brain temperature by 3°C. Control rats received PBBI or sham surgeries without SBC. Brain tissues and blood were collected at 6, 24,48, 72h, and 7 days post injury and HO-1 was measured by Western blot. Our results show that following PBBI, HO-1 protein increased in brain and plasma at all time points studied, reaching the peak level at 48 h. SBC attenuated PBBI induced up-regulation of HO-1, but did not affect HO-1 expression in the sham controls. These results suggest that altered expression of HO-1 may play an important role in the formation of brain edema following PBBI and neuroprotective effects of SBC may be related to reduction in brain edema. Furthermore, these changes in HO-1 could also be used as a hemorrhagic brain injury biomarker for therapeutic intervention.

5916. Yao, C., et al. (2009). "P43/pro-EMAPII: a potential biomarker for discriminating traumatic versus ischemic brain injury." Journal of neurotrauma **26**(8): 1295-1305.

To gain additional insights into the pathogenic cellular and molecular mechanisms underlying different types of brain injury (e.g., trauma versus ischemia), recently attention has focused on the discovery and study of protein biomarkers. In previous studies, using a high-throughput immunoblotting (HTPI) technique, we reported changes in 29 out of 998 proteins following acute injuries to the rat brain (penetrating traumatic versus focal ischemic). Importantly, we discovered that one protein, endothelial monocyte-activating polypeptide II precursor (p43/pro-EMAPII), was differentially expressed between these two types of brain injury. Among other functions, p43/pro-EMAPII is a known pro-inflammatory cytokine involved in the progression of apoptotic cell death. Our current objective was to verify the changes in p43/pro-EMAPII expression, and to evaluate the potentially important implications that the differential regulation of this protein has on injury development. At multiple time points following either a penetrating ballistic-like brain injury (PBBI), or a transient middle cerebral artery occlusion (MCAo) brain injury, tissue samples (6-72 h), CSF samples (24 h), and blood samples (24 h) were collected from rats for analysis. Changes in protein expression were assessed by Western blot analysis and immunohistochemistry. Our results indicated that p43/pro-EMAPII was significantly increased in brain tissues, CSF, and plasma following PBBI, but decreased after MCAo injury compared to their respective sham control samples. This differential expression of p43/pro-EMAPII may be a useful injury-specific biomarker associated with the underlying pathologies of traumatic versus ischemic brain injury, and provide valuable information for directing injury-specific therapeutics.

5917. Yao, C., et al. (2008). "Detection of protein biomarkers using high-throughput immunoblotting following focal ischemic or penetrating ballistic-like brain injuries in rats." Brain injury **22**(10): 723-732.

PRIMARY OBJECTIVE: Recent efforts have been aimed at developing a panel of protein biomarkers for the diagnosis/prognosis of the neurological damage associated with acute brain injury., METHODS AND PROCEDURES: This study utilized high-throughput immunoblotting (HTPI) technology to compare changes between two animal models of acute brain injury: penetrating ballistic-like brain injury (PBBI) which mimics the injury created by a gunshot wound and

transient middle cerebral artery occlusion (MCAo) which is a model of stroke. Brain and blood were collected at 24-hours post-injury., MAIN OUTCOMES AND RESULTS: This study identified the changes in 18 proteins following PBBI and 17 proteins following MCAo out of a total of 998 screened proteins. Distinct differences were observed between the two models: five proteins were up- or down-regulated in both models, 23 proteins changed in only one model and one protein was differentially expressed. Western blots were used to verify HTPI results for selected proteins with measurable changes observed in both blood and brain for the proteins STAT3, Tau, PKA RII beta, 14-3-3 epsilon and p43/EMAPII., CONCLUSIONS: These results suggest distinct post-injury protein profiles between brain injury types (traumatic vs. ischemic) that will facilitate strategies aimed at the differential diagnosis and prognosis of acute brain injury.

5918. Yao, H., et al. (2020). "Association between initial ICU admission diagnosis and outcomes in chronic critically ill patients: A retrospective cohort study." Canadian Journal of Respiratory, Critical Care, and Sleep Medicine **4**(3): 187-193.

INTRODUCTION: Advancements in the care of acutely ill patients has reduced intensive care unit (ICU) mortality but has also led to the emergence of a group of patients who have a prolonged dependency on life support measures. Despite this rapidly growing demographic, a relatively minimal amount is known in the way of identifiable risk factors for outcomes in chronic critically ill patients. We sought to explore the association between admission diagnostic category and acute hospital mortality in chronic critically ill patients. METHODS: The study is a retrospective cohort study of adult patients aged 18 and over, admitted to two Canadian, university associated ICUs between July 2012 and June 2013. We included in our study all patients who had a tracheostomy placed for prolonged mechanical ventilation in the ICU. The primary outcome was ultimate acute hospital mortality. A univariate and multivariate analysis was performed to assess the association of admission diagnostic category and ultimate acute hospital mortality. RESULTS: One hundred and forty-four patients received a tracheostomy in the ICU during the study period with 134 patients eligible for analysis. We demonstrated both baseline characteristics and outcomes differences between medical patients, non-trauma surgical patients and trauma patients. The trauma group had a lower ICU and hospital mortality even after adjusting for potential confounders such as severity of illness and co-morbidities (OR: 0.1 95% CI 0.0-0.3, p ' 0.001). They were also more likely to be discharged home or to a rehabilitation center. CONCLUSION: In conclusion, we demonstrated that ICU admission diagnostic category is associated with acute hospital mortality. Chronic critically ill trauma patients were found to have lower acute hospital mortality rates than medical or non-trauma surgical patients even after adjustment for confounders using severity of illness scores that contain variables for admission type. Admission diagnostic category should inform patients, surrogate decision makers and the health care team regarding decisions related to tracheostomy placement and prolonged supportive care.

5919. Yao, S. T., et al. (1972). "Gunshot wounds of the face." The Journal of trauma **12**(6): 523-528.

5920. Yarandi, K. K., et al. (2018). "Stab Wounds to the Head; Case Series, Review of Literature, and Proposed Management Algorithm." Asian journal of neurosurgery **13**(3): 754-759.

BACKGROUND AND OBJECTIVES: Stabbing the head is a rare event. It may occur following an assault or self-inflicted injury. We intend to report our experience with four such cases and review narratively the relevant literature. A treatment algorithm will be delivered., MATERIALS AND METHODS: We have reviewed four of our cases; three were stabbed to the orbit and one to the head., RESULTS: Enucleation was performed in one case. Vision could be preserved in the other two and brain abscess developed in the other cases due to a retained piece of knife. We made a comparison between our cases and those limited reports in the literature to reach an algorithm., CONCLUSION: The temporal region and the orbit are the targets mostly attacked in the craniofacial stabs. Since knives have a sharp and thin edge, they may break when penetrating the skull. The damage to the brain tissue and the retained piece of knife may be missed easily by overlooking the small injury to the scalp. The suggested algorithm would be a contrast-enhanced computed tomography scan of the skull and brain and a kind of brain vascular study are necessary, considering the location of the knife in the skull and brain passing the area with crowded vasculature. The best treatment protocol is surgery accompanied by antibiotic therapy.

5921. Yardley, A.-M. E., et al. (2015). "Running with scissors." The Journal of pediatrics **166**(1): 205.

5922. Yarlagadda, B., et al. (2012). "Retrieval of projectile foreign bodies from the paranasal sinuses and skull base." American journal of rhinology & allergy **26**(3): 233-236.

BACKGROUND: Penetrating trauma to the paranasal sinuses and skull base with retained foreign bodies represents a unique challenge for head and neck surgeons. Management of these injuries is complicated by associated injuries and the proximity to vital neurovascular structures. This study was designed to review the clinical experience with retained sinonasal and skull base projectile foreign bodies at a single academic tertiary care institution., METHODS: A retrospective review of patients who suffered penetrating trauma to the head with retained metallic foreign bodies in the paranasal sinuses and/or skull base between January 2002 and August 2011 was performed at a single academic medical center., RESULTS: There were 599 patients who suffered penetrating trauma to the head and neck, with 13 patients having retained metallic foreign bodies in the sinuses and/or skull base, mostly bullets or nails. Ten patients underwent urgent (n = 5) or delayed (n = 5) removal of foreign bodies accessible without compromise of adjacent structures either through an endoscopic or open approach. Three patients had multiple foreign bodies that were not removed. Three patients experienced traumatic cerebrospinal fluid fistula managed with either conservative measures (n = 2) or intraoperative repair at the time of foreign body retrieval (n = 1). All patients received prophylactic antibiotic coverage. No patients suffered infectious complications such as sinusitis from retained foreign bodies., CONCLUSION: Although not all retained foreign bodies after penetrating trauma to the head require removal, those that are safely accessible and at risk for infectious complications should be recovered. The timing and approach of retrieval are dictated by the clinical scenario.

5923. Yashon, D., et al. (1972). "Management of civilian craniocerebral bullet injuries." The American surgeon **38**(6): 346-351.

5924. Yashon, D., et al. (1968). "Arteriographic observations in craniocerebral bullet wounds." The Journal of trauma **8**(2): 238-255.

5925. Yattoo, G. H. and S. A. Tabish (2013). "The profile of head injuries and traumatic brain injury deaths in Kashmir." Journal of Head Trauma Rehabilitation **28**(5): E65.

Introduction/Rationale: Head injury is considered to be a major health problem that is a frequent cause of death and disability and that makes considerable demands on health services. In developing countries, accident rates, in general, and traumatic brain injury (TBI) in particular, are increasing as traffic increases and as industrialization, falls and ballistic trauma occurs. Head injuries account for one quarter to one third of all accidental deaths, and for two thirds of trauma deaths in hospitals. Method/Approach This study was conducted on head injury patients admitted to the Accident and Emergency Department of Sher-i-Kashmir Institute of Medical Sciences. The purpose was to track and evaluate the number of head injury patients, nature of head injuries, condition at presentation, treatment given in the hospital and the outcome of intervention. Traumatic brain injury (TBI) deaths were also studied retrospectively for a period of eight years (1996 to 2003). Results/Effects The number of TBI deaths showed a steady increase from year 1996 to 2003 except for 1999 where there was a decline. The highest number of TBI deaths was in the age group of 21-30 years (18.8%), followed by 11-20 years where it was a (17.8%) and 31-40 years was (14.3%). TBI death was more common in males than in females. The maximum number of TBI deaths was from rural areas as compared to urban areas. Conclusions/Limitations To minimize the morbidity and mortality resulting from head injury and TBI, there is a need for improved roadmaintenance, visibility and lighting, proper mechanical maintenance of automobiles and other vehicles, rigid enforcement of traffic rules, compulsory wearing of crash helmets by motor cyclist and scooterists, shoulder belts in cars, and compulsory road safety education for school age children.

5926. Yaw, T. J., et al. (2020). "Postmortem Evaluation of Reintroduced Migratory Whooping Cranes (Grus americana) in Eastern North America." Journal of wildlife diseases **56**(3): 673-678.

We reviewed necropsy records of 124 Whooping Cranes (Grus americana) recovered following reintroduction of 268 individuals from 2001 to 2016 in the eastern US. Causes of death were determined in 62% (77/124) of cases

facilitated by active monitoring that limited decomposition and scavenging artifact. The greatest proportions of mortality were caused by predation (0.468; 95% confidence interval 0.356-0.580; 36/77), collision with power lines or vehicles (0.260; 0.162-0.358; 20/77), and gunshot (0.169; 0.085-0.253; 13/77). Six deaths were attributed to infection (0.078; 0.018-0.138; 6/77), including bacterial and fungal etiologies. Lead analysis of 50 liver samples yielded two results with elevated concentrations (3.65 and 10.97 ppm wet weight), and 10 bone samples from partial carcasses lacking suitable liver tissue resulted in one elevated result (48.82 ppm dry weight). These data indicate that underlying subclinical or clinical lead toxicosis may be a factor in up to 5% of deaths attributed to predation or impact trauma. Brain cholinesterase activity testing indicated no exposure to organophosphate or carbamate pesticides (mean+/-SD=17.32+/-2.90 micromol/min/g, 31/71). The causes of death and potential underlying factors summarized in this study constitute the first definitive mortality survey of migratory Whooping Cranes based on a high carcass recovery rate. Causes of death by infectious etiologies remained comparatively rare in this study, and occurred as single cases with no evidence of sustained transmission among reintroduced Whooping Cranes.

5927. Yawn, R. J., et al. (2016). "Facial nerve repair after operative injury: Impact of timing on hypoglossal-facial nerve graft outcomes." American journal of otolaryngology **37**(6): 493-496.

PURPOSE: Reanimation of facial paralysis is a complex problem with multiple treatment options. One option is hypoglossal-facial nerve grafting, which can be performed in the immediate postoperative period after nerve transection, or in a delayed setting after skull base surgery when the nerve is anatomically intact but function is poor. The purpose of this study is to investigate the effect of timing of hypoglossal-facial grafting on functional outcome., MATERIALS AND METHODS: A retrospective case series from a single tertiary otologic referral center was performed identifying 60 patients with facial nerve injury following cerebellopontine angle tumor extirpation. Patients underwent hypoglossal-facial nerve anastomosis following facial nerve injury. Facial nerve function was measured using the House-Brackmann facial nerve grading system at a median follow-up interval of 18months. Multivariate logistic regression analysis was used determine how time to hypoglossal-facial nerve grafting affected odds of achieving House-Brackmann grade of <=3., RESULTS: Patients who underwent acute hypoglossal-facial anastomotic repair (0-14days from injury) were more likely to achieve House-Brackmann grade <=3 compared to those that had delayed repair (OR 4.97, 95% CI 1.5-16.9, p=0.01)., CONCLUSIONS: Early hypoglossal-facial anastomotic repair after acute facial nerve injury is associated with better long-term facial function outcomes and should be considered in the management algorithm.

5928. Yazar, U. (2021). "Penetrating craniocerebral nail gun injury in a child: a case report." Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery **37**(4): 1345-1349.

Penetrating craniocerebral injuries with a nail gun are extremely rare and even rarer in children. In this case, a 2-year-old boy, who was the youngest patient in the literature with an intracranial nail gun injury involving penetration of the right temporal lobe, was reported. The patient was evaluated by plain radiography and computed tomography. The nail was loosened and pulled gently out by creating a small craniotomy around the nail entrance. Although clinical characteristics and treatment methods of penetrating craniocerebral injuries were similar for reported in literature, the injury mechanism of presented case was different. Penetrating craniocerebral injuries with a nail gun are very dramatic situation, but mortality and morbidity are low. Without major vascular injury, a nail can be removed through a small incision. Penetrating injuries often occur accidentally in the pediatric age group, but the risk of child abuse should always be considered.

5929. Yazgan, S., et al. (2017). "An excellent anatomical and visual recovery after surgical repair of an open eye injury with poor baseline prognostic factors." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES **23**(2): 167-169.

Presently described is case of a 42-year-old woman with eye injury that was result of gunshot fired by a man at a wedding celebration. Bullet penetrated inferior quadrant of nasal sclera of left eye 7-12 mm behind limbus. Choroid and vitreous were prolapsed around bullet. Hemorrhage, vitreous prolapse and lens subluxation were present in anterior chamber. Presenting visual acuity (VA) was hand motion. Bullet 14x5 mm in size was carefully extracted from the eye. Fifteen days later, argon laser photocoagulation was performed on retina in area of bullet entry point. VA was 20/25

(Snellen) at final visit. In this case, although foreign body was large, area of penetration was Zone III, and initial VA was poor, early and appropriate surgical repair achieved integrity of the globe and good vision prognosis.

5930. Yazici, B., et al. (2007). "Intraorbital arteriovenous fistula secondary to penetrating injury." Ophthalmic plastic and reconstructive surgery **23**(4): 275-278.

PURPOSE: : To describe the clinical and radiologic features and management of an intraorbital arteriovenous fistula secondary to penetrating injury., METHOD: : Interventional case report and literature review., RESULTS: : We describe a 13-year-old girl with a history of penetrating orbital injury who presented with proptosis, eyelid hyperemia, and orbital venous congestion. Computed tomography showed a large foreign body in the superiormedial orbit and an enlarged superior ophthalmic vein (SOV). Doppler ultrasonography revealed arterialized flow in the SOV. Removal of the foreign body did not alter the orbital symptoms. Carotid angiography disclosed a fistula between the ophthalmic artery and the SOV. The patient underwent an attempted coil embolization of the fistula through the femoral vein, which was unsuccessful, but she developed profound thrombosis of the SOV, which propagated through the orbital venous system. Although orbital venous congestive symptoms were acutely exacerbated, they regressed spontaneously within 1 month. The patient was followed for 23 months without recurrence., CONCLUSIONS: : Penetrating injury of the orbital apex may lead to the formation of an arteriovenous fistula, transvenous embolization of which may be complicated by thrombosis of the SOV. In our case, this unintentional result facilitated the resolution of the fistula.

5931. Yazici, P., et al. (2010). "Comparison of isolated and concomitant liver injuries: is hepatic trauma entirely responsible for the outcome?" Acta chirurgica Belgica **110**(6): 598-602.

OBJECTIVE: This study was undertaken to examine both isolated and concomitant liver injuries to clarify the role of liver trauma on outcome., PATIENTS AND METHODS: This retrospective study was a review of all abdominal trauma patients who presented with liver injuries, with or without concomitant injury at Ege University School of Medicine over a 3-year period. Presentation, injury grade, management, and outcomes were analyzed. Patients with isolated hepatic injury (Group A) were compared with patients who had concomitant hepatic injury (liver and spleen/small bowel) (Group B). Significance was set at 95% confidence intervals., RESULTS: Of 368 patients, 80 (21%) presented with liver injury. Of these, the aetiology was as follows: 53 (66.2%) blunt injury, 19 (23%) penetrating injury, and 8 (10%) gun shot trauma. There were 38 patients in Group A and 42 in Group B. Of these 42 patients, 19 were diagnosed with serious types of injury ; eight thoracic, three open long bone fracture, one intra-cardiac, one intracranial. Six additional patients were observed with injuries to large abdominal vessels. Eleven patients (28.9%) with isolated hepatic injury were managed non-operatively. Mortality, intensive care unit and hospital length of stay, and transfusion requirements were significantly higher in Group B. Only the number of transfused blood units and the grade of liver injury were found to be effective on outcome whereas stepwise regression analysis revealed that injury type (penetrating) and blood transfusion were predictive for mortality., CONCLUSION: This study highlighted that although isolated liver injury results in good outcome with non-operative management, concomitant injuries to the liver lead to a higher failure and mortality rate. However, liver injury itself is rarely responsible for death.

5932. Ye, C. N., et al. (2020). "Double penetration wound: A nail gun injury involving the head and heart." Radiology Case Reports **15**(4): 334-338.

Nail gun injuries usually occur at the extremities due to working accidents. Intracranial or intrathoracic injuries are relatively rare, and cases combined with both injuries are even rarer. Such situations pose challenges for surgeons due to their uniqueness during operation. Radiologic imaging findings in our case were significant in indicating surgical findings. Herein, we report a patient who shot himself using a nail gun, damaging his brain and heart.

5933. Yeakley, J. W. (1999). "Temporal bone fractures." Current problems in diagnostic radiology **28**(3): 65-98.

High-resolution technique is essential to the evolution of temporal bone fractures. Axial and coronal scan planes are optimal but may not be possible in acutely traumatized patients. A knowledge of normal temporal bone anatomy is important and can be obtained from standard texts, so it will not be considered in detail in this article. Classically, petrous temporal bone fractures have been classified as longitudinal, transverse, or mixed. Recent publications have emphasized the importance of describing fractures in terms of planes rather than lines. According to this concept, most

temporal bone fractures are actually oblique, and true longitudinal fractures are rare. Petrous temporal bone fractures may be associated with cranial nerve or vascular injuries when the fracture extends to the skull base. This is particularly true of the oblique fracture, which characteristically extends anteromedially to the skull base through weak places in that area, thus avoiding the compact bone of the otic capsule surrounding the labyrinth. The most common associated injury is to the facial nerve in its geniculate or proximal tympanic segment. Transverse fractures frequently involve the labyrinth. A careful search for various types of ossicular dislocation should be performed in association with temporal bone fractures, because this may result in conductive hearing loss. The site of cerebrospinal fluid otorhinorrhea resulting from temporal bone fractures can usually be defined on plain high-resolution temporal bone images, but intrathecal contrast may be helpful. Temporal bone fractures caused by gunshot wounds are frequently complex and may be limited by metallic streak artifacts. Pediatric patients have different proportions of facial nerve injury and types of hearing loss as compared with adults.

5934. Yeates, K. O. and B. G. Enrile (2005). "Implicit and explicit memory in children with congenital and acquired brain disorder." Neuropsychology **19**(5): 618-628.

Implicit and explicit memory were examined in 8- to 15-year-old children with myelomeningocele and shunted hydrocephalus, severe traumatic brain injuries, or orthopedic injuries. Each group included between 22 and 29 children. Children completed a fragmented picture identification task to assess perceptual priming and a semantic decision-making task to assess conceptual priming. Each task also assessed procedural learning as well as explicit recall and recognition. All 3 groups showed significant perceptual and semantic priming of similar magnitude. In contrast, both brain-disordered groups displayed poorer explicit memory than did the comparison group. No group showed significant procedural learning on either task. Age and IQ were stronger predictors of explicit recall than of implicit memory. The findings indicate that implicit memory is relatively intact in many children with congenital and acquired brain disorders, despite deficits in explicit memory, and support the existence of separate memory systems in children.

5935. Yeatts, R. P., et al. (1994). "Ocular injury secondary to periorbital use of stainless-steel wire and suture." Archives of ophthalmology (Chicago, Ill. : 1960) **112**(2): 213-216.

OBJECTIVE: To describe previously unreported ocular injuries from stainless-steel wire or suture used for facial skeletal or soft-tissue repair., PARTICIPANTS: Three patients who underwent orbital reconstruction (n = 2) or ptosis repair with excision of the orbiculus oculi (n = 1) were referred with signs and symptoms of ocular injury., INTERVENTIONS: Removal of the wires and sutures., RESULTS: Treatment resolved discomfort and irritation and diminished ocular motility, iritis, and bullous keratopathy but did not improve diminished vision in one of the patients., CONCLUSIONS: Occult ocular injury from misdirected or migrating stainless-steel wire should be considered in any case of ocular injury following orbital fracture or reconstructive repair when other disease processes are readily excluded. In these three cases, stainless-steel wire or suture impinged against or impaled the globe. The use of rigid plate fixation for orbital reconstruction or otherwise placing all stainless-steel wires and sutures outside the confines of the orbit would avoid such ocular injury.

5936. Yeh, A., et al. (2020). "End of Life in the Neurological Intensive Care Unit: Is Extubating to Comfort Care Comfortable? (S707)." Journal of Pain and Symptom Management **59**(2): 532.

Objectives: • Discuss potential correlation of signs of distress in neurologically devastated patients with the underlying neurological pathology. • Debate standardization of sedation prior to and during extubation of neurologically devastated patients to comfort care. Original Research Background: Patients extubated to comfort care in the neurological intensive care unit (Neuro-ICU) comprise a unique population because their end of life signs of distress can be related to both neurological pathology and multisystem dysfunction. Little is known about distress development and control in these patients. Research Objectives: To determine if patients in the Neuro-ICU have persistent signs of distress after removal of life-sustaining therapies and, if signs of distress do develop, determine the time to distress control. Methods: Retrospective medical record review of patients who died in a Neuro-ICU at a single tertiary center over a 12-month period. Inclusion criteria were mechanical ventilation with extubation to comfort care and deaths from neurologic pathology. Patients were excluded if under the age of 18, pregnant, had penetrating brain injury, declared brain dead, received cardiopulmonary resuscitation < 24 hours prior to cardiac death, or had incomplete medical record

documentation. Results: Of the 38 patients, 28 (73.7%) developed signs of distress, with 23 (60.5%) patients developing signs of distress immediately after extubation. Twenty (52.6%) patients developed signs of distress that took >50% of their remaining time after extubation to attempt to achieve distress control. The median time in attempting to achieve distress control was 2.4 hours (S.D.: 4.7 hours). The median time to cardiac death was 2.7 hours (S.D.: 5.8 hours). Conclusion: Almost 75% of patients extubated to comfort in the Neurological ICU are likely to develop signs of distress requiring pharmacologic intervention; and of these patients who develop signs of distress, over 70% will develop persistent signs of distress that will be difficult to control. Implications for Research, Policy, or Practice: Results could hopefully change how providers approach patients who are planned for extubation to comfort care in terms of pre-medication or post-extubation liberalization of medications as well as lead to prospective studies for standardization of end of life care management.

5937. Yen, K., et al. (2003). "Blood-spatter patterns: hands hold clues for the forensic reconstruction of the sequence of events." The American journal of forensic medicine and pathology **24**(2): 132-140.

Biologic and nonbiologic traces on the hands are of particular importance for the forensic reconstruction of shooting incidents; gunpowder residue analysis in particular helps determine whether the gunshot is close range or distant. In crime scene investigation, knowledge about the morphology of bloodstain patterns-including gunshot-related back spatter-has increased since various experimental examinations have been performed in the last years; nowadays, these traces are frequently used for forensic crime scene reconstruction. The goal of this study was to deduce the position and orientation of the hands, and therefore the firearm, according to the bloodstain patterns on the hands of the deceased. For this purpose blood-spatter stains on the hands were examined on site in 5 suicides caused by gunshot. In all cases, forensically relevant conclusions regarding forensic reconstruction were enabled through close examination of the spatter marks. Therefore, in shooting incidents, analysis and documentation of blood-spatter findings on the hands is recommended before hands are tested for gunpowder residue or wrapped for the transport of the body.

5938. Yen, K. G. and M. T. Yen (2009). "Orbital approach for retrieval of transected extraocular muscles." Strabismus **17**(2): 53-56.

Transection of an extraocular muscle can occur from orbital and facial trauma, or as a complication of surgery. The injury can occur either near the muscle insertion or in the muscle belly. Identification of the proximal end of the muscle in the orbit may be difficult, especially if the transection occurs a farther distance from the insertion, and, in these cases, the muscle is often considered lost. We present two patients who suffered from traumatic transections of an extraocular muscle more than 10 mm from the insertion. Both patients underwent transconjunctival orbitotomy to retrieve and secure the severed extraocular muscle. Both patients achieved good primary gaze alignment postoperatively. Preoperative imaging should be considered in cases of traumatic extraocular muscle transection.

5939. Yengo-Kahn, A. M., et al. (2021). "The value of simplicity: externally validating the Baylor cranial gunshot wound prognosis score." Journal of neurosurgery: 1-9.

OBJECTIVE: Gunshot wounds to the head (GSWH) are devastating injuries with a grim prognosis. Several prognostic scores have been created to estimate mortality and functional outcome, including the so-called Baylor score, an uncomplicated scoring method based on bullet trajectory, patient age, and neurological status on admission. This study aimed to validate the Baylor score within a temporally, institutionally, and geographically distinct patient population., METHODS: Data were obtained from the trauma registry at a level I trauma center in the southeastern US. Patients with a GSWH in which dural penetration occurred were identified from data collected between January 1, 2009, and June 30, 2019. Patient demographics, medical history, bullet trajectory, intent of GSWH (e.g., suicide), admission vital signs, Glasgow Coma Scale score, pupillary response, laboratory studies, and imaging reports were collected. The Baylor score was calculated directly by using its clinical components. The ability of the Baylor score to predict mortality and good functional outcome (Glasgow Outcome Scale score 4 or 5) was assessed using the receiver operating characteristic curve and the area under the curve (AUC) as a measure of performance., RESULTS: A total of 297 patients met inclusion criteria (mean age 38.0 [SD 15.7] years, 73.4% White, 85.2% male). A total of 205 (69.0%) patients died, whereas 69 (23.2%) patients had good functional outcome. Overall, the Baylor score showed excellent discrimination of mortality (AUC = 0.88) and good functional outcome (AUC = 0.90). Baylor scores of 3-5 underestimated mortality. Baylor scores of 0, 1, and 2 underestimated good functional outcome., CONCLUSIONS: The Baylor score is an accurate and easy-

to-use prognostic scoring tool that demonstrated relatively stable performance in a distinct cohort between 2009 and 2019. In the current era of trauma management, providers may continue to use the score at the point of admission to guide family counseling and to direct investment of healthcare resources.

5940. Yeni-Komshian, G. H., et al. (1986). "Lesion locations associated with speech perception deficits following penetrating head injury." Neuropsychologia **24**(5): 631-647.

Speech discrimination and identification tasks assessing voicing and place distinctions were given to 16 unilaterally brain injured subjects free of aphasic or dysarthric symptoms 12-15 yr post head injury. Seven subjects did not demonstrate any difficulty with these speech tasks, while five left- and four right-brain-injured subjects showed moderate difficulties. These difficulties were more pronounced on the discrimination than on the identification tasks. Analysis of CT scans demonstrated that the lesion locations most clearly associated with the speech discrimination deficits were upper levels of the white matter subjacent to cortical regions in either hemisphere.

5941. Yergey, J. A. and M. P. Heyes (1990). "Brain eicosanoid formation following acute penetration injury as studied by in vivo microdialysis." Journal of cerebral blood flow and metabolism : official journal of the International Society of Cerebral Blood Flow and Metabolism **10**(1): 143-146.

Formation of eicosanoids has been implicated in the pathological changes that follow brain injuries. In the present study, we used a microdialysis probe to both induce acute penetration injury and also sample extracellular fluid concentrations of eicosanoids. Formation of prostaglandin (PG) D2, PGF2 alpha, and thromboxane B2 was highest in the first hour following introduction of the probe into rat striatum. In contrast, the level of PGE2 was highest during the sixth hour of collection, while 6-keto-PGF1 alpha remained stable throughout the sampling period. We conclude that in vivo microdialysis may be useful in the evaluation of the time course of the effects of acute penetration injury of the brain on the local production of eicosanoids.

5942. Yerram, S., et al. (2018). "Seizure prophylaxis in the neuroscience intensive care unit." Journal of Intensive Care **6**(1).

Background: Seizures are a considerable complication in critically ill patients. Their incidence is significantly high in neurosciences intensive care unit patients. Seizure prophylaxis with anti-epileptic drugs is a common practice in neurosciences intensive care unit. However, its utility in patients without clinical seizure, with an underlying neurological injury, is somewhat controversial. Body: In this article, we have reviewed the evidence for seizure prophylaxis in commonly encountered neurological conditions in neurosciences intensive care unit and discussed the possible prognostic role of continuous electroencephalography monitoring in detecting early seizures in critically ill patients. Conclusion: Based on the current evidence and guidelines, we have proposed a presumptive protocol for seizure prophylaxis in neurosciences intensive care unit. Patients with severe traumatic brain injury and possible subarachnoid hemorrhage seem to benefit with a short course of anti-epileptic drug. In patients with other neurological illnesses, the use of continuous electroencephalography would make sense rather than indiscriminately administering anti-epileptic drug.

5943. Yetiser, S., et al. (2008). "Facial nerve problems and hearing loss in patients with temporal bone fractures: demographic data." The Journal of trauma **65**(6): 1314-1320.

BACKGROUND: The incidence of temporal bone fractures have increased in recent decades together with the increasing traffic and population. The aim of this study is to evaluate the cause, treatment methods, radiologic, and intraoperative findings in patients with temporal bone fractures., METHODS: Thirty-five patients with temporal bone fracture who have been followed between 1992 and 2006 were retrospectively reviewed. Computerized tomography and audiometric tests were obtained. Electrophysiological evaluation of the facial nerve in patients with traumatic facial paralysis was carried by serial electromyogram (EMG). House-Brackmann grading system was used to evaluate the function of the facial nerve. Twenty-three patients underwent operation for facial paralysis or hearing loss. Results of medical and surgical therapy were documented., RESULTS: Traffic crash was the most common cause (54%). Eighteen (51.4%) of patients had conductive hearing loss, 6 (17.14%) of the patients had sensorineural hearing loss, and 11 (31.42%) had normal hearing. Transient or persistent facial paralysis was detected in 24 of 35 patients (68.57%).

Nineteen patients underwent partial or total facial decompression. Preoperative EMG of the majority of the operated patients revealed total axonal degeneration. The most common affected area of the facial nerve by trauma was the vertical segment (31.58%). House-Brackmann 1 and 2 grade was achieved in majority of the patients. Fourteen ossicular abnormalities were detected in 10 patients, and the abnormality was usually related to the incus. More than 10 dB air-bone gap closure was achieved in six of eight patients (75%)., CONCLUSIONS: Traffic crashes continue to be the main cause of temporal bone fractures. Facial paralysis caused by temporal bone trauma can be satisfactorily treated by decompression. EMG, clinical grading, and onset of the paralysis are important guides for the surgery. Restoration of the hearing can be achieved in majority of patients.

5944. Yetiser, S. and M. Kahramanyol (1998). "High-velocity gunshot wounds to the head and neck: a review of wound ballistics." Military medicine **163**(5): 346-351.

Patients who sustain gunshot injuries to the head and neck face heavy tissue damage and eventually life-threatening conditions. A very significant factor that determines the degree of injury is the course and extent of the missile track. The missile track is well correlated with bullet structure, size, and velocity, which have distinct features in civilian and military firearm injuries. The missile entrance or exist wound may be out of sight in some injuries, and often it is difficult to predict the severity of the injury in the chaotic circumstances of the battlefield. We studied the wound ballistics in five soldiers who suffered penetrating cranial and cervical firearm injuries.

5945. Yevich, S., et al. (2011). "Endovascular management of acute arterial injuries associated with penetrating trauma in the head and neck." Interventional Neuroradiology **17**: 165.

Purpose: The purpose of this study is to report the use of endovascular management of acute arterial injuries associated with penetrating trauma in the head and neck. Material and Methods: Between January 2009 and March 2011, 46 patients, with penetrating head and neck trauma were referred for diagnostic angiograms. Angiographic evaluation was performed either based on the clinical conditions or on computed tomographic findings to confirm and/or treat potential arterial injuries. Results: In 13/46 patients, major vessel injuries, requiring immediate surgical or endovascular intervention were documented. One patient with a carotid artery dissection by stent placement. 2 patients presenting with ruptured vertebral arteries were treated by coil occlusions (1) and a combination of coils and NBCA (1). In 6 patients with life-threatening blood loss, active extravasations from the maxillary (4), occipital (1) or superficial temporal (1) arteries were found and managed using NBCA (5) or Onyx (1) injections with immediate occlusion. In 2 patients, arteriovenous fistulas of the common carotid and the subclavian arteries were surgically corrected. All but two patients recovered partially or completely from their injuries. Conclusions: Penetrating trauma to the arteries in the head and neck are rare in civilian patients, but frequently seen in large trauma centers. Minor vessel injuries are often manageable with conservative management and low dose anticoagulation or antiplatelet therapy. Major vessel injuries may require stent placement or complete endovascular vessel blockage. In cases with critical blood loss, immediate transarterial embolization becomes life saving measure.

5946. Yildirim, A. E., et al. (2014). "Endoscopic endonasal removal of a sphenoidal sinus foreign body extending into the intracranial space." Ulusal travma ve acil cerrahi dergisi = Turkish journal of trauma & emergency surgery : TJTES **20**(2): 139-142.

Sphenoidal sinus foreign bodies are very rare entities that are often associated with a cranial and/or orbital trauma. In this paper, a case of a metallic foreign body that pierced the sphenoid sinus and penetrated into the intracranial space due to a work accident is presented. A 29-year-old male was referred to our clinic due to a right orbital penetrating trauma. Skull X-ray and computed tomography (CT) scans demonstrated a foreign body inside the sphenoidal sinus, extending to the left temporal fossa. The foreign body was removed using an endoscopic endonasal technique, and the skull base was reconstructed with a multilayer closure technique. There were no complications during or after the operation. Postoperative result was perfect after three months of follow up.

5947. Yildirim, A. E., et al. (2014). "Unusual posttraumatic delayed cerebrospinal fluid rhinorrhea due to gunshot wound." Turkish neurosurgery **24**(2): 276-280.

Delayed posttraumatic cerebrospinal fluid rhinorrhea (CSFr) without meningitis is considered to be relatively rare. However, even years after trauma, recurrence or delayed onset of CSFr and meningitis due to CSFr are possible. In this article, a case of delayed CSFr from the sphenoid sinus without meningitis three years after the transfacial gunshot wound is reported. Plain high-resolution computed tomography sections through the sphenoid sinus showed a bone defect at the roof with CSF-density fluid extending into the sphenoid sinus. Arachnoid membrane herniation into the sphenoid sinus was found and site of CSF fistula confirmed during the surgery. Skull base defect was reconstructed through an endoscopic approach without any complications and the patient was followed up for 12 months without recurrence. The cause, timing, clinical course and location of CSFr make this an apparently unique case. Patients with a skull base defect without CSFr should be closely followed up and may need further evaluation or management due to the possibility of CSFr development. The positive diagnosis of a CSFr raises the matter of choosing the adequate surgical approach for its repair. Endoscopic closure of CSFr is both safe and effective.

5948. Yilmaz, H., et al. (2020). "Guillain-Barre Syndrome After Craniocerebral Gunshot Injury: First Report." World neurosurgery **143**: 23-25.

BACKGROUND: Guillain-Barre syndrome (GBS) is a rare but serious disorder involving peripheral nerve inflammatory demyelination characterized by acute onset tetraparesis and areflexia. Generally, GBS is preceded by a bacterial or viral infection, and post-traumatic or postsurgical GBS is rarely seen., CASE DESCRIPTION: A 41-year-old man with severe craniocerebral gunshot injury and open depressed occipital bone fracture was operated urgently. Two weeks postoperatively, he suffered from sudden quadriparesis. He had flaccid paralysis of his bilateral muscle lower extremities (0/5), along with bilateral upper extremity weakness (2/5)., CONCLUSIONS: We report the first case, to our knowledge, with post-traumatic GBS after craniocerebral gunshot injury. We want to indicate the possibility of post-traumatic GBS in cases of unexplained quadriparesis or quadriplegia after trauma or surgery.

5949. Yilmaz, T., et al. (2006). "Delayed trigeminocardiac reflex induced by an intraorbital foreign body. Case report." Ophthalmologica. Journal international d'ophtalmologie. International journal of ophthalmology. Zeitschrift fur Augenheilkunde **220**(1): 65-68.

OBJECTIVE: To emphasize the importance of the mechanism and surgical approach to trigeminocardiac reflex (TCR) developing 48 h after orbital trauma due to a foreign body., CASE REPORT: After gunshot injury of a 17-year-old male patient, computerized tomography evaluation revealed a right globe perforation and an intraorbital metallic foreign body in the right orbita adjacent to the lateral wall. The ocular perforation was repaired, but the foreign body was not removed. Constant bradycardia (45/min) developed 48 h after the operation. Since there were no cardiological findings, a temporary cardiac pacemaker was inserted and on the 6th postoperative day, the foreign body was removed through orbitolateral approach. After the removal of the foreign body, bradycardia completely recovered., CONCLUSION: In the presence of an intraorbital foreign body accompanied by globe perforation, TCR may develop 48 h after the trauma and insertion of a temporary pacemaker may be required to control the cardiac rhythm. In this paper, the delayed TCR complication presented an indication for the removal of the intraorbital foreign body.

5950. Yip, C. C., et al. (1998). "High-pressure paint gun injury to the orbit and ocular adnexa." International ophthalmology **22**(6): 335-339.

High-pressure injection injury to the orbit and adnexa is a rare but potentially blinding type of trauma. Few cases of such injury have been reported in the literature. A 27-year-old Indian man accidentally injected paint material from a high-pressure nozzle gun into his left eye. Radiological investigation revealed the presence of paint material in the orbital tissues and the ethmoidal sinuses. The patient underwent two orbital surgeries to remove the paint material. He later developed signs suggestive of limbal stem cell failure and was treated with limbal stem cell autografting. He also has ophthalmoplegia with a compensatory anomalous head posture that was managed conservatively. We report the clinical course and outcome of this unfortunate patient to highlight the complexity of such an injury and the need for a multidisciplinary approach in its management.

5951. Ylioja, S., et al. (2010). "Are cognitive outcome and recovery different in civilian penetrating versus non-penetrating brain injuries?" The Clinical neuropsychologist **24**(7): 1097-1112.

The present study sought to determine whether cognitive outcome and course of recovery in civilian penetrating brain injury due to gunshot can be distinguished from that of non-penetrating brain injury due to motor vehicle accident. Matched survivors of penetrating and non-penetrating brain injury were assessed with a brief neuropsychological test battery at inpatient rehabilitation, 1 year post-injury, and 2 years post-injury. The traumatic brain injury groups were found to have patterns of performance marked by reliably distinct differences in isolated areas, with different cognitive predictors of brain injury type present in early versus later recovery. The degree of recovery over the first 2 years appeared to be quite similar for penetrating and non-penetrating injuries.

5952. Yoganathan, P., et al. (2008). "The use of intraoperative fluoroscopy as an aid for removal of radiopaque intraorbital foreign bodies." Ophthalmic surgery, lasers & imaging : the official journal of the International Society for Imaging in the Eye **39**(5): 436-437.

Two patients with orbital trauma and intraorbital foreign bodies, as seen on a computed tomography scan, were taken to the operating room to rule out occult ruptured globe with possible foreign body removal. The C-arm fluoroscopic unit was employed to obtain real-time images of the foreign body's location in relation to the surgeon's dissection tools and the foreign body was extracted with minimal dissection and operating time. When removal of a foreign body is warranted, intraoperative fluoroscopy can help reduce surgical time and orbital manipulation.

5953. Yokobori, S., et al. (2013). "Different blood coagulation profiles in different tbi rat models: An experimental study with thromboelastography (TEG)." Journal of neurotrauma **30**(15): A43-A44.

Introduction Recent prospective clinical trials (CRASH-2, 2012 and Narayan et al., 2008) failed to show efficacy of recombinant factor (rFVIIa) and tranexamic acid with the reduction of mortality in TBI patients. These failures in clinical trials may be caused by the pathophysiological diversity of TBI. Moreover, there is still little information on the different coagulopathic mechanisms (enzymatic coagulopathy, platelet dysfunction, and hyperfibrinolysis) underlying different type of TBI. The aim of this study is thus to clarify the coagulopathic mechanisms in different ''pure'' TBI rat models with thromboelastography (TEG), which can provide quick, simultaneous estimation of multiple coagulopathic mechanisms. Methods Sprague Dawley rats (300-350g) were subjected to one of three different injuries: penetrating ballistic brain injury (PBBI), lateral fluid percussion injury (FPI), and acute subdural hematoma (ASDH). In each TBI model, non-heparinized blood samples were collected from a tail artery catheter at different time points (PreTBI, 2.5h, 24h 7days after TBI). TEG parameters (R/K/a/MA/G/CI) were compared among the three TBI models, and at different time points. Results In the early phase (2.5h) after injury, K-value, which indicates impairment of fibrinogenesis, was significantly higher in ASDH than in FPI. (Median[IQR]: ASDH 1.7[1.4-9.5] vs. FPI 0.8[0.8± 1.0] min, $P < 0.05$ with Kruskal-Wallis test). Moreover, MA and G value, which indicate the strength of platelet-fibrin interaction, were significantly lower in ASDH than FPI. (MA: ASDH 50.5 [42.0-58.5] vs. FPI 64.6 [58.0-66.9]mm, G: ASDH 5099 [3694± 7085] vs. FPI 8640[6449-10062] dyn/cm2 $P < 0.05$, respectively). Moreover, the Coagulation Index (CI), which indicates overall status of coagulation was the lowest in ASDH. Blood coagulation profiles of PBBI were similar to ASDH, although less severe. On the other hand, the peak of coagulopathy in FPI existed on later phase (24h) after injury, and continued by the 7th day. In FPI, the coagulation status was switched to a hypercoagulation on the 7th day after injury. Conclusions Our study clarified 1) The presence of acute-severe coagulopathy in ASDH, 2) gradually worsening coagulopathy and late-onset hypercoagulation in FPI, 3) acute-mild coagulopathy in PBBI. The pathophysiology and severity of coagulopathy was specific to the type of injury and the duration after injury. These results warrant a future clinical study to profile the coagulation disorders after TBI, and possibly of ''TEG derived'' treatment for coagulation disorder in TBI.

5954. Yokoo, S., et al. (2003). "Replantation of an avulsed zygomatic bone as a freeze-preserved autologous graft: a case report." Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery **31**(2): 115-119.

We describe a very rare case of midface fracture where the zygomatic bone had been completely avulsed. The fragment was preserved in a frozen state for 40 days, then replanted and the graft was taken. The conditions favourable for the taking of the freeze-preserved zygomatic graft were: (1) an appropriate preservation method, (2) conservation of

the periosteum on the zygomatic bone, (3) diversity of the haemodynamics of the zygomatic membranous bone, (4) immobilization of the zygoma by rigid fixation, and (5) a rich blood supply at the recipient site.

5955. Yolas, C., et al. (2007). "Intracerebral sewing needle." Pediatric neurosurgery **43**(5): 421-423.

A 9-year-old male patient complaining of seizure attack was admitted to the neurosurgery department. Radiologic investigations revealed a 5-cm-long metallic sewing needle extending from the right frontal cortex to the right lateral ventricle. Burr hole surgery was performed and the needle was grasped with biopsy forceps and removed with endoscopic guidance. The patient recovered without any complications. Copyright (c) 2007 S. Karger AG, Basel.

5956. Yoneoka, Y., et al. (2020). "Traumatic Nonmissile Penetrating Transnasal Anterior Skull Base Fracture and Brain Injury with Cerebrospinal Fluid Leak: Intraoperative Leak Detection and an Effective Reconstruction Procedure for a Localized Skull Base Defect Especially After Coronavirus Disease 2019 Outbreak." World neurosurgery **140**: 166-172.

BACKGROUND: Cerebrospinal fluid (CSF) leakage after penetrating skull base injury is relatively rare compared with close head injuries involving skull base fractures., CASE DESCRIPTION: We report the case of a 65-year-old man who had presented with epistaxis and serous rhinorrhea. When he had fallen to the ground near his bee boxes, a garden pole had poked into his right nostril. He had instantly removed the pole from his nostril himself. However, immediately after removal of the pole, he had developed nasal bleeding and serous rhinorrhea. He then drove to our emergency room. Computed tomography showed pneumocephalus with a minor cerebral contusion in the left frontal lobe and a penetrating injury in the left anterior skull base. His CSF leakage had not resolve spontaneously within 1 week after the injury with strict bed rest. We repaired the CSF leakage using a fat (adipose tissue)-on-fascia autograft plug and caulked the defect in the anterior skull base with the fat-on-fascia graft (FFG) plug through the left nostril with endoscopic guidance. The CSF rhinorrhea was successfully controlled. Intranasal local application of fluorescein aided in the detection of the direction of flow of the CSF leakage., CONCLUSIONS: Endonasal endoscopic caulking of a skull base defect using an FFG plug can be useful to treat CSF leakage due to the localized skull base defect, especially in the coronavirus disease 2019 pandemic. It is simple, inexpensive, and timesaving. It requires no special skills nor sophisticated instruments that can cause aerosolization, reducing the risk of infection during the surgery.

5957. Yoneoka, Y., et al. (2020). "Glass Fragment Injury to the Craniocervical Junction with Interatlantooccipital Penetration to the Subarachnoid Space: Not-To-Be-Missed Important Aspects of Craniocervical Trauma Even in the Middle of the COVID-19 Pandemic: Case Report and Review of Literature." World neurosurgery **141**: 402-405.

BACKGROUND: Nonmissile penetrating injuries to the craniocervical junction caused by a glass fragment are rare, and a standard management strategy has not been established., CASE DESCRIPTION: A 75-year-old Japanese man was brought into our emergency department after receiving a left retroauricular stab wound by broken glass fragments. After spinal immobilization, a computed tomography (CT) scan revealed glass fragments penetrating at the right craniocervical junction to the interatlantooccipital subarachnoid space. CT angiography showed that both vertebral arteries were not injured. Magnetic resonance imaging demonstrated that the glass fragments did not penetrate the cervical cord or medulla oblongata. These glass fragments were removed via a midline incision from the external occipital protuberance to the C7 and with laminectomy without suboccipital craniectomy. Five of the glass fragments were found and removed in total. The dural defect was patched with a free fascia autograft. His postoperative course was uneventful. Postoperative CT angiography showed that both vertebral arteries were intact and the glass fragments had been removed completely., CONCLUSIONS: CT graphical diagnosis is useful for the management of penetrating craniocervical junction trauma, and it should be considered in the evaluation of patients who have suffered craniocervical penetrating injury even in the absence of major wounds or bleeding. Spinal immobilization of patients with craniocervical penetrating injuries is crucial to avoid not only secondary neurologic damage but also secondary critical vascular damage. Incomplete or inadequate assessment of craniocervical stab wounds results in unexpected hazards that are preventable.

5958. Yoon, J., et al. (2022). "Blunt Cerebrovascular Injury-Like Injury Observed in Patients With Craniofacial Self-Inflicted Gunshot Wounds." The Journal of craniofacial surgery **33**(4): 1046-1050.

BACKGROUND: Although blunt cerebrovascular injury (BCVI) is recognized as a risk factor for trauma morbidity and mortality, little is described regarding similar cerebrovascular injury (CVI) in patients with penetrating wounds. The authors aim to characterize these injuries in the craniofacial self-inflicted gunshot wound (SIGSW) population., METHODS: An institutional review board (IRB)-approved retrospective nstudy was conducted on patients presenting to the R Adams Cowley Shock Trauma Center with SIGSWs between 2007 and 2016. All CVIs were categorized by location, type, and associated neurologic deficits. Demographic data, patient characteristics, additional studies, and long-term outcomes were collected. A multivariate analysis determining independent predictors of CVI in the SIGSW population was performed., RESULTS: Of the 73 patients with SIGSWs, 5 (6.8%) had CVIs separate from the bullet/cavitation tract (distant CVIs) and 9 had CVIs along the bullet/cavitation tract (in-tract CVIs). A total of 55.6% of in-tract and 40% of distant injuries were missed on initial radiology read. One distant CVI patient suffered a stroke during admission. The anterior to posterior gunshot wound trajectory was positively associated with distant CVIs when compared with no CVIs (P = 0.01). Vessel dissection was more prevalent in patients with distant CVIs, when compared against patients with in-tract CVIs (P = 0.02)., CONCLUSIONS: Nearly 20% of craniofacial SIGSW patients have CVIs and 6.8% have BCVI-like injuries, which is 2-to-6-fold times higher than traditional BCVIs. Craniofacial SIGSWs serve as an independent screening criterion with comparable screening yields; the authors recommend radiographic screening for these patients with particular scrutiny for CVIs as they are frequently missed on initial radiographic interpretations.

5959. Yoon, J., et al. (2020). "Airbag related penetrating brain injury." ANZ journal of surgery **90**(3): 384-385.

5960. Yorks, M. L. (2005). "More on Phineas Gage." The New England journal of medicine **352**(9): 944-944.

5961. Yoshida, K., et al. (1992). "Myocardial lesions induced after trauma and treatment." Forensic science international **54**(2): 181-189.

In order to clarify the effect of trauma and treatment as stresses on myocardia, we examined histological changes of myocardia in victims who received various kinds of traumata and treatments. We also undertook a histochemical study for calmodulin, which we found useful in the diagnosis of early ischemia. Those who died shortly after stab wounds, traffic accident or head injuries, showed mild cardiac lesions such as contraction bands or fragmentation and mild diffusion of calmodulin, a marker for necrosis. A case with hemorrhagic shock after a traffic accident, involving intense resuscitation for 2 h, showed severe cardiac lesions such as contraction bands, hydropic change and subendocardial hemorrhage along with severe diffusion of calmodulin. In most of the instant death cases after falls, severe contraction band necrosis and severe calmodulin diffusion were observed. Myocardia of victims, who died several days after head injuries or traffic accidents, generally demonstrated distinct diffusion of calmodulin as compared to the mild and non-specific lesions detected by hematoxylin-eosin (H&E) staining. In cases of long-term survival in a state of brain death, calmodulin staining was very low, which was not always associated with the severity of the lesions on H&E staining. In cases with intensive or extended treatment, it appeared to be difficult to determine the cause-effect relationship between trauma and cardiac lesions or to distinguish the lesions due to extrinsic factors from those of disease. In some cases, calmodulin intensely stained the areas with hydropic appearance or hypereosinophilia, which may be related to calcium overload.

5962. Yoshida, M. and H. Kamiishi (2003). "Traumatic aneurysm of the maxillary artery with mandibular bone fracture; case report." Japanese Journal of Plastic and Reconstructive Surgery **46**(2): 207-213.

Traumatic aneurysms of the internal maxillary artery are rare events, usually mentioned in the literature as possible complications of penetrating trauma or occurring as a result of maxillomandibular osteotomy or arthroscopy of the temporomandibular joint. More rarely, traumatic aneurysm results from blunt trauma and fracture of the mandibular condyle. A case of a traumatic aneurysm of the maxillary artery is reported. The aneurysm appeared nine days after facial injuries that included mandibular fractures. The lesion was successfully treated by ligation of the external carotid artery.

5963. Yoshigoe, A., et al. (2013). "A case of orbital-sinus wooden foreign body extracted using endoscopic sinus surgery." Oto-Rhino-Laryngology Tokyo **56**(3): 34-38.

An 81-year-old male sustained a penetrating injury at the left medial angle of the eye caused by a wooden foreign body. Computed tomography showed that the foreign body had penetrated the orbit, ethmoidal sinus, nasal septum, and finally reached just in front of the atlas. We tried to extract the foreign body as soon as possible for preventing infection using endoscopic sinus surgery, and could do so succeeded without complication. Endoscopic sinus surgery is an effective approach to extract orbital-sinus foreign body.

5964. Yoshihara, S., et al. (2019). "Craniofacial penetration by a wooden stick." European annals of otorhinolaryngology, head and neck diseases **136**(5): 393-395.

INTRODUCTION: Penetrating craniofacial injuries caused by stick-like foreign bodies occur as a result of accidents particularly in children, and often lead to significant morbidity., CASE SUMMARY: We describe a 5-year-old boy who sustained facial trauma after falling on a wooden stick which penetrated his left cheek. At the initial visit, his vital and neurological signs were normal. However, the stick had penetrated the frontal lobe to a depth of 3cm via the orbital cavity and the anterior skull base. The stick was successfully removed while visualizing the anterior skull base in an endoscopic transethmoidal approach. A follow-up examination one year after the accident demonstrated normal visual acuity and ocular motility, with no diplopia, tearing or pain., DISCUSSION: Penetrating facial injuries caused by stick-like objects carry a significantly higher risk of serious neurological involvement. Even if penetrating facial injuries sometimes appear trivial, the external injury site is often insufficient to determine the position of the object within the head. Although the cheek is a rare entry site for intracranial injuries, the extent of damage should be assessed fully before attempting removal.

5965. Yoshii, M., et al. (2004). "Intraorbital wooden foreign body." Acta ophthalmologica Scandinavica **82**(4): 492-493.

5966. Yoshijima, S., et al. (1979). "[A case of successful removal of a deep-seated bullet in the brain by stereotaxic approach (author's transl)]." No shinkei geka. Neurological surgery **7**(10): 989-994.

5967. Yoshimoto, T. and B. K. Siesjo (1999). "Posttreatment with the immunosuppressant cyclosporin A in transient focal ischemia." Brain research **839**(2): 283-291.

Cyclosporin A (CsA) reduces ischemic brain damage when administered in such a way that its penetration across the blood-brain barrier is enhanced. Since only pretreatment has previously been used in focal ischemia, the objective of the present study was to establish whether posttreatment is efficacious and to assess the window of therapeutic opportunity for CsA. To that end, CsA was given 5 min to 6 h after the start of reperfusion following 2 h transient ischemia, and infarct volume was assessed after 48 h by triphenyltetrazolium chloride staining. Attempts were made to circumvent the BBB to CsA by an intracerebral needle lesion, by an increase in the intravenous CsA dose, or by osmotic opening with intracarotid mannitol. The results were compared to those obtained with FK506. Intravenous CsA in a dose of 10 mg/kg failed to reduce infarct volume, unless preceded by a needle lesion. That procedure, and an increase in CsA dose to 50 mg/kg, reduced infarct volume to about 50% of control, but the higher dose had toxic side effects. The coupled intracarotid infusion of mannitol and CsA (10 mg/kg) was more efficacious, without overt side effects. However, mannitol proved dispensable since CsA alone reduced infarct volume to 30% of control, with a therapeutic window of 3-6 h. When given after 5 min of reflow, CsA reduced infarct volume to 10% of control and was clearly more neuroprotective than FK506. Possibly, this is because CsA blocks the mitochondrial permeability transition pore which is opened under adverse conditions.

5968. Yoshioka, T., et al. (1986). "Prolonged hemodynamic maintenance by the combined administration of vasopressin and epinephrine in brain death: a clinical study." Neurosurgery **18**(5): 565-567.

The present study attempted long term hemodynamic maintenance in 16 adult brain-dead patients, 14 with head injury and 2 with cerebrovascular accidents. In addition to respiratory and fluid management, 10 were treated with continuous infusion of epinephrine to maintain systolic blood pressure above 90 mm Hg. The remaining 6 patients each

received a continuous infusion of synthetic arginine vasopressin (ADH) at a rate of 1 or 2 units/hour (285 +/- 45 microunits/kg/minute) simultaneously with epinephrine. The 10 patients treated with epinephrine alone all succumbed to cardiac arrest within 48 hours of brain death, with a mean survival time of 24.1 +/- 17.2 hours. In the patients who received simultaneous ADH infusion, a minimal dose of epinephrine of no more than 0.5 mg/hr in most instances sufficed to maintain blood pressure. Their mean survival time after brain death was remarkably prolonged to 23.1 +/- 19.1 days. In brain death, ADH plays a critical role in hemodynamic maintenance, and ADH administration permits long term hemodynamic stabilization of brain-death patients, offering increasing opportunities for organ transplantation.

5969. Youmans, Q. R., et al. (2019). "The Association of Donor Cause of Death with Outcomes Post-Heart Transplant." Journal of Cardiac Failure **25**(8): S169.

Objective: Approximately 3000 orthotopic heart transplants (OHT) occur annually in the United States. Donor selection is a key decision point for patients undergoing transplantation. Donor factors such as age, BMI, left ventricular function, chest trauma, history of hemodynamic compromise, donor-recipient compatibility, and ischemic time have all been associated with post-transplant survival. Few studies have examined donor cause of death (DCOD) and its association with post-transplant outcomes. In this study we examine the association of DCOD with post-transplant primary graft dysfunction (PGD), rejection and survival. Methods: This study was a retrospective analysis of 40,485 patients captured in the United Network for Organ Sharing (UNOS) registry. Included in this analysis were adult OHT recipients older than 18 years of age from 1989 to 2017. DCOD was categorized into blunt trauma (BT), cerebral vascular accidents (CVAs), and penetrating trauma (gunshot and stab wounds). Chi square analysis was used to compare baseline characteristics among the three groups. The Cox proportional hazard model was used to estimate the association of DCOD with PGD and acute rejection. The cumulative incidence competing risk method was used for survival analysis. Results: Donors had a median age of 31 (interquartile range 22, 43), were predominately Caucasian (69%), and were predominately male 78%. 992 episodes of PGD were observed and occurred more frequently in the CVA group (41% vs BT 38% and penetrating trauma 19%, p 0.03). Univariate analysis showed a higher risk of acute graft failure (HR 1.24, CI 1.19-1.29, P <0.001) in the CVA group. Conclusions: DCOD by CVA is associated with an in increased risk of PGD and acute graft failure. Further multivariate analysis is needed.

5970. Young, A. (1974). "Gunshot injury to the mandible. A case report." British dental journal **137**(4): 136-138.

5971. Young, B., et al. (1981). "Early prediction of outcome in head-injured patients." Journal of neurosurgery **54**(3): 300-303.

The relationship between Glasgow Coma Scale (GSC) scores obtained during the 1st week after head injury and outcome at 1 year was analyzed in 170 patients. Seventy-two of 76 patients with initial GCS scores of 3 or 4 lived, and only one had a favorable outcome. Favorable and unfavorable outcomes were almost equally divided when the initial GCS scores were in the intermediate range of 5, 6, or 7. No patients with an initial GCS score in this intermediate range that subsequently worsened had a favorable outcome, while over 80% of those improving to a score higher than 7 had a favorable outcome. Only 12% of those persisting with a score of 5, 6, or 7 for 1 week had favorable outcome. Outcome predictions using the multiple logistic model were made for this intermediate group of patients based on GCS scores and data on midline shift derived from computerized tomography (CT). The patients with initial scores of 5, 6, or 7 with midline shifts of less than 4.1 mm on initial CT scanning had a significantly higher favorable outcome rate compared with patients with a larger shift. However, outcome prediction made by combining shift data and initial GCS scores are not significantly more accurate than predictions based solely on initial GCS scores. Combining 48-hour GCS scores and shift data significantly improves predictive accuracy based only on coma scores. The data obtained by combining GCS scores at 72 hours and 1 week and shift data is marginally significant for improving accuracy of outcome predictions. It is concluded that GCS scores and shift data are highly accurate indicators of outcome in head-injured patients.

5972. Young, P. A. and D. H. Rice (2007). "Management of a type II nasoethmoid orbital fracture and near-penetration of the intracranial cavity with transnasal canthopexy." Ear, nose, & throat journal **86**(6): 344-360.

Nasoethmoid orbital fractures are perhaps the most complicated aspect of craniomaxillofacial trauma. Involvement of the medial canthal tendon markedly increases the complexity of the repair. We report a case of type II

nasoethmoid orbital fracture in a 32-year-old man that was managed without formal medial canthal tendon repair; instead, we used open reduction and internal fixation of the central fragment and the nasoethmoid complex. However, during the immediate postoperative period, we noted anterior and inferior displacement of the medial canthus. We took the patient back to the operating room to address the detachment. Revision surgery was successful, and at the 6-month follow-up, his medial canthi were completely symmetrical in all dimensions. We describe our intraoperative technique and measures to prevent complications that can help the surgeon intraoperatively. We also discuss an important point that has not been adequately addressed in the literature to date--that is, the fact that the use of the frontoethmoid suture line and the anterior ethmoid artery as a guide to the skull base can be inaccurate. Problems associated with this inaccuracy can be avoided by carefully reviewing preoperative computed tomography, which can help keep the surgeon from entering the intracranial cavity while fixing the medial canthal tendon during transnasal canthal repair.

5973. Young, W. F., Jr., et al. (1993). "Spontaneous migration of an intracranial bullet into the cervical canal." Southern medical journal **86**(5): 557-559.

We have reported a case of intracranial to intraspinal migration of a retained bullet fragment over a course of approximately 4 years. The patient remained asymptomatic. The bullet was removed via a posterior cervical laminectomy. Migration of bullet fragments, though rare, should be included as one of the delayed complications of gunshot wound to the head.

5974. Young, W. F., et al. (1994). "Diagnosis and management of occipital condyle fractures." Neurosurgery **34**(2): 257-251.

The authors recently treated three cases involving fractures of the occipital condyle. First described by Bell in 1817, this lesion has proven to be very rare, with only 32 cases previously reported in the literature. Plain films often do not reveal any abnormality, making diagnosis difficult. High-resolution computed tomography has been demonstrated to be very sensitive in diagnosing this lesion. This fact was borne out in the authors' series. All of the authors' patients were managed either with a Philadelphia collar or with halo fixation, with excellent outcomes.

5975. Youssef, A. S., et al. (2008). "Penetrating craniofacial injury inflicted by a knife." The Journal of trauma **64**(6): 1622-1624.

5976. Yu, A.-Y., et al. (2014). "Characteristics of a rat model of an open craniocerebral injury at simulated high altitude." Neuroreport **25**(16): 1272-1280.

To establish a rat model of an open craniocerebral injury at simulated high altitude and to examine the characteristics of this model. Rats were divided randomly into a normobaric group and a high-altitude group and their corresponding control groups. A rat model of an open craniocerebral injury was established with a nail gun shot. Simulated high-altitude conditions were established with a hypobaric chamber at 0.6 ATA to mimic pressure at an altitude of 4000 m. Mortality, brain water content (BWC), Evans blue content, pathology, regional cerebral blood flow (rCBF), partial pressure of brain tissue oxygen (PbtO2), and brainstem auditory-evoked potential were observed after injury. The mortality of the high-altitude group was significantly greater than that of the normobaric group within 72 h after injury ($P<0.05$). BWC and Evans blue content increased by 48 h after injury ($P<0.05$); pathological changes in damaged brains were more serious. In contrast, rCBF and PbtO2 had decreased markedly by 72 h ($P<0.01$); brainstem auditory-evoked potential values were significantly prolonged ($P<0.05$). Moreover, an inverse correlation between rCBF and BWC and a positive correlation between rCBF and PbtO2 were found. The rat model of an open craniocerebral injury at simulated high altitude can be established successfully using a nail gun shot and a hypobaric chamber. The injury characteristics at high altitude were more serious, rapid, and prolonged than those in the normobaric group.

5977. Yu, C., et al. (2015). "A systems biology strategy to identify molecular mechanisms of action and protein indicators of traumatic brain injury." Journal of neuroscience research **93**(2): 199-214.

The multifactorial nature of traumatic brain injury (TBI), especially the complex secondary tissue injury involving intertwined networks of molecular pathways that mediate cellular behavior, has confounded attempts to elucidate the pathology underlying the progression of TBI. Here, systems biology strategies are exploited to identify novel molecular mechanisms and protein indicators of brain injury. To this end, we performed a meta-analysis of four distinct high-throughput gene expression studies involving different animal models of TBI. By using canonical pathways and a large human protein-interaction network as a scaffold, we separately overlaid the gene expression data from each study to identify molecular signatures that were conserved across the different studies. At 24 hr after injury, the significantly activated molecular signatures were nonspecific to TBI, whereas the significantly suppressed molecular signatures were specific to the nervous system. In particular, we identified a suppressed subnetwork consisting of 58 highly interacting, coregulated proteins associated with synaptic function. We selected three proteins from this subnetwork, postsynaptic density protein 95, nitric oxide synthase 1, and disrupted in schizophrenia 1, and hypothesized that their abundance would be significantly reduced after TBI. In a penetrating ballistic-like brain injury rat model of severe TBI, Western blot analysis confirmed our hypothesis. In addition, our analysis recovered 12 previously identified protein biomarkers of TBI. The results suggest that systems biology may provide an efficient, high-yield approach to generate testable hypotheses that can be experimentally validated to identify novel mechanisms of action and molecular indicators of TBI.

5978. Yu, D.-z., et al. (2012). "[Successful treatment of a patient with craniocervical penetrating injury by a steel bar]." Zhonghua er bi yan hou tou jing wai ke za zhi = Chinese journal of otorhinolaryngology head and neck surgery **47**(5): 424.

5979. Yu, H., et al. (2021). "Anterograde venous bullet embolism from the left facial vein to the right ventricle." Trauma case reports **36**.

A young man presented to the emergency department reporting he had been recently shot in the face and chest with an unknown weapon. Initial physical examination only found bruising by the left hemimandible, but CT angiography of the thorax revealed a BB in the right ventricle. A subsequent CT angiography of the head and neck showed no major arterial injury but noted stranding and irregularity of the left facial vein directly deep to the injury site. The findings favoured anterograde venous bullet embolism from the left facial vein to the right ventricle. To our knowledge, this is the first report of a relatively small diameter and superficial vein of the face resulting in this phenomenon.

5980. Yu, J. L., et al. (2014). "Frontal sinus volume predicts incidence of brain contusion in patients with head trauma." The journal of trauma and acute care surgery **76**(2): 488-492.

BACKGROUND: The function of the paranasal sinuses is a topic of debate. One hypothesis suggested has been that sinuses act as a "crumple zone," serving to protect the contents of the head from impact. In this study, we examine the interactions of the frontal sinus and the brain in the setting of head trauma. Our formal hypothesis is that frontal sinus volume is less in head trauma patients with contusion than in head trauma patients without contusion., METHODS: Computed tomographic (CT) scans of patients who sustained blunt head trauma performed at the University of Pittsburgh Medical Center from 2007 to 2012 were reviewed retrospectively. Inclusion criteria were presence of blunt trauma and complete brain and maxillofacial CT scan. Exclusion criteria included patients with incomplete imaging, imaging unrelated to trauma, previous cranial injury, and penetrating trauma.With the use of maxillofacial CT scans, height, depth, and width were measured, and a cubical approximation of volume was determined for each frontal sinus. Presence of frontal sinus fracture was considered an indicator of high-impact trauma. Grading of brain contusion severity was performed using head CT scans. A scale of 0 to 5 was used based on the Marshall Criteria.Categorical data were analyzed using the chi(2) or Fisher's exact test. Continuous data were analyzed using Student's t test or analysis of variance. $p < 0.05$ was considered statistically significant., RESULTS: Among patients with frontal sinus fracture, the average sinus volume of those without contusion was 32.72 mL, while the average sinus volume of those with brain contusion was 21.85 mL ($p = 0.023$). Thus, the volume of the frontal sinuses was 33% less in patients with contusion than in patients without contusion., CONCLUSION: Our study supports the theory that the frontal sinuses impart a protective advantage against frontal brain contusion. The dynamics of head injury and force distribution during trauma may be the basis for more advanced protective devices., LEVEL OF EVIDENCE: Prognostic study, level III.

5981. Yu, M., et al. (2012). "The treatment strategies of penetrating orbito-cranial injuries: Two cases reports and literature review." Brain injury **26**(4-5): 466-467.

Objective: To report two cases with penetrating orbito-cranial injuries. One case was operated by early surgical debridement. Another patient experienced the third operation for cellulitis in the orbit, brain abcess and subperiosteal abscess after two operations. We discuss treatment keypoints of penetrating orbito-cranial injuries and infectious complications. Methods: The relationship of preoperative evaluation and treatment strategies with curative effect is analyzed in a case for early debridemen. At the same time, the treatment process and operation strategy of another patient with cellulitis in the orbit, brain abcess and subperiosteal abscess are introduced. The second patient experienced a debridement for orbito-cranial penetrating wounds first and the resection of right frontal brain abscess afterwards, then transferred to our hospital for the third operation. Results: The first patient experienced a early complete debridement, foreign body excise, the optic canal and supraorbital split decompression, cranium reconstruction at the same time, and his wound was healed at phase 1. Follow-up has been done for 11 months postoperation. He got good recovery of eyesight, eye movement, satisfactory appearance and no postoperative complications. The second patient experienced one operation for puncture drainage of brain abscesses, surgical debridement and drainage of intraorbit and frontal subperiosteal abscess, who was cured and recovered better without relapse after follow-up of 10 months. Conclusion: The state of penetrating orbito-cranial wounds is complicated, which can cause brain injury, also accompanied by ocular trauma, cranial nerves and big vascular injury, and may lead to orbito-cranial deformity, nerve dysfunction or lifethreatening. So the treatment is very difficult. Once infectious complications occur, it will be difficult to handle and may directly endanger life. The ideal treatment of penetrating orbit-cranial wounds includes: early thorough debridement, exact hemostatic, regular strictly skull base reconstruction, recovering satisfactorily appearance, and preventing complications. The early complete debridement is the key, which often need multidisciplinary cooperation.

5982. Yu, M. K. (2014). "The surgical strategy of penetrating orbitocranial combined injuries from high temperature liquid plastic: Case report." Journal of neurotrauma **31**(12): A17.

The objective is to report the surgical experience for one case with penetrating orbito-cranial combined injuries from high temperature plastic, we discuss the surgical key points and some announcements. By imaging examination and physical examination, we found that the plastic foreign bodies were inserted into the patient's right eye socket, which passed across orbital medial penetrating orbital plate into the supraorbital fissure and anterior skull base. Using the right frontotemporal joint approach, the intracranial wound track was fully exposed in operation. Due to the larger volume tip of foreign bodies which were fixed in the orbit and could not be removed directly by cranial or orbital department, intracranial foreign body could be only disconnected from the orbital plate first, and then a thorough debridement was done. The tissue spaces around the orbital foreign bodies were then separated out, and the residual plastic foreign bodies incarcerated in upper eyelid, intraorbital and outside the orbit were taken out. Finally, the reconstruction of the skull base was implemented by neurosurgery. After joint surgery by neurosurgeon and ophthalmology, removal of orbital cranial foreign bodies, orbital-cranial wound debridement, and the reconstruction of the skull base were finished during the same period. The patient was cured through an operation with intact eye ball at the injury side. The state of these penetrating orbito-cranial wounds is complicated, which will be difficult to handle and may directly endanger life. Methods of dealing with orbital cranial penetrating injury have their particularity. Based on the application of effective broad spectrum antibiotics, the situation of foreign bodies and the wounded, and their correlation with orbital or cranial injury should be clearly detected as early as possible. According to the traumatic condition, it is the key to take the appropriate surgical strategy for cure of this combined injury. Because of complex structure and wide range around the injury, the operation often needs multidisciplinary collaboration.

5983. Yuan, Y.-K., et al. (2020). "Rational design of secondary operation for penetrating head injury: A case report." Chinese journal of traumatology = Zhonghua chuang shang za zhi **23**(2): 84-88.

Penetrating head injury is rare, and thus management of such injuries is non-standard. Early diagnosis and intraoperative comprehensive exploration are necessary considering the complexity and severity of the trauma. However, because of the lack of microsurgical techniques in local hospitals, the possible retained foreign bodies and other postoperative complications such as cerebrospinal fluid (CSF) leak usually require a rational design for a secondary operation to deal with. We present a case of a 15-year-old boy who was stabbed with a bamboo stick in his left eye. The chopsticks passed through the orbit roof and penetrated the skull base. In subsequent days, the patient sustained CSF

leak and intracranial infection after an unsatisfied primary treatment in the local hospital and had to request a secondary operation in our department. Computed tomography including plain scan, three dimension reconstruction and computed tomographic angiography are used to determine the course and extent of head injury. A frontal craniotomy was performed. Three pieces of stick were found residual and removed with the comminuted orbit bone fragments. A pedicled temporalis muscle fascia graft was applied to repair the frontier skull base and a free temporalis muscle flap to seal the frontal sinus defect. Aggressive broad-spectrum antibiotics of vancomycin and meropenem were administrated for persistent fever after operation. CSF external drainage system continued for 12 days, and was removed 10 days after temperature returned to normal. The Glasgow coma scale score was improved to 15 at postoperative day 7 and the patient was discharged at day 22 uneventfully. We believe that appropriate preoperative surgical plan and thorough surgical exploration by microsurgery is essential for attaining a favorable outcome, especially in secondary operation. Good postoperative recovery depends on successfully management before and after operation for possible complications as well.

5984. Yucel, A., et al. (2018). "Transnasal Endoscopic Removal of a Knife Causing Penetrating Brain Injury in a Child." The Journal of craniofacial surgery **29**(7): e694-e695.

Transnasal penetrating brain injuries are rare and a medical emergency, which needs to be treated promptly. A 4-year-old male patient was brought to our emergency room with a knife sticking out of his nose. The patient was immediately taken to the operating room and the knife was removed under general anesthesia. No cerebrospinal fluid leakage or any bleeding was seen and so the operation was terminated. The authors herein report a penetrating brain trauma through to the cella turcica with a knife that improved without any sequelae at a child.

5985. Yue, J., et al. (2017). "Adult firearm-related traumatic brain injury in United States trauma centers." Journal of neurotrauma **34**(13): A23.

Firearm injuries cause an estimated 33,000 deaths annually in the United States. Management algorithms following gunshot wounds to the head (GSWH) have been static for two decades and outcomes remain in need of systematic characterization. Adult GSWH patients in the National Sample Program (NSP) of the National Trauma Data Bank (NTDB), years 2003-2012, were extracted. Multivariable regression identified predictors for hospital length of stay (HLOS), intensive care unit length of stay (ICU LOS), medical complications, mortality, and discharge disposition. Odds ratios (OR) and 95% confidence intervals (CI) were reported. Statistical significance was assessed at $p < 0.001$. In total, 8,148 patients were included extrapolating to 32,439 national incidents. Age was 36.6 - 16.4 years. Mean HLOS was 13.9 - 17.9 days and ICU LOS was 8.6 - 17.4 days. The mortality was 54.6%. Age, injury intent, Glasgow Coma Scale (GCS) score, Injury Severity Score (ISS), and hypotension were significant predictors as previously reported ($p < 0.001$). Compared to privately insured patients, Medicare/Medicaid patients had longer HLOS (mean increase 4.4 days, 95% CI [2.6-6.3 days], $p < 0.001$). Compared to the Midwest, the South had longer HLOS (mean increase 3.7 days [2.0-5.4 days], $p < 0.001$) and more complications (OR 1.7 [1.4-2.0], $p < 0.001$); the West had less complications (OR 0.6 [0.5-0.7], $p < 0.001$). Compared to handgun, injury from shotgun and hunting rifle had lower odds of death (OR 0.3 [0.2-0.4], $p < 0.001$; OR 0.5 [0.4-0.8], $p < 0.001$). Suicide had lower odds of discharge to home compared to accident (OR 0.5 [0.3-0.7], $p < 0.001$). Relative to Level I trauma centers, Level II trauma centers had lower odds of discharge to home (OR 0.7 [0.5-0.8], $p < 0.001$). In conclusion, firearm type, injury intent, insurance type, and geographic region are important prognosticators for acute recovery and outcome following GSWH, in addition to older age, hypotension, and injury severity. Improved understanding of civilian GSWH is critical to increasing awareness and reducing injury burden from firearm injuries.

5986. Yue, J. K., et al. (2022). "Management of migrating intracranial bullet fragments in a 13-year-old female after firearm brain injury: technical and surgical nuances." Brain injury **36**(3): 432-439.

INTRODUCTION: We present the challenges and nuances of management in a rare case of multiple migrating intracranial fragments after pediatric gunshot wound to the head (GSWH)., CASE PRESENTATION: A 13-year-old girl suffered left parietal GSWH, with new neurologic decline 3 days after initial debridement. Serial imaging showed the largest intracranial fragments had migrated into the left trigone, and descended further with head of bed (HOB) elevation. HOB was iteratively decreased, with concurrent intracranial pressure monitoring. After extubation, with an alert and stable neurologic exam, HOB was decreased to -15 degrees, allowing gravity-assisted migration of the

fragments to an anatomically favorable position within the left occipital horn. The patient underwent occipital craniotomy for fragment retrieval on hospital day 27. Two large and >20 smaller fragments were retrieved using neuronavigation and intraoperative ultrasound. Forensics showed these to be .45 caliber handgun bullet fragments. The patient recovered well after 2-months of intensive inpatient rehabilitation., DISCUSSION: During new neurologic decline after GSWH, bullet migration must be considered and serial cranial imaging is requisite. Surgical retrieval of deep fragments requires judicious planning to minimize further injury. Tightly controlled HOB adjustments with gravity assistance for repositioning of fragments may have utility in optimizing anatomic favorability prior to surgery.

5987. Yuen, E. C. P. (2004). "The use of prophylactic antibiotics in trauma." Hong Kong Journal of Emergency Medicine **11**(3): 161-168.

Infection is an important cause of morbidity and mortality in trauma. In this literature review, the microbiological profiles and the use of prophylactic antibiotics in various traumatic situations are discussed. This review includes abdominal and chest trauma, craniocerebral trauma, long bone fractures, open globe injuries and animal bite injuries.

5988. Yuh, S.-J. and A. Alaqeel (2015). "Ten self-inflicted intracranial penetrating nail gun injuries." Neurosciences (Riyadh, Saudi Arabia) **20**(3): 267-270.

Penetrating craniocerebral injuries from nail gun use are rare. We describe a case of 10 self-inflicted nail gun injuries with intracranial penetrations. We also review the literature and discuss management strategies of such craniocerebral trauma. A 33-year-old male with a long-standing history of severe depression took a nail gun and sustained 10 penetrating intracranial injuries. Initial neuroimaging revealed 10 penetrating nails, all sparing the major cerebral vasculature. Immediate surgical removal was undertaken in the surgical suite using a combination of craniotomies, craniectomies, and blind removal. Intracranial injuries from self-inflicted nail gun misuse is becoming increasingly more frequent. Initial appropriate clinical decision-making are critical in preventing further cortical or vascular damage.

5989. Yuksel, F., et al. (2004). "Management of maxillofacial problems in self-inflicted rifle wounds." Annals of plastic surgery **53**(2): 111-117.

Severe gunshot wounds to the face, produced by high-velocity rifles or shotgun blasts, present a formidable challenge to reconstructive surgeons. In this study, the results of 14 cases with gunshot wounded faces caused by fire from rifles are presented, and the principles of the management of those victims were determined. These patients had attempted to commit suicide and placed the muzzles of the rifles beneath their chins. The ages of the patients ranged from 20 to 24 years, with a mean age of 22 years. These wounds were caused by close-range gunshots (<10 cm), and the missiles had high velocity (more than 800 m/second). All patients had wounds in their submental triangle areas. The exit sites of the missiles differed among patients. All exit wounds were in the angle limited by the deviation from the gun-barrel axis. After clinical and radiologic evaluation and conservative debridement of all devitalized tissues, the fractures were reduced and stabilized appropriately. Large bony defects were treated by bone grafting, and all soft tissue lesions were closed in layers. The entrance and exit sites were covered primarily after thorough debridement except one case whose defect was reconstructed with bilateral sternocleidomastoid (SCM) flaps, one for submental skin and the other for the mouth floor. Intraoral soft tissues were then repaired by primary closure, tongue flaps, or SCM flaps in case they were necessary. Free tissue transfers were not required for treatment of secondary soft-tissue problems. Resolution of tissue edema, softening of scars in time, and insertion of bone graft may improve the deformity significantly. The initial anatomic reconstruction of the existing bone skeleton and the maximal use of regional tissue for cutaneous reconstruction provide an esthetic appearance that can never be duplicated by secondary reconstruction.

5990. Yun, J., et al. (2018). "YH25448, an irreversible 3r d generation EGFR TKI, exhibits superior anticancer effects with potent brain BBB penetration in NSCLC." Cancer Research **78**(13).

EGFR mutated lung cancer shows approximately 10-15% of non-small cell lung cancer (NSCLC). Although the best therapeutic EGFR tyrosine kinase inhibitors (TKIs) targeting mutant EGFR, such as gefitinib and erlotinib, are used in the first line treatment of patients with advanced EGFR mutated NSCLC, the acquired resistance to the drugs usually

appears in 10-12 months of therapy by the occurrence of a second EGFR mutation T790M. YH25448, a highly mutant-selective and irreversible 3rd generation EGFR TKI potently penetrating blood brain barrier (BBB) penetration, targets both activating EGFR mutations Del19, L858R and T790M mutation while sparing wild type. In NSCLC cell lines and primary cancer cells from patients harboring EGFR mutations, YH25448 showed more potent inhibition of cancer cell growth and significantly increased tumor cell apoptosis compared to osimertinibs, which is one of 3rd generation EGFR TKIs. In vivo mouse model implanted with H1975 cells, YH25448 treatment at the once-daily showed a dramatic dose-dependent tumor regression in both subcutaneous and intracranial lesions with no abnormal signs such as skin keratosis shown in osimertinib-treated mice. Plasma half life of YH25448 was 5.9-6.8 hr and tumor to plasma AUC0-last ratio was 3.0-5.1 in tumor bearing mice. YH25448 also showed excellent penetration of the BBB, achieving CSF concentrations exceeding the IC50 value for pEGFR inhibition in the tumor-bearing mice. Taken together, these findings suggest important role for the further development of YH25448 as a novel therapeutic for the treatment of EGFR mutant-positive NSCLC patients with brain metastases.

5991. Yurdakul, A. S., et al. (2005). "An interesting cause of recurrent haemoptysis: haemoptysis 7 years after a foreign body penetrated the lung parenchyma and aorta." Respirology (Carlton, Vic.) **10**(2): 229-232.

A 43-year-old man presented with a 12-month history of recurrent haemoptysis. Postero-anterior chest X-ray of a patient with a history of a penetrating thoracic trauma 8 years previously showed a long wedge-shaped opacity just above the left hemidiaphragm, representing the 'tip of the knife' appearance, and penetrating from the lateral chest wall deep to the thoracic aorta. After consultation with the cardiovascular surgeons, it was decided that the patient should have an operation to remove the foreign body penetrating the aorta. During the operation, a piece of glass was located in the posterior segment of the left lower lobe, and it had also penetrated the aorta through to the posterior wall. The glass had a pointed end, was wedge-shaped and measured 8 cm x 3 cm x 0.5 cm. It was removed, and a 5-cm segment of aorta was replaced with dacron graft. Patients with penetrating chest trauma require routine chest X-rays as many will have a haemothorax, pneumothorax or a penetrating foreign body in the chest in the absence of clinical findings. Postero-anterior chest X-rays as well as lateral X-rays must be carefully and systematically examined for foreign bodies.

5992. Yusuf, A. S., et al. (2017). "Clinical Presentation and Outcome of Impalement Craniocerebral Injuries - A CASE SERIES." Journal of the West African College of Surgeons **7**(2): 112-123.

Non-missile, low-velocity penetrating craniocerebral injuries are uncommon among civilians and unlike missile injuries, are associated with localized brain injury and subsequent good outcome if managed appropriately. Penetrating injuries to the brain caused by a retained, relatively blunt or sharp object that perforate the brain along its longitudinal axis producing a wound track corresponding to its length of penetration, are called impalement injuries. Most of the impalement craniocerebral injuries are accidental and varying objects have been reported. We report our experience with the management of seven cases of impalement craniocerebral injuries. Five of the patients were adult male while two female children were involved. One case was from assault, others resulted from accidental injury. Left side of the cranium was more commonly involved. The impaled objects in this study included a lead pencil, a screw driver, a branch of a tree, and other metallic objects. Most of the patients had craniectomy and water tight dura repair during remover of the impaled object. All patients made good recovery following surgical intervention. Management principles entail early recognition, deliberate and careful debridement, and judicious antibiotic therapy. The surgical approach to these injuries varies, depending on the route of entry.

5993. Yu-Wai-Man, P. (2015). "Traumatic optic neuropathy-Clinical features and management issues." Taiwan journal of ophthalmology **5**(1): 3-8.

Traumatic optic neuropathy (TON) is an uncommon cause of visual loss following blunt or penetrating head trauma, but the consequences can be devastating, especially in cases with bilateral optic nerve involvement. Although the majority of patients are young adult males, about 20% of cases occur during childhood. A diagnosis of TON is usually straightforward based on the clinical history and examination findings indicative of an optic neuropathy. However, the assessment can be difficult when the patient's mental status is impaired owing to severe trauma. TON frequently results in profound loss of central vision, and the final visual outcome is largely dictated by the patient's baseline visual acuities. Other poor prognostic factors include loss of consciousness, no improvement in vision after 48 hours, the absence of

visual evoked responses, and evidence of optic canal fractures on neuroimaging. The management of TON remains controversial. Some clinicians favor observation alone, whereas others opt to intervene with systemic steroids, surgical decompression of the optic canal, or both. The evidence base for these various treatment options is weak, and the routine use of high-dose steroids or surgery in TON is not without any attendant risks. There is a relatively high rate of spontaneous visual recovery among patients managed conservatively, and the possible adverse effects of intervention therefore need to be even more carefully considered in the balance.

5994. Yu-Wai-Man, P. and P. G. Griffiths "Steroids for traumatic optic neuropathy." (6).

Background, Traumatic optic neuropathy (TON) is an important cause of severe visual loss following blunt or penetrating head trauma. Following the initial injury, optic nerve swelling within the optic nerve canal can result in secondary retinal ganglion cell loss. Optic nerve decompression with steroids or surgical interventions or both has therefore been advocated as a means of improving visual prognosis in TON., Objectives, The aim of this review was to examine the effectiveness and safety of using steroids in TON., Search methods, We searched CENTRAL (which contains the Cochrane Eyes and Vision Group Trials Register) (The Cochrane Library 2013, Issue 4), Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, Ovid MEDLINE Daily, Ovid OLDMEDLINE, (January 1950 to May 2013), EMBASE (January 1980 to May 2013), Latin American and Caribbean Literature on Health Sciences (LILACS) (January 1982 to May 2013), Web of Science Conference Proceedings Citation Index- Science (CPCI-S) (January 1990 to May 2013), the metaRegister of Controlled Trials (mRCT) (), ClinicalTrials.gov (and the WHO International Clinical Trials Registry Platform (ICTRP) (). We did not use any date or language restrictions in the electronic searches for trials. We last searched the electronic databases on 21 May 2013. We also searched the reference lists of included studies, other reviews and book chapters on TON to find references to additional trials. The Science Citation Index was used to look for papers that cited the studies included in this review. We did not manually search any journals or conference proceedings. We contacted trial investigators and experts in the field to identify additional published and unpublished studies., Selection criteria, We planned to include only randomised controlled trials (RCTs) of TON in which any steroid regime, either on its own or in combination with surgical optic nerve decompression, was compared to surgery alone or no treatment., Data collection and analysis, Two review authors independently assessed the titles and abstracts identified from the electronic searches., Main results, We included one study that met our selection criteria; a double-masked, placebo-controlled, randomised trial of high dose intravenous steroids in patients with indirect TON diagnosed within seven days of the initial injury. A total of 31 eligible participants were randomised to receive either high dose intravenous steroids (n = 16) or placebo (n = 15), and they were all followed-up for three months. Mean final best corrected visual acuity (BCVA) was 1.78+/-1.23 Logarithm of the Minimum Angle of Resolution (LogMAR) in the placebo group, and 1.11+/-1.14 LogMAR in the steroid group. The mean difference in BCVA between the placebo and steroid groups was 0.67 LogMAR (95% confidence interval -1.54 to 0.20), and this difference was not statistically significant (P = 0.13). At three months follow-up, an improvement in BCVA of 0.40 LogMAR occurred in eight eyes (8/15, 53.3%) in the placebo group, and in 11 eyes (11/16, 68.8%) in the treatment group. This difference was not statistically significant (P = 0.38)., Authors' conclusions, There is a relatively high rate of spontaneous visual recovery in TON and there is no convincing data that steroids provide any additional visual benefit over observation alone. Recent evidence also suggests a possible detrimental effect of steroids in TON and further studies are urgently needed to clarify this important issue. Each case therefore needs to be assessed on an individual basis and proper informed consent is paramount.

5995. Yu-Wai-Man, P. and P. G. Griffiths (2007). "Steroids for traumatic optic neuropathy." Cochrane database of systematic reviews (Online)(4).

Background: Traumatic optic neuropathy (TON) is an important cause of severe visual loss following blunt or penetrating head trauma. Following the initial injury, optic nerve swelling within the optic nerve canal can result in secondary retinal ganglion cell loss. Optic nerve decompression with steroids or surgical interventions or both has therefore been advocated as a means of improving visual prognosis in TON. Objectives: The aim of this review was to examine the effectiveness and safety of using steroids in TON. Search strategy: We searched the Cochrane Central Register of Controlled Trials (CENTRAL) in The Cochrane Library (Issue 1, 2007), MEDLINE (1966 to February 2007), EMBASE (1980 to February 2007), LILACS (March 2007) and NRR (Issue 1, 2007). We also searched the reference lists of included studies, other reviews and book chapters on TON to find references to additional trials. The Science Citation Index was used to look for papers that cited the studies included in this review. We did not manually search any journals or conference proceedings. Trial investigators and experts in the field were contacted to identify additional published

and unpublished studies. There were no date or language restrictions in the electronic searches for trials. Selection criteria: We planned to include only randomised controlled trials (RCTs) of TON in which any steroid regime, either on its own or in combination with surgical optic nerve decompression, was compared to surgery alone or no treatment. Data collection and analysis: Two review authors independently assessed the titles and abstracts identified from the electronic searches. Main results: No studies were found that met our selection criteria and therefore none were included for analysis. Authors' conclusions: There is a relatively high rate of spontaneous visual recovery in TON and no convincing data that steroids provide any additional benefit over observation alone. Recent evidence also suggests a possible detrimental effect of steroids in TON and further studies are urgently needed to clarify this important issue. Based on the current literature, TON cases presenting more than eight hours after the initial injury should not be treated with steroids. The decision to initiate treatment for patients seen within the eight-hour window remains controversial and the supporting evidence is weak. Each case therefore needs to be assessed on an individual basis and proper informed consent is paramount. An adequately powered RCT of steroids in TON poses difficult challenges and is probably not feasible.

5996. Yu-Wai-Man, P. and P. G. Griffiths (2013). "Steroids for traumatic optic neuropathy." The Cochrane database of systematic reviews(6): CD006032.

BACKGROUND: Traumatic optic neuropathy (TON) is an important cause of severe visual loss following blunt or penetrating head trauma. Following the initial injury, optic nerve swelling within the optic nerve canal can result in secondary retinal ganglion cell loss. Optic nerve decompression with steroids or surgical interventions or both has therefore been advocated as a means of improving visual prognosis in TON., OBJECTIVES: The aim of this review was to examine the effectiveness and safety of using steroids in TON., SEARCH METHODS: We searched CENTRAL (which contains the Cochrane Eyes and Vision Group Trials Register) (The Cochrane Library 2013, Issue 4), Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, Ovid MEDLINE Daily, Ovid OLDMEDLINE, (January 1950 to May 2013), EMBASE (January 1980 to May 2013), Latin American and Caribbean Literature on Health Sciences (LILACS) (January 1982 to May 2013), Web of Science Conference Proceedings Citation Index- Science (CPCI-S) (January 1990 to May 2013), the metaRegister of Controlled Trials (mRCT) (www.controlled-trials.com), ClinicalTrials.gov (http://clinicaltrials.gov) and the WHO International Clinical Trials Registry Platform (ICTRP) (www.who.int/ictrp/search/en). We did not use any date or language restrictions in the electronic searches for trials. We last searched the electronic databases on 21 May 2013. We also searched the reference lists of included studies, other reviews and book chapters on TON to find references to additional trials. The Science Citation Index was used to look for papers that cited the studies included in this review. We did not manually search any journals or conference proceedings. We contacted trial investigators and experts in the field to identify additional published and unpublished studies., SELECTION CRITERIA: We planned to include only randomised controlled trials (RCTs) of TON in which any steroid regime, either on its own or in combination with surgical optic nerve decompression, was compared to surgery alone or no treatment., DATA COLLECTION AND ANALYSIS: Two review authors independently assessed the titles and abstracts identified from the electronic searches., MAIN RESULTS: We included one study that met our selection criteria; a double-masked, placebo-controlled, randomised trial of high dose intravenous steroids in patients with indirect TON diagnosed within seven days of the initial injury. A total of 31 eligible participants were randomised to receive either high dose intravenous steroids (n = 16) or placebo (n = 15), and they were all followed-up for three months. Mean final best corrected visual acuity (BCVA) was 1.78+/-1.23 Logarithm of the Minimum Angle of Resolution (LogMAR) in the placebo group, and 1.11+/-1.14 LogMAR in the steroid group. The mean difference in BCVA between the placebo and steroid groups was 0.67 LogMAR (95% confidence interval -1.54 to 0.20), and this difference was not statistically significant (P = 0.13). At three months follow-up, an improvement in BCVA of 0.40 LogMAR occurred in eight eyes (8/15, 53.3%) in the placebo group, and in 11 eyes (11/16, 68.8%) in the treatment group. This difference was not statistically significant (P = 0.38)., AUTHORS' CONCLUSIONS: There is a relatively high rate of spontaneous visual recovery in TON and there is no convincing data that steroids provide any additional visual benefit over observation alone. Recent evidence also suggests a possible detrimental effect of steroids in TON and further studies are urgently needed to clarify this important issue. Each case therefore needs to be assessed on an individual basis and proper informed consent is paramount.

5997. Yu-Wai-Man, P. and P. G. Griffiths (2013). "Surgery for traumatic optic neuropathy." The Cochrane database of systematic reviews **6**: CD005024.

BACKGROUND: Traumatic optic neuropathy (TON) is an important cause of severe visual loss following blunt or penetrating head trauma. Following the initial insult optic nerve swelling within the optic nerve canal or compression by bone fragments are thought to result in secondary retinal ganglion cell loss. Optic nerve decompression with steroids or surgical interventions or both have therefore been advocated to improve visual prognosis in TON., OBJECTIVES: To examine the effects and safety of surgical interventions in the management of TON., SEARCH METHODS: We searched CENTRAL (which contains the Cochrane Eyes and Vision Group Trials Register) (The Cochrane Library 2013, Issue 4), Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, Ovid MEDLINE Daily, Ovid OLDMEDLINE, (January 1950 to May 2013), EMBASE (January 1980 to May 2013), Latin American and Caribbean Literature on Health Sciences (LILACS) (January 1982 to May 2013), the metaRegister of Controlled Trials (mRCT) (www.controlled-trials.com), ClinicalTrials.gov (http://clinicaltrials.gov) and the WHO International Clinical Trials Registry Platform (ICTRP) (www.who.int/ictrp/search/en). We did not use any date or language restrictions in the electronic searches for trials. We last searched the electronic databases on 28 May 2013. We also searched the reference lists of other reviews and book chapters on TON. We also contacted researchers in the field., SELECTION CRITERIA: We planned to include only randomised controlled trials (RCTs) of TON in which any form of surgical intervention either on its own or in combination with steroids was compared to steroids alone or no treatment., DATA COLLECTION AND ANALYSIS: Two authors independently assessed the titles and abstracts identified from the search strategy. No studies were found that met our inclusion criteria and therefore none were included for analysis., MAIN RESULTS: No studies were found that met our inclusion criteria., AUTHORS' CONCLUSIONS: The current body of evidence consists mostly of small, retrospective case series. Given the wide range of surgical interventions used in TON it is very difficult to compare these studies, even qualitatively. However, there is a relatively high rate of spontaneous visual recovery and no evidence that surgical decompression of the optic nerve provides any additional benefit. On the other hand, surgery carries a definite risk of complications such as postoperative cerebrospinal fluid leak and meningitis. The decision to proceed with surgery in TON therefore remains controversial and each case needs to be assessed on its own merits. Although there is an urgent need for an adequately powered, RCT of surgical intervention in TON, this will prove a difficult endeavour.

5998. Zaaroor, M., et al. (2008). "Administration off label of recombinant factor-VIIa (rFVIIa) to patients with blunt or penetrating brain injury without coagulopathy." Acta neurochirurgica **150**(7): 663-668.

Traumatic brain contusions may increase in size over time or may develop at a delay after injury. This may lead to neurological deterioration, long term morbidity or even death. Coagulation disorders after injury can contribute to progression of haemorrhage. Recombinant activated factor VII (rFVIIa) was used in 12 patients with a severe head injury who had no systemic coagulopathy but who were considered to be at risk of progression of their intracranial lesion. Twelve consecutive patients suffering from life-threatening acute head injuries from blunt (3 cases) and penetrating mechanisms were given with rFVIIa, either to prevent the expected development of brain contusion or to assist in bleeding control during surgery. In 11 patients, rFVIIa was given by the attending neurosurgeon. Two of the patients died of their severe penetrating injuries one of whom had severe vasospasm 2 days after administration of rFVIIa. The other 11 patients did not appear to suffer any treatment-related adverse effects. When the drug was given prophylactically to prevent brain resection (6 cases) or to limit the need for widening resection (5 cases), marked control was achieved in seven cases, and a lesser effect was observed in the other 4 cases. We conclude that, in a small and highly individually selected series of patients with severe head injury, the administration of rFVIIa did not lead to adverse effects. Although the majority of patients were considered to be at high risk of progression of their lesions, this occurred in only one. The early use of rFVIIa in head injured patients without systemic coagulopathy may reduce the occurrence of enlargement of contusions, the requirement of further operation, and adverse outcome. Prospective randomised controlled studies are required to investigate this.

5999. Zaba, C., et al. (2009). "[Diagnostic and organizational error in head injuries]." Blad diagnostyczny i organizacyjny w obrazeniach glowy. **59**(3): 259-262.

The study aimed at presenting a case of a diagnostic and organizational error involving lack of detection of foreign body presence in the soft tissues of the head. Head radiograms in two projections clearly demonstrated foreign bodies that resembled in shape flattened bullets, which could not have been missed upon evaluation of the X-rays. On the other hand, description of the radiograms entered by the attending physicians to the patient's medical record indicated an absence of traumatic injuries or foreign bodies. In the opinion of the authors, the case in question involved

a diagnostic error: the doctors failed to detect the presence of foreign bodies in the head. The organizational error involved the failure of radiogram evaluation performed by a radiologist.

6000. Zacharias, G., et al. (2002). "Foreign body in the base of skull." Indian Journal of Otology **8**(1): 37-39.

We would present a case of a young boy who accidently shot himself with an airgun and the pellets were lodged in the infraorbital region and the floor of the middle cranial fossa. With the help of the orbital ultrasound and x-ray lateral view of the skull, surgical exploration and removal of the pellets through an external modified Lynch Howarth approach was done successfully. Emphasis is being, laid on the intraoperative use of C-arm.

6001. Zack, F., et al. (2018). "Unusual head injury by a forklift vehicle." Journal of forensic and legal medicine **56**: 9-11.

A case of an unusual head injury by a forklift vehicle is presented. Copyright © 2018 Elsevier Ltd and Faculty of Forensic and Legal Medicine. All rights reserved.

6002. Zacks, J. M., et al. (2016). "Effects of penetrating traumatic brain injury on event segmentation and memory." Cortex; a journal devoted to the study of the nervous system and behavior **74**: 233-246.

Penetrating traumatic brain injury (pTBI) is associated with deficits in cognitive tasks including comprehension and memory, and also with impairments in tasks of daily living. In naturalistic settings, one important component of cognitive task performance is event segmentation, the ability to parse the ongoing stream of behavior into meaningful units. Event segmentation ability is associated with memory performance and with action control, but is not well assessed by standard neuropsychological assessments or laboratory tasks. Here, we measured event segmentation and memory in a sample of 123 male military veterans aged 59-81 who had suffered a traumatic brain injury as young men, and 34 demographically similar controls. Participants watched movies of everyday activities and segmented them to identify fine-grained or coarse-grained events, and then completed tests of recognition memory for pictures from the movies and of memory for the temporal order of actions in the movies. Lesion location and volume were assessed with computed tomography (CT) imaging. Patients with traumatic brain injury were impaired on event segmentation. Those with larger lesions had larger impairments for fine segmentation and also impairments for both memory measures. Further, the degree of memory impairment was statistically mediated by the degree of event segmentation impairment. There was some evidence that lesions to the ventromedial prefrontal cortex (vmPFC) selectively impaired coarse segmentation; however, lesions outside of a priori regions of interest also were associated with impaired segmentation. One possibility is that the effect of vmPFC damage reflects the role of prefrontal event knowledge representations in ongoing comprehension. These results suggest that assessment of naturalistic event comprehension can be a valuable component of cognitive assessment in cases of traumatic brain injury, and that interventions aimed at event segmentation could be clinically helpful. Copyright © 2015 Elsevier Ltd. All rights reserved.

6003. Zafonte, R., et al. (2012). "Results of the citicoline brain injury treatment (COBRIT) trial." Brain injury **26**(4-5): 389.

Traumatic Brain Injury is a major cause of death and disability.Citicoline has a favorable side-effect profile and several met analysis have suggested a possible benefit in stroke and dementia. COBRIT is an NIH sponsored randomized double blind, placebo controlled, multi center trial of 1213 patients designed to evaluate the effects of 90 days of citicoline on functional outcome. Unique to this study is the enrollment of those with complicated mild, moderate and severe TBI. Participants: 1,213 patients with complicated mild (GCS 13-15 or motor score=6 with abnormal CT scan, moderate (GCS 9-12 and motor score<6,) or severe (GCS<9, -) TBI were randomized within 24 hours of injury. Subjects ranged from 18 to 69 years of age. Those with penetrating injuries or preexisting severe psychiatric or neurological problems were excluded.Interventions: Citicoline 1000mg twice daily (via feeding tube or orally) beginning within 24 hours and extending to 3 months after injury. Main Outcome Measures: Assessments at 1, 3, and 6 months after injury involving several functional and cognitive instruments combined to form a global statistic. Instruments included the Extended Glasgow Outcome Scale, California Verbal Learning Test-2, Controlled Oral Word Association Test, Digit Span subtest and Working Memory Index of the Wechsler Adult Intelligence Test-3, Stroop Test, and Trail Making Test. A databank of neuroimaging and genomic markers was established for enrolled subjects. Secondary outcomes also include, survival, toxicity and rate of recovery. Results: Enrollment has concluded and the dataset will be closed in

October. Final results will be analyzed and reported. Those attending will be able to describe the design and unique aspects of the COBRIT trialThose attending will be able to discuss the results and caveats of the COBRIT trial.

6004. Zafonte, R., et al. (1998). "Superior sagittal sinus thrombosis: a complication of gunshot wound injuries to the brain." NeuroRehabilitation **10**(1): 61-66.

Superior sagittal sinus thrombosis (SSST) is a rare complication of non-penetrating brain injuries. However, this is not an uncommon event in those patients who have suffered a gun shot wound (GSW) to the head. Disturbances in blood flow, lead to development of SST, endothelial injury and clotting abnormalities. Complications include increased weakness, mental status changes, seizures and potential mortality. The purpose of this paper is to illustrate three cases of SSST and the need to be alert for this entity. Our cases involve three young female patients each of whom suffered a GSW to the head, with resultant severe brain injury. In each case, severe disability ensued and imaging studies revealed the presence of the superior sagittal sinus syndrome. The cases demonstrate three different presentations and time courses of this entity, along with the appropriate treatment choices. This condition may appear in the immediate post-injury period, in the post-acute rehabilitation period or even at distant follow-up; therefore, patients with TBI secondary to GSW need to be monitored for an extended time interval for clinical signs which may be indicative of SSST.

6005. Zafonte, R. D., et al. (1997). "Functional outcome after violence related traumatic brain injury." Brain injury **11**(6): 403-407.

Violent injuries have become an increasingly prevalent cause of traumatic brain injury (TBI). These injuries can be classified as either penetrating or non-penetrating in nature. While much of the research on violence has been within a military population, there exists a marked difference between military and civilian injuries. Prior work has reported relatively poor outcomes for those individuals who have suffered penetrating TBIs, but little has been done to assess specific functional outcome parameters in survivors. We examined 25 subjects that had sustained blunt injuries and 25 cases with penetrating injuries as a result of a violent act. Cases were matched by initial Glasgow Coma Scale (GCS), age and educational level. Mean GCS for this study sample was 8.8. The following outcome variables were assessed at rehabilitation admission and discharge and at 1 year post injury: Disability Rating Scale (DRS), Rancho Los Amigos Scale (LCFS), Functional Independence Measure (FIM) (ambulation, expression items), length of stay, and cost of care. Student's t-tests were performed to assess for differences between the two groups. No significant differences were noted between the groups for any of the outcome variables. Although penetrating injuries may have a higher initial mortality, those who survive to come to rehabilitation appear to have similar outcomes to those patients with non-penetrating violence related injuries.

6006. Zafonte, R. D., et al. (1998). "Moving bullet syndrome: a complication of penetrating head injury." Archives of physical medicine and rehabilitation **79**(11): 1469-1472.

Penetrating injuries, by definition, result in retained bullets or fragments. Usually, these fragments are removed surgically during wound debridement. Occasionally, the position of the bullet may preclude removal if it is thought that surgery could exacerbate neurologic damage. Complications from retained fragments are uncommon. One rare complication is the spontaneous migration of the fragment. Two cases of spontaneous migration of retained bullets are presented. In both cases neurologic deterioration was noted and computed tomographic imaging was diagnostic. In one case, this complication delayed transfer from the acute care hospital to rehabilitation. In the other case, the migrating bullet was removed during the inpatient rehabilitation stay. Each person improved neurologically after the migrating bullet fragment was removed. Additionally, functional progress was marked in both persons and symptomatic relief noted. Rehabilitation physicians caring for survivors of penetrating brain injuries need to be aware of this potentially devastating phenomenon.

6007. Zafonte, R. D., et al. (2001). "Severe penetrating head injury: a study of outcomes." Archives of physical medicine and rehabilitation **82**(3): 306-310.

OBJECTIVE: To determine and describe the demographics and functional outcomes of persons who require inpatient rehabilitation for severe penetrating head injury resulting from a gunshot wound to the head., DESIGN: Data were collected prospectively from the time of admission to acute care through discharge from inpatient rehabilitation.,

SETTING: Two sites: an urban, level I, acute care, trauma center and an inpatient rehabilitation hospital with a specialized brain injury unit., PARTICIPANTS: Twenty-seven persons with severe penetrating head injury., MAIN OUTCOME MEASURES: The FIM instrument, the Disability Rating Scale (DRS), and the length of stay (LOS)., RESULTS: Demographic data showed our population to be similar to other groups of persons at high risk for violent injury. Eighty-five percent of the subjects were men with a mean age of 34 years. The majority were African American (93%), reflective of our general patient population. Average acute care LOS was 31 days and average rehabilitation LOS was 44 days. Average FIM gain was 40.2 and, on average, DRS scores improved 7.6 points from rehabilitation admission to discharge. All study participants made enough progress to be discharged to private residences., CONCLUSION: Although the mortality rate is high among patients with penetrating head injury, those who survive to receive inpatient rehabilitation can achieve functional improvement.

6008. Zafonte, R. D., et al. (2001). "Penetrating head injury: a prospective study of outcomes." Neurological research **23**(2-3): 219-226.

The purpose of our study was to describe the outcomes of persons with penetrating brain injury resulting from a gunshot wound to the head. It is a prospective study of 442 patients admitted with gunshot wounds to the head over a 7 year period to our University Trauma Center Emergency Department, an urban trauma center and an inpatient rehabilitation hospital with a specialized brain injury unit. Measures and factors described include initial Glasgow Coma Scale score, Revised Trauma Score, the Disability Rating Scale, Functional Independence Measure, levels of cognitive functioning, patient demographics, length of stay, hospital charges, and discharge disposition. Initially 36% of patients expired in or were dead upon arrival to the Emergency Department; 64% of patients survived to be admitted for inpatient care. Of those admitted, 41% expired within the first 48 h of admission. Fifty-two percent of those admitted had severe injuries, 7% moderate injuries, and 42% had mild head injuries. Sixty-two percent of the survivors were discharged from acute care to private residences. The remaining 38% were discharged to programs providing varying levels of care depending upon their level of functioning and care needs. Patients sustaining severe injuries following gunshot wound(s) to the head have high early mortality. Survivors able to participate in an inpatient rehabilitation program have good potential for functional improvement.

6009. Zaidel, D. W. and N. Edelstyn (1995). "Hemispheric semantics: effects on pictorial organization of patients with unilateral brain damage." The International journal of neuroscience **82**(3-4): 215-221.

Memory for incongruous scenes (violating "knowledge-of-the-world") versus unorganized (jumbled) arrays was tested in war veterans with unilateral penetrating missile wounds of the brain in order to assess hemispheric differences in semantic schemas in long-term memory. Left brain-damaged (LBD) patients were selectively impaired in remembering unorganized scenes compared to right brain-damage (RBD) patients. There was no significant LBD-RBD difference in remembering incongruous scenes. The results confirm the presence of hemispheric asymmetry for semantic schemas in long-term memory, even in pictorial material. However, some features in the organization of semantic schemas are common to both hemispheres and suggests presence of similar knowledge systems. The asymmetry is discussed in terms of intact left hemisphere specialization for assigning meaning to a visual scene when obvious meaning appears to be absent.

6010. Zaitsev, O. S., et al. (2000). "[An epileptic syndrome in patients with the sequelae of gunshot craniocerebral wounds]." Epilepticheskii sindrom u bol'nykh s posledstviiami ognestrel'nykh cherepno-mozgovykh ranenii.(2): 21-25.

To study the specific features of the epileptic syndrome after present-day gunshot cranial wounds (GCW), as well as risk factors of its occurrence, 56 victims were examined prospectively (within at least a year after their admission). The epileptic syndrome developed in 18 (32.1%) patients within 1 to 15 months following GCW; there were prevalent generalized convulsive (in 13 of the 18 patients) and focal (in 12 of the 18 ones) seizures. One type of seizures was noted in 7 patients, two or three ones were in 11. The polymorphism of seizures and a disparity of their psychopathological structure to the side of brain lesion were typical for left-handers. As compared to other patients, epileptics were more commonly found to have: 1) frontoparietal lesion; 2) multiple bony defects of the vault of the skull; 3) enlargement of the lateral ventricle of the brain on CT scans; 4) primary coma for > 2 hours and other depressed consciousness syndromes for > 1 day; 5) signs of left-handedness. The findings suggest that there is a need for studies of the functional asymmetry of the brain to gain a better insight into the problem.

6011. Zajkova, M. V. and E. V. Koroleva (1983). "The long-termed results of the plastic surgery of the eyelids and orbital region defects resulting from wartime firearms wounds." Acta chirurgiae plasticae **25**(3): 127-136.

6012. Zakrison, T. L., et al. (2022). "Review Paper on Penetrating Brain Injury: Ethical Quandaries in the Trauma Bay and Beyond." Annals of surgery.

OBJECTIVE: The aim of this review was to review the ethical and multidisciplinary clinical challenges facing trauma surgeons when resuscitating patients presenting with penetrating brain injury (PBI) and multicavitary trauma., BACKGROUND: While there is a significant gap in the literature on managing PBI in patients presenting with multisystem trauma, recent data demonstrate that resuscitation and prognostic features for such patients remains poorly described, with trauma guidelines out of date in this field., METHODS: We reviewed a combination of recent multidisciplinary evidence-informed guidelines for PBI and coupled this with expert opinion from trauma, neurosurgery, neurocritical care, pediatric and transplant surgery, surgical ethics and importantly our community partners., RESULTS: Traditional prognostic signs utilized in traumatic brain injury may not be applicable to PBI with a multidisciplinary team approach suggested on a case-by-case basis. Even with no role for neurosurgical intervention, neurocritical care, and neurointerventional support may be warranted, in parallel to multicavitary operative intervention. Special considerations should be afforded for pediatric PBI. Ethical considerations center on providing the patient with the best chance of survival. Consideration of organ donation should be considered as part of the continuum of patient, proxy and family-centric support and care. Community input is crucial in guiding decision making or protocol establishment on an institutional level., CONCLUSIONS: Support of the patient after multicavitary PBI can be complex and is best addressed in a multidisciplinary fashion with extensive community involvement.

6013. Zamani, A., et al. (2021). "White matter changes following experimental pediatric traumatic brain injury: an advanced diffusion-weighted imaging investigation." Brain imaging and behavior **15**(6): 2766-2774.

Pediatric traumatic brain injury (pTBI) is a major community health concern. Due to ongoing maturation, injury to the brain at a young age can have devastating consequences in later life. However, how pTBI affects brain development, including white matter maturation, is still poorly understood. Here, we used advanced diffusion weighted imaging (DWI) to assess chronic white matter changes after experimental pTBI. Mice at post-natal day 21 sustained a TBI using the controlled cortical impact model and magnetic resonance imaging (MRI) was performed at 6 months post-injury using a 4.7 T Bruker scanner. Four diffusion shells with 81 directions and b-values of 1000, 3000, 5000, and 7000s/mm2 were acquired and analyzed using MRtrix3 software. Advanced DWI metrics, including fiber density, fiber cross-section and a combined fiber density and cross-section measure, were investigated together with three track-weighted images (TWI): the average pathlength map, mean curvature and the track density image. These advanced metrics were compared to traditional diffusion tensor imaging (DTI) metrics which indicated that TBI injured mice had reduced fractional anisotropy and increased radial diffusivity in the white matter when compared to age-matched sham controls. Consistent with previous findings, fiber density and TWI metrics appeared to be more sensitive to white matter changes than DTI metrics, revealing widespread reductions in fiber density and TWI metrics in pTBI mice compared to sham controls. These results provide additional support for the use of advanced DWI metrics in assessing white matter degeneration following injury and highlight the chronic outcomes that can follow pTBI.

6014. Zamick, P. (1976). "Reconstruction of an orbito-facio-cranial gunshot wound." British journal of plastic surgery **29**(1): 92-96.

6015. Zamora, R., et al. (2016). "Dynamic networks and principal drivers of systemic inflammation in combat casualties." Shock **45**(6): 77.

Objective: After more than a decade of war in Iraq and Afghanistan, we observed an increase in combat-related injury survival, a paradoxical increase in injury severity, and extensive systemic inflammation all mainly due to blasts. In the civilian setting, we have begun to address the complexity of post-traumatic inflammation using computational

modeling. We hypothesized that computational assessment of dynamic networks and principal drivers following assessment of relevant systemic inflammatory mediators could provide insights into the role of inflammation in determining clinical outcomes in combat casualties. Methods: Two hundred combat wounded active-duty service members who sustained high-energy extremity injuries were enrolled prospectively between 2008 and 2012. In addition to injury-specific and demographic data, serum samples from those patients were collected and assayed for 24 inflammatory mediators during each debridement. Segregation of the patients based on the type of injury (Blast injury [Blast, n = 67] vs. Gunshot wound [GSW, n = 9]; magnitude of injury (number of wounds (1 [n = 16]; 2 [n = 13]; 3 [n = 14]; more than 3 [n = 33]), and the presence of traumatic brain injury (TBI [n = 27] vs. no TBI [n = 43]) was performed followed by analysis using multiple datadriven algorithms: Principal Component Analysis (PCA), Dynamic Network Analysis (DyNA), and Dynamic Bayesian Network (DBN). Results: Similar to civilian trauma, DBN defined a consensus network in all patient sub-groups involving MCP-1 and IP-10 upstream of multiple mediators including IL-6. PCA suggested both conserved and different principal drivers in each sub-group. DyNA suggested differences in dynamic networks between GSW and Blast. There was no apparent effect of number of wounds on inflammatory DyNA network complexity, although in general inflammatory complexity was higher with time post-injury in all sub-groups. DyNA complexity was overall greater in TBI vs no-TBI patients. Conclusions: This is the most comprehensive systems analysis to date of systemic inflammation following combat injury. We have defined key dynamic network signatures associated with different injury type, especially with regard to TBI, with core inflammation network features resembling those seen in civilian blunt trauma patients. These approaches may help better diagnose, and ultimately treat, combat casualties.

6016. Zarate-Méndez, A., et al. (2003). "Utility predicts of the Glasgow out come scale in severe head injury." Archivos de Neurociencias **8**(2): 70-74.

Severe head injury (SHI) is the fourth cause of general mortality on population and the first in the working population in our country. This work analyse the outcome of severe head injury don't yet clear. Material and Method: The present it is an observational, longitudinal and ambipective study, which analyzed demographic distribution from a population of 6844 patients with head injury, 364 patients with a SHI, this study was made at the emergency room of a General Hospital of Mexico City, since 1ts January 1997 to 1st January 2002. In a question table we had recorded the Initial Glasgow Coma 3Scale (IGCS) score's, head scan finding, medical or surgical initial treatment, Glasgow outcome scale (GOS) and a 6 month follow up. Results: From a total of 364 patient selected, 46.4% (n=169) were female and 53.6%(n=195) male, the media age was 39.1 (22.2 years and the Initial Glasgow Coma Scale score's was of 6.8 (1.4 points, the head scan finding were brain edema 47.3% (n=172), surgical intracerebral hematoma 29.4% (n=107), non-surgical intracerebral hematoma 12.6% (n=46), skull fracture 29.7% (n=108), epidural hematoma 13.5% (n=49), convexity subdural hematoma 10.2% (n=37), interhemispheric subdural hematoma 2.7% (n=10), intraventricular hemorrhage 12.6% (n=46).The treatments were: medical treatment was given only in 51.1% (n=186), medical and surgical treatment in 48.9% (n=178). Admission causes were the following: robbery 49.8% (n=167), games 10. 4% (n=38), falls 11.0% (n=40), firearm wound 6.3% (n=23), car accidents 26.4% (n=96). The result of the Glasgow outcome scale were: good recovery 49.7% (n=181), moderate disability 15.7% (n=57), severe disability 13.2% (n=48), persistent vegetative state 14.3% (n=52), death 7.1% (n=26). There was an strong correlation between poor prognosis for life in GCS of 4 and 5 points ($p<0.01$), and poor prognosis for function with score of 5 and 6 points ($p<0.01$), and good prognosis in score of 7 points ($p<0.01$), with a confidence interval of 95% (8.445- .9202) and a correlation index r= -0.9613. Conclusion: We recommended a quantitative and exact evaluation due to direct correlation for outcome, perhaps in a near future the developed of a new subscale it is a possibility.

6017. Zavaros, G., et al. (1991). "[A case of maxillofacial gunshot wound complicated by acute hemorrhage from the internal carotid artery and the internal jugular vein]." Maxillofacialis lovesi serules a. carotis interna es v. jugularis interna akut verzeses szovodmenyes esete. **84**(2): 53-56.

A complicated case of a big vein injury associated with a maxillofacial gun-shot injury and its successful treatment are reported on. The course of the vein injury is explained and the significance of team work is emphasized.

6018. Zavotsky, K. E. and L. M. Tamburri (2007). "A case in successful organ donation: emergency department nurses do make a difference." Journal of emergency nursing **33**(3): 235-241.

6019. Zazpe, I., et al. (2006). "[Multiple penetrating brain injuries caused by a nail gun: a case report]." Heridas multiples penetrantes intracraneales causadas por pistola de clavos: caso clinico. **17**(6): 544-549.

Multiple and self-inflicted penetrating brain injuries (PBI) rare. PBI are rare. We report the case of multiple self-inflicted PBI in a 45 year old man caused by a nail gun. He was admitted to after shooting four nails into his head and one into his thorax. We review the literature on the topic and describe how this case was successfully managed in our hospital.

6020. Zdetsis, A. D. (2009). "Rationalizing and functionalizing stannaspherene: Very stable stannaspherene "alloys"." The Journal of chemical physics **131**(22): 224310.

It is illustrated here by ab initio calculations based on density functional theory and other high level methods that the high stability of the icosahedral Sn(12) (2-) dianion known as stannaspherene, reflects stability toward ionization rather than cohesion. This could be also connected with novel fluxional rearrangements and paths of Sn(12) (1-) leading eventually to Sn(12) (2-) involving charge transfer. In view of the very similar structural and electronic properties with the corresponding isovalent borane (B(12)H(12))(2-), it is demonstrated that stannaspherene can be further rationalized and functionalized on the basis of an isolobal analogy between group 14 clusters and isovalent boranes, carboranes, and bisboranes. Such analogy is of the same nature with analogous isolobal and isovalent similarities between silicon, hydrogenated silicon-carbon clusters and deltahedral boranes and carboranes, which the present author, scoptically and synoptically, has described as the "boron connection." It is predicted and verified theoretically: First, that the isovalent Bi(2)Sn(10) and Sb(2)Sn(10) clusters, considered as the microscopic analogs of tin-bismuth alloys, are very stable (more stable than stannaspherene itself) very symmetric and isolobal to Sn(12) (2-); and second, that embedded clusters of the form M@Sn(12) (2-), M@Bi(2)Sn(10), M=Pt,Pd are very stable and highly symmetrical (I(h) and D(5d) respectively) with large highest occupied-lowest unoccupied molecular orbital gaps and very large embedding energies of the order of 5-6 eV. It is furthermore predicted that Pt@Sn(12) (2-) and Pt@Bi(2)Sn(10) can be synthesized in view of their higher stability compared to Pt@Pb(12) (2-) which has already been synthesized. The marginal energy difference of 0.03 eV between the meta- and the para-isomer of Bi(2)Sn(10) indicates a fluxional behavior with respect to Bi-Sn interchange which should be related with the Sn(12) (1-) fluxionality leading eventually to Sn(12) (2-). This rearrangement is also associated with a strange aromatic behavior. The same type of Bi-Sn fluxionality is also encountered in higher energy structures. Due to the "inert pair effect" in tin, the validity of the isolobal analogy is much stronger and fully valid compared to isovalent species based on germanium or silicon, such as Ge(12) (2-), Bi(2)Ge(10), and Ge(10)C(2)H(2) and Si(12) (2-), Bi(2)Si(10), and Si(10)C(2)H(2). The present ideas are in full agreement with available experiments and suggest even further functionalization of stannaspherene, analogous to metaloboranes, metalocarboranes, and stannaboranes with several potential applications.

6021. Zdravkovic, M., et al. (2009). "Three cases of death caused by shots from blank cartridge." The American journal of forensic medicine and pathology **30**(4): 403-406.

The authors describe 3 cases of lethal injuries caused by 7.62 mm blank cartridge shots from military automatic rifle of domestic origin (AK 47, 7.62 mm). In 1 case, the cartridge was fired from a weapon that had been leaned on the head, with subsequent destruction of brain, and in other 2 cases, the weapon had been leaned on the chests, which led to destruction of heart parts. The injuries were caused by the action of striking wave of gunpowder explosion, the air blast type. The cases demonstrate that the gas pressure from the exploding propellant of blank cartridge is powerful enough to penetrate the thoracic wall and the skull.

6022. Zechnich, A. D., et al. (1995). "Applying the trauma triage rule to blunt trauma patients." Academic emergency medicine : official journal of the Society for Academic Emergency Medicine **2**(12): 1043-1052.

OBJECTIVE: To determine the accuracy of the Baxt Trauma Triage Rule (TTR: systolic blood pressure < 85 mm Hg; Glasgow Coma Scale-motor score < 5; or penetrating trauma to head, neck, or trunk) for prediction of major trauma in an independent data set of blunt trauma patients., METHODS: Retrospective evaluation of the TTR in a cohort of patients identified by Oregon Trauma System entry criteria. Accuracy for prediction of "major trauma" victims was measured using resource-based definitions of major trauma. Participants included 626 adult, blunt trauma patients at a level-I trauma center serving a metropolitan center of more than one million people., RESULTS: Of 524 patients with

sufficient registry data to apply the TTR, 95 (18%) and 63 (12%) patients met the criteria for major trauma suggested by Baxt et al. and Emerman et al., respectively. Using the Baxt definition of major trauma, the TTR had a sensitivity of 74% (95% CI: 0.65-0.83) and a specificity of 84% (95% CI: 0.81-0.88). There were 25 significant false-negative results, including 12 patients requiring urgent laparotomy and four patients requiring emergency airway procedures. Using the Emerman definition of major trauma, sensitivity improved modestly to 76% (95% CI: 0.65-0.87) and specificity decreased slightly to 80% (95% CI: 0.77-0.84)., CONCLUSIONS: In this blunt trauma population, the Baxt TTR failed to identify a significant number of severely injured patients. Slight alterations in the definition of "major trauma" can significantly affect the performance characteristics of triage instruments.

6023. Zee, I. and K. A. Duncan (2012). "Regulation of estrogen receptors and CREB-binding protein (CBP) following traumatic brain injury." FASEB Journal **26**.

Following brain injury, estradiol is neuroprotective and promotes neuronal survival and cell proliferation. Transcription of estrogen-mediated targets occurs through the dimerization of the estrogen receptor alpha and beta (ERα, ERβ), to DNA following recruitment of coregulators and heat shock proteins. Coregulators (coactivators and corepressors) remodel chromatin via histone-DNA contact stabilization and allow for the binding of additional transcription factors and RNA polymerase II recruitment. The role of coregulators following traumatic brain injury (TBI), though, is unknown. In this study, we investigated the interaction between ERα, ERβ, and CREB-binding protein (CBP) following neurotrauma. CBP is a nuclear coactivator that interacts with both the amino-terminal domain (AF-1) and carboxy-terminal ligand-binding domain (AF-2) of ER. Adult male and female zebra finches (Taeniopygia guttata) were given a single penetrating injury and collected at 1 and 7 days post injury. Transcriptional activity and expression of ERα, ERβ, and CBP were examined using quantitative polymerase chain reaction and immunohistochemistry. Preliminary data suggest that CBP is upregulated following injury and play a role in estrogen receptor mediated neuroprotection following injury, and suggest a novel role for estrogen receptor coactivators.

6024. Zeiderman, M. R. and L. L. Q. Pu (2020). "Contemporary reconstruction after complex facial trauma." Burns and Trauma **8**.

Complex facial trauma requires complex repair and solutions. This process is challenging for the surgeon who seeks to manage the expectations of the patient and family while achieving the best possible result. Historically, the use of pedicled flaps, and then free tissue transfer, were the primary techniques utilized. Advancements in soft-tissue reconstruction, such as perforator flaps and pre-expanded and prefabricated flaps, allow refinement of the soft-tissue reconstruction process to create the best initial soft-tissue coverage. The advent of contemporary technologies, such as virtual surgical planning, stereolithography and customized implants and plates, facilitates a tailored approach to the patient’s reconstructive needs for precise bony reconstruction. When surgical and technological techniques are combined in complementary multistage reconstructions, better reconstructive and aesthetic outcomes are achievable than ever before. In this review, the authors present a summary of the management of complex facial trauma based on the senior author’s broad experience. Initial management and contemporary reconstructive techniques and technology to provide optimal outcomes are reviewed. A case series of complex facial traumas and their reconstructive process is also presented to demonstrate how complementary staged procedures can yield an optimal result. We believe the reconstructive surgeon managing complex facial trauma should strive to incorporate contemporary technologies and techniques into their armamentarium to provide the best patient care.

6025. Zeiler, F. A. and C. J. Kazina (2016). "Lateral plating of the temporal bone: Hemostatic technique for complex transverse fractures of the petrous temporal bone." Trauma case reports **3**: 12-17.

Background: Transverse petrous temporal bone fractures are commonly associated with significant intracranial trauma. Diastases of these fractures can lead to issues with hemostasis in the setting of venous sinus or petrous internal carotid artery (ICA) injuries. Objective: To describe a rare case of a severe displaced transverse petrous temporal bone fracture with impending intra-operative exsanguination, treated with fracture reduction and lateral plating in order to achieve hemostasis. Methods: We retrospectively reviewed the records of a patient admitted to the neurosurgical department with a hyperacute epidural hematoma (EDH) secondary to a transverse petrous temporal bone fracture with venous sinus and petrous ICA injuries. Results: A 22 year old male was admitted for a severe traumatic brain injury leading to a left displaced transverse petrous temporal bone fracture and a hyperacute EDH. Given the location of the

fractures, injury to the venous sinus (at the area of the transverse-sigmoid junction) and petrous ICA was suspected.Intra-operatively, significant blood loss from both the venous sinus and petrous ICA was encountered. Given the displaced temporal bone fracture, packing of the areas was impaired.We performed a manual reduction of the temporal fracture, followed by lateral plating in order to achieve hemostasis from the petrous ICA and aid with packing of the venous sinus injury. Conclusions: Reduction and lateral plating of displaced transverse petrous temporal bone fractures can aid significantly with intra-operative hemostasis in the extreme case of venous sinus and/or petrous ICA injuries.

6026. Zeilig, G., et al. (2010). "Civilian spinal cord injuries due to terror explosions." Spinal cord **48**(11): 814-818.

STUDY DESIGN: Retrospective analysis of civilians with spinal cord injuries (SCIs) due to terror explosions., OBJECTIVES: To analyze and describe the clinical characteristics and rehabilitation outcomes of civilians with SCI due to explosions admitted for in-patient rehabilitation from 2000-2004., SETTING: SCI rehabilitation service, Tel Hashomer, Israel., METHODS: Retrospective chart review. Civilians with SCI due to terror-related gunshot wounds (GSWs) served as a control group., RESULTS: Eleven civilians with SCI caused by penetrating atypical foreign objects (PAFOs) and eight with GSWs were identified. The male-to-female ratio was approximately 2:1. Foreign objects were present within the spinal canal in seven patients, causing bone injury without canal penetration in three, and one patient had both bone injury and canal penetration. The most common level of injury was thoracic. Seven had complete motor SCI. Three individuals improved in American Spinal Injury Association status: one individual improved from B to C (cervical); one from C to D (thoracic); and the third from D to E (lumbar). Despite the similar acute hospital length of stay and functional independence measure (FIM) scores on admission, the PAFO group had a shorter rehabilitation length of stay with higher FIM scores and higher FIM efficiency at discharge., CONCLUSIONS: Although the pathophysiology of PAFO blast injuries is similar to the high-velocity GSWs or the high-energy military munition injuries, better rehabilitation outcomes were seen, with slightly higher FIM efficiency and efficacy at discharge. This result is likely to be caused by less neurological tissue damage at impact.

6027. Zellem, R. T. (1985). "Wounded by bayonet, ball, and bacteria: medicine and neurosurgery in the American Civil War." Neurosurgery **17**(5): 850-860.

The American Civil War was a holocaust that illustrated the mid-19th century's unpreparedness for the delivery of medical care to the mass casualties due to both wounds and disease. Several major considerations are offered to explain the soldiers' morbidity. Incomplete understanding of pathophysiology and its management is exemplified by the treatment of the battlefield head injury. Accepting these concepts and the extent of the knowledge of the time, that higher mortality did not occur is in part testimony to the admirable care that was rendered and human resilience in an effort to survive.

6028. Zemla, J. and J. Brydak (1977). "[Gunshot wounds of facial cranium in radiological examination (author's transl)]." Polski przeglad radiologii i medycyny nuklearnej **40**(6): 468-470.

6029. Zentner, J., et al. (1991). "A wooden foreign body penetrating the superior orbital fissure." Neurochirurgia **34**(6): 188-190.

The case of a 12-year-old patient with a wooden foreign body which had penetrated the superior orbital fissure is presented. Using a transethmoidal approach, only some splinters lying in the periorbital soft tissue were removed. The patient became febrile, indicating an infectious complication due to a retained foreign body. This was confirmed by CT scan and MRI demonstrating a main splinter in the superior orbital fissure. Total removal of the wood was achieved via a pterional extradural approach. The difficulties of identifying wooden foreign bodies as well as the topographical problems involved with the approach to the superior orbital fissure are discussed.

6030. Zerbo, S., et al. (2021). "Preventable fatal injury during rally race: a multidisciplinary approach." International journal of legal medicine **135**(3): 893-901.

INTRODUCTION: The motor vehicle crash (MVC) constitutes an important challenge for forensic pathology in order to identify the manner and cause of death. Our study focuses on a fatal accident during a rally race corresponding to MVC sub-category., MATERIALS AND METHOD: Postmortem computed tomography (PMCT) was performed before the conventional autopsy. Autoptic and PMCT data were compared. Data collection allowed analyzing biomechanical dynamics of the incident and post-traumatic injuries through qualitative-statistics and solicitation quantitative indices., RESULTS: Photo and circumstantial evidence analysis showed a wrong installation of double shoulder belt system of head and neck support (HANS) collar. PMTC clearly highlighted multiple and bilateral fractures involving roof and base of skull; a displaced fracture of the right acetabulum was also encountered. Autopsy confirmed PMCT data and revealed a brainstem laceration. AIS (Abbreviated Injury Scale) achieved a maximum score in consideration of fatal injuries., DISCUSSION: The injuries analysis resulting from photographic surveys examination, conventional autopsy, and PMCT has led us to confirm a fatal front collision with a tree trunk. Head trauma represents a major injury in the present case. In this case, head injuries, related to whiplash trauma, are a consequence of a double shoulder belt system (HANS collar component) wrong installation., CONCLUSION: MVC and especially high-speed motor racing represent an important death cause. There was, for this reason, a marked development of cars and occupants' safety systems, such as HANS collar. PMCT improves the diagnostic performance of conventional autopsy and increases forensic medical knowledge related to traumatic injuries.

6031. Zerpa, E. (2022). "Traumatic Injuries From an Encounter With a North American Grizzly Bear." Air medical journal **41**(1): 23-24.

Introduction: Estimates of grizzly bear, Ursus arctos horribilis, populations in North America include 25,000 in Canada, 30,000 in Alaska, and 1,918 in the lower-48 states.1,2 Because of population growth due to wildlife conservation and increased outdoor recreation, bear encounters are more common in recent years, contributing to a greater incidence of human injuries.3,4,5 Encounters are classified as “sudden,” “provoked,” or “predatory,” with most human injuries being associated with “sudden” encounters in response to a perceived threat by the bear.3,6,7 These encounters are likely to occur in the remote wilderness leading to a significant delay in treatment and transport to definitive care.8 We report a patient with injuries sustained from a “sudden” grizzly bear encounter who was treated and transported via helicopter emergency medical services (HEMS) to a trauma center. Case Report: After a bear encounter in a remote wilderness area, a 41-year-old male patient sustained a scalp avulsion at the right occiput above the superior nuchal line and an approximately seven-inch laceration running contralaterally from the avulsion to the left occiput. Bleeding at both injury sites was self-limiting and successfully controlled with direct pressure. Substantial bruising and abrasions to the left anterior chest were noted, along with mild abrasions to the right hip and a puncture wound to the right posterior forearm. The patient's eyes also became irritated from capsaicin exposure when a bear spray canister deployed after being punctured during the encounter. The patient was alert and oriented without respiratory distress and displayed no signs of hemodynamic instability throughout the transport. Pain was managed with fentanyl and antibiotic prophylaxis was initiated with cefazolin. The patient was delivered to the trauma team at the receiving facility in a stable condition. Discussion: Bear encounter injury patterns that predominate in the literature are puncture, avulsion, and crush injuries, notably to the head, face, and scalp.3,6 These injuries stem from a combination of the bear's jaws, teeth, and claws. Infection risk is considerable due to aerobic and anaerobic species in the oral cavity as well as contamination with foreign material from the environment.4,9 These injuries require thorough debridement and broad-spectrum antibiotic therapy should be initiated early. Capsaicin spray has been shown to be an effective bear deterrent and its use in this case, though incidental, likely contributed to termination of the encounter.3,10 Conclusion: This case underscores the serious and potentially life-threatening injuries that can result from encounters with grizzly bears and is consistent with previously reported encounters. Patients may present with complex soft-tissue and musculoskeletal injuries and risk of infection, requiring acute trauma resuscitation and early antibiotic treatment. Additional research on bear encounter injuries and their management will help improve the care of these patients by HEMS crews that are likely to care for these patients on “scene” flights or hospital transports to higher levels of trauma care.

6032. Zhang, A. F., et al. (1997). "Mandibular fracture due to gunshot: A case report." Japanese Journal of Plastic and Reconstructive Surgery **40**(3): 299-302.

It is rather uncommon to sustain a gunshot wound in Japan. We report a case of mandibular fracture due to such. A 27-year-old male, who unintentionally shot himself in the mandible by a .38 caliber handgun, was transported to

our critical care center by ambulance and was treated immediately. X-rays upon admission showed the bullet and its fragments lodged in the subcutaneous tissue behind the fractured mandible with the inner table being severely crushed. Since intraoral and neck swelling were tremendous, only the bullet and the hematoma were removed via the wound in the initial operation. A week later, a second operation was performed to repair the bicortical fracture of the mandible. A follow-up four months after discharge confirmed that the postoperative course was uneventful and the operations left no occlusal or maceration problems.

6033. Zhang, B., et al. (2011). "Neurological, functional, and biomechanical characteristics after high-velocity behind armor blunt trauma of the spine." The Journal of trauma **71**(6): 1680-1688.

BACKGROUND: Behind armor blunt trauma (BABT) describes a nonpenetrating injury to the organs of an individual wearing body armor. The aim of this study was to investigate the neurologic and functional changes that occur in the central nervous system after high-velocity BABT of the spine as well as its biomechanical characteristics., METHODS: This study evaluated 28 healthy adult white pigs. Animals were randomly divided into three experimental groups: (1) 15 animals (9 in the exposed group and 6 in the control group) were tested for neurologic changes; (2) 10 animals (5 in the exposed group and 5 in the control group) were used for studies of cognitive function; (3) and 3 animals were used for examination of biomechanics. In the group tested for neurologic changes, 9 anesthetized pigs wearing body armor (including a ceramic plate and polyethylene body armor) on the back were shot on the eighth thoracic vertebrae (T8) with a 5.56-mm rifle bullet (velocity appropriately 910 m/s). As a control, six pigs were shot with blank ammunition. Ultrastructural changes of the spinal cord and brain tissue were observed with light and electron microscopy. Expression levels of myelin basic protein, neuron-specific enolase (NSE), and glial cytoplasmic protein (S-100B) were investigated in the serum and cerebrospinal fluid using enzyme-linked immunosorbent assays. Electroencephalograms (EEGs) were monitored before and 10 minutes after the shot. Pressures in the spine, common carotid artery, and brain were detected. Acceleration of the 10th vertebrae (T10) was tested. Finally, cognitive outcomes between exposed and control groups were compared., RESULTS: Neuronal degeneration and nerve fiber demyelination were seen in the spinal cord. The concentrations of neuron-specific enolase, myelin basic protein, and S-100B were significantly increased in the serum and cerebrospinal fluid 3 hours after trauma ($p < 0.05$). The electroencephalogram was suppressed within 3 to 6 minutes after trauma. The pressure detected in the brain was higher than that detected in the common carotid artery ($p < 0.01$). The trauma resulted in paralysis of two hind limbs and in cognitive dysfunction., CONCLUSION: The results from our animal model indicate that high-velocity BABT of the spine generates high pressure and acceleration in the spine, induces varying degrees of paralysis of hind limbs, and disturbs cerebral function. The neuronal degeneration caused by the pressure wave may be one of the important pathologic events involved in the development of trauma-related complications.

6034. Zhang, D., et al. (2017). "Management of Penetrating Skull Base Injury: A Single Institutional Experience and Review of the Literature." BioMed research international **2017**: 2838167.

BACKGROUND: Penetrating skull base injury (PSBI) is uncommon among head injuries, presenting unique diagnostic and therapeutic challenges. Although many cases of PSBIs have been reported, comprehensive understanding of its initial diagnosis, management, and outcome is still unavailable., MATERIALS AND METHODS: A retrospective review was performed for patients treated in neurosurgical department of Changzheng Hospital for PSBIs. Presurgical three-dimensional (3D) Slicer-assisted reconstructions were conducted for each patient. Then we reviewed previous literature about all the published cases of PSBIs worldwide and discussed their common features., RESULTS: A total of 5 patients suffering PSBIs were identified. Penetrating points as well as the surrounding neurovascular structures were clearly visualized, assisting in the presurgical planning of optimal surgical approach and avoiding unexpected vascular injury. Four patients underwent craniotomy with foreign bodies removed successfully and 1 patient received conservative treatment. All of them presented good outcomes after proper management., CONCLUSION: Careful physical examination and radiological evaluation are essential before operation, and angiography is recommended for those with suspected vascular injuries. 3D modeling with 3D Slicer is practicable and reliable, facilitating the diagnosis and presurgical planning. Treatment decision should be made upon the comprehensive evaluation of patient's clinicoradiological features and characteristics of foreign bodies.

6035. Zhang, J., et al. (2018). "WSD1227: A brain penetrable VEGFR2 inhibitor for the treatment of primary and metastatic brain tumors." Neuro-Oncology **20**: vi30.

The VEGF pathway has emerged as an important target for cancer therapy by blocking the development of malignant neovasculature, thus to reduce oxygen availability to the tumor and decrease its growth. Anti- VEGF agents have been approved for several malignancies, such as GBM, NSCLC, mBC, CRC, OC, etc with satisfactory performance to extracranial lesions, but not in intracranial lesions. Insufficient penetration across BBB is one of factors limiting intracranial anti-tumor activity for those anti- VEGF agents, due to either large molecule weight or being substrate of BBB efflux transporters. The incidence of BM is increasing, and surgery/ radiotherapy are the most common options for the management of BM. Patients with BM have a very poor prognosis and short survival. To address the role of anti-angiogenesis in the treatment of BM, a BBB penetrable, selective and potent VEGFR2 inhibitor WSD1227 is discovered with IC50 against VEGFR1/2/3 at 0.69/0.35/0.41nM versus against other targets such as PDGFRα IC50 22.9nM, PDGFRβ IC50 19.4nM, cKit IC50 383nM, FLT3 IC50 555 nM and CSF1R IC50 1062nM. In-vitro MDCKII transfected cell assays demonstrated WSD1227 is not a substrate of P-gp or BCRP, two main efflux transporters on human BBB. Preclinical CNS PK studies confirmed brain penetration of WSD1227 with Kp,uu,brain close to unity, thus not exacerbating VEGF related systemic toxicities. WSD1227 possessed superior PK profile with sufficient free PK exposure to achieve target engagement in mice. Treatment of tumor bearing mice in GBM, NSCLC, CRC and OC xenograft models with WSD1227 resulted in significant tumor growth inhibition. Predicted human PK properties are very promising to offer sufficient target engagement in clinic. Taken together, our data provide a good rationale for WSD1227 to be developed toward clinic to investigate antiangiogenetic therapies for management of patients with primary or metastatic brain tumors.

6036. Zhang, J., et al. (2019). "Wsd1227: A bbb penetrable vegfr small molecule for the treatment of primary and metastatic brain tumors." Cancer Research **79**(13).

Anti-angiogenesis has been proved to be a good strategy for cancer treatment (such as in GBM, NSCLC, mBC, CRC, OC, etc.) with satisfactory performance to extracranial lesions, but not in intracranial lesions. Insufficient penetration across BBB could be one of factors limiting intracranial activity for those approved anti-VEGF agents. There is a need to develop a BBB penetrable VEGFR inhibitor to clinic to assess the efficacy and safety. Here we report that WSD1227, a novel, selective VEGFR inhibitor, displays potent activity, excellent CNS penetration and preclinical safety and efficacy. The IC of WSD1227 against VEGFR1/2/3 at 0.69/0.35/0.41nM versus against other targets such as PDGFR IC 22.9nM, PDGFR IC 19.4nM, cKit IC 383nM, FLT3 IC 555 nM and CSF1R IC 1062nM. WSD1227 treatment resulted in significant anti-tumor activity in VEGF related extracranial and intracranial mice models, with superior efficacy than bevacizumab. There is no increased risk of CNS hemorrhage in intracranial tumor bearing mice treated with WSD1227. In addition, WSD1227 is predicted to be CNS penetrable with decent PK in human. Taken together, our data provide a good rationale for WSD1227 to be developed toward clinic to investigate anti-angiogenetic therapies for management of patients with primary or metastatic brain tumors.

6037. Zhang, J. L., et al. (2021). "Research progress in the systemic treatment for breast cancer with brain metastasis." Journal of Shanghai Jiaotong University (Medical Science) **41**(5): 671-677.

Breast cancer is one of the most common malignancies in women. Brain metastases occur in approximately 10%-20% of patients with advanced breast cancer. In recent years, with the rapid progress of systemic treatment, extracranial lesions have been effectively controlled and the survival time of patients with breast cancer have been prolonged. Thus the possibility of developing brain metastases has been increased. Moreover, advances in modern diagnostic imaging technology and the routine surveillance of cancer patients have increased the detection rate of brain lesions. Based on the above two aspects, the breast cancer brain metastases (BCBM) have become increasingly common in the clinical settings. Because many chemotherapeutic drugs can not penetrate the blood-brain barrier, the patients with brain metastases have less treatment options, worse survival outcomes and lower quality of life. This article focuses on the recent advances in systemic treatment for BCBM, aiming to provide reference for basic research and clinical practices of this disease.

6038. Zhang, L., et al. (2020). "Abdominal skin inflammation as an initial symptom of a perforating gastric foreign body: A case report." Medicine **99**(40): e22534.

RATIONALE: Foreign bodies are frequently ingested, but only approximately 1% of them cause perforation. Perforations in the lesser curvature of the stomach are exceedingly rare. Here, we report a case of gastric perforation in the lesser curvature caused by a foreign body. The patient presented to the clinic complaining of abdominal skin swelling and reddening with upper abdominal discomfort as the initial symptoms., PATIENT CONCERNS: An 83-year-old female presented with a mass in the middle of the epigastrium for 10 days. Physical examination found an apparent local tenderness and inflammatory mass in the upper abdominal wall. Her body temperature was normal (37.5degreeC) and the white blood cell count was elevated (8.12 x 10/L [reference value 3.5-9.5 x 10/L])., DIAGNOSES: The ultrasound examination of the abdomen revealed a 4 cm strip-like hyperechoic object entangled in the muscles of the abdominal wall. The computed tomography scan revealed a thin strip of bone-like hyperdense shadow. Intraoperative findings showed a sharp fishbone protruding from the lesser curvature of the stomach into the abdominal cavity, part of which remained in the gastric cavity. The postoperative pathological report revealed chronic suppurative inflammation with abscess and sinus canal formation., INTERVENTIONS & OUTCOMES: The patient underwent a gastric foreign body removal with partial gastrectomy. Anti-inflammatory treatment post-surgery rapidly relieved the patient's symptoms of discomfort in the upper abdomen. At the 1-month follow-up, the patient showed no discomfort in the upper abdomen and the inflammatory mass was no longer present., LESSONS: A foreign body had penetrated through the lesser curvature of the stomach, an area with a flat gastric wall, which occurs infrequently. In such cases, computed tomography is the gold standard for diagnosis of foreign bodies in the digestive tract. Ultrasound can also be used as a supplemental diagnostic technique. It is recommended that people who wear dentures should exercise caution while eating, especially when the food contains bones.

6039. Zhang, L., et al. (2017). "Development of crash induced injury criteria for predicting brain injuries using a human head computer model." Journal of neurotrauma **34**(13): A32-A33.

Finite element (FE) modelling can serve as a powerful tool to study biomechanical process of head and brain injuries that is difficult to investigate experimentally on living human subjects. Recently, a detailed human head model, GHBMC (Global Human Body Modelling Consortium) M50, representing a 50th percentile male adult head has been developed, validated and used to develop tissue level injury criteria for TBI. The objective of this study was to validate a detailed GHBMC 5th percentile female (F05) head model which accounts for gender related size, geometrical and anatomical differences in order to properly predict injury risk sustained by this population. A number of Crash Induced Injury (CII) criteria for injuries to the skull, face, and brain of various regions were developed to enable the prediction of the injury risk by the model. Thirty-one sets of published cadaveric head impact experimental data were simulated to validate the biomechanical response of the head model in terms of force-deflection for various facial and cranial bones, intracranial pressure and brain/skull relative displacement for brain of various regions. Then, Forty-four sets of head impact experiments with injurious and non-injurious conditions were simulated to develop CII values for skull fracture, facial fracture, acute subdural hematoma (ASDH), cerebral contusion, and diffuse axonal injury (DAI) at various white matter structures/regions and their associated severities. Model predicted biomechanical responses correlated well to the experimentally measured results with objective ratings greater than 0.7 (1 being perfect). The current GHBMC F05 head model has been rigorously validated against all exiting data head impact experiments and responses. The current model is capable of predicting six different head injury types affecting nine regions/locations with reasonable predictive capability. With further improvement and exercises, the human head model can enable assessment of possible real-world injury scenarios to understand the injury mechanisms and allow for engineering improvements to help prevent potential head/brain injury from traumatic events.

6040. Zhang, L., et al. (2019). "Validation of the strain response in the brain: Recent update of the ghbmc M50 head model." Journal of neurotrauma **36**(13): A38-A39.

A number of finite element (FE) head models have been developed to improve the prediction of traumatic brain injury. Development of brain injury criteria requires a FE head model that has detailed anatomical and material representation of a human head and robust performance under various impact conditions. The GHBMC M50 head model introduced in 2013 has been validated against various cadaveric impact data. The model has the capability of predicting skull and facial fractures, contusion, diffuse axonal injury and acute subdural hematoma. The current study reports the new validation study against available cadaveric brain strain data and optimized brain tissue properties for improving the biofidelity. In cadaver tests, the maximum principal strain (MPS) was calculated from 12-triads formed by a cluster of 7 radio-opaque targets implanted in the brain. All 8 cadaver impact tests were simulate. The head model

predicted node displacements at the NDT locations were used to calculate the model MPS results. The viscoelastic properties of brain tissues were optimized to improve the correlation. The head model predicted MPS in the brain was 0.05-0.10 while as the cadaver MPS was 0.04-0.09. The overall temporal responses of the model MPS matched to most of the cadaveric responses except for a couple of cases where presumably the deviation of the node locations in the FE model compared to the target locations in the cadaver brain could affect the displacement results, subsequently the strain calculation. The average objective CORA rating was 0.52. It exceeded the CORA results reported by another group using a different head model recently. The current GHBMC M50 head model version 5 has been validated against localized strain responses in the brain according to the newly available data obtained from cadaveric head impact tests. The material properties of the viscoelastic brain tissues defined for the model have been optimized to mimic the material behaviors under relevant impact conditions. This enhancement will add the improved capability to the current model in predicting tissue-strain mediated brain injury.

6041. Zhang, M., et al. (2019). "Combined penetrating trauma of the head, neck, chest, abdomen and scrotum caused by falling from a high altitude: A case report and literature review." International emergency nursing **44**: 1-7.

This report describes an extremely rare case of combined penetrating trauma that includes the head, neck, chest, abdomen and scrotum. A 46-year-old male construction worker fell from a 5-metre-high platform, and a rebar that was fixed vertically on the ground penetrated the scrotum into the pelvic and abdominal cavities, passing through the chest, neck, mouth, and nose to the outside of the body through the left side of the head. The rebar penetrated the oral cavity and was palpable on the anterior side of the neck and abdomen. The head, neck, chest and abdominal CT scan and reconstruction showed brain contusion, fractures of the skull and skull base, subarachnoid haemorrhage, palate injury, tongue injury, injury to the right lobe of the thyroid, pleural effusion, pulmonary contusion, cardiac contusion, injury to the left lobe of the lung, neck and mediastinal emphysema, and pneumothorax. Emergency green channels provide a rescue process for urgent and severe cases and smooth and timely diagnostic and treatment process to save patients' lives. The medical staff worked together as a team for the initial evaluation and rescue. Emergency nurses played an important role in communicating, cooperating, managing insulation and pain, and providing psychological counselling, which greatly enhanced the efficiency and quality of the nursing. After the patient underwent surgery, anti-infection treatment, sedatives, analgesics, nutritional therapy, psychological support, and other intensive treatment measures, he recovered well two months after the injury. Follow-up at 5 and 11months after discharge showed good recovery.

6042. Zhang, X., et al. (2012). "Noteworthy orbital-craniocerebral trauma." Neurology **78**(14): 1104.

6043. Zhang, X.-Y. and Y.-M. Yang (2016). "Scissors stab wound to the cervical spinal cord at the craniocervical junction." The spine journal : official journal of the North American Spine Society **16**(6): e403-406.

BACKGROUND CONTEXT: Stab wounds resulting in spinal cord injury of the craniocervical junction are rare. A scissors stab wound to the cervical spinal cord has been reported only once in the literature., PURPOSE: This paper aimed to report a case of Brown-Sequard-plus syndrome in an 8-year-old boy secondary to a scissors stab wound at the craniocervical junction., STUDY DESIGN: Case report and review of the literature., PATIENT SAMPLE: Case report of an 8-year-old boy accidentally stabbed in the neck by scissors, which were thrown as a dart., METHODS: The case study of an 8-year-old boy who was hospitalized because of a scissors stab wound at the craniocervical junction. The patient developed Brown-Sequard-plus syndrome on the left side of the body. Magnetic resonance imaging revealed a laceration of the spinal cord at the craniocervical junction with cerebrospinal fluid leakage. Careful cleansing and interrupted sutures of the wounds were performed to prevent cerebrospinal fluid leakage. Rehabilitation therapy was performed 2 days later., RESULTS: A follow-up examination revealed complete recovery of the neurologic deficit 8 months post-injury., CONCLUSION: Treatment of scissors stab wounds to the cervical spinal cord, whether conservative management or thorough surgical exploration, should be individualized based on history, examination, and imaging. As shown in this case report, despite conservative management, complete recovery, which was unexpected, was attributed to the initial mild laceration of the spinal cord and ipsilateral spinal cord functional compensation.

6044. Zhang, Y. P., et al. (2014). "Traumatic brain injury using mouse models." Translational stroke research **5**(4): 454-471.

The use of mouse models in traumatic brain injury (TBI) has several advantages compared to other animal models including low cost of breeding, easy maintenance, and innovative technology to create genetically modified strains. Studies using knockout and transgenic mice demonstrating functional gain or loss of molecules provide insight into basic mechanisms of TBI. Mouse models provide powerful tools to screen for putative therapeutic targets in TBI. This article reviews currently available mouse models that replicate several clinical features of TBI such as closed head injuries (CHI), penetrating head injuries, and a combination of both. CHI may be caused by direct trauma creating cerebral concussion or contusion. Sudden acceleration-deceleration injuries of the head without direct trauma may also cause intracranial injury by the transmission of shock waves to the brain. Recapitulation of temporary cavities that are induced by high-velocity penetrating objects in the mouse brain are difficult to produce, but slow brain penetration injuries in mice are reviewed. Synergistic damaging effects on the brain following systemic complications are also described. Advantages and disadvantages of CHI mouse models induced by weight drop, fluid percussion, and controlled cortical impact injuries are compared. Differences in the anatomy, biomechanics, and behavioral evaluations between mice and humans are discussed. Although the use of mouse models for TBI research is promising, further development of these techniques is warranted.

6045. Zhao, Y. F., et al. (2011). "A rare case of a glass fragment impacted in the parapharyngeal space associated with neurovascular compromise." International journal of oral and maxillofacial surgery **40**(2): 209-211.

It is rare for foreign bodies to be found in the parapharyngeal space due to the protection of the mandibular ramus and zygomatic bone. The authors describe a rare case of a patient with an unusual penetrating neck injury caused by broken windshield glass in a traffic accident, which lodged in the parapharyngeal space and punctured the internal jugular vein and cranial nerves. 3 weeks later, a delayed exploration was performed on the patient after detailed evaluation of the relationship between the foreign body and the great vessels. The authors removed the glass fragment easily with no active bleeding because it had been surrounded by a fibrous envelope. This experience indicates that increasing the duration of foreign body retention in the parapharyngeal space may be helpful, allowing fibrosis to surround the foreign body, reducing the risk of active bleeding when it is removed.

6046. Zhdanova, D., et al. (2022). "Intranasal Administration of Microvesicles in the Brain of Mice with Induced Model of Alzheimer's Type of Neurodegeneration." BioNanoScience **12**(2): 685-692.

Despite significant advances in modern medicine, effective therapeutics for Alzheimer's disease (AD) treatment have not yet been found. Currently, the use of exosomes and microvesicles derived from mesenchymal stem cells (MSCs) has begun to be considered as one of the promising approaches to the therapy of this disease. Exosomes and microvesicles in comparison with MSCs have significant benefits such as nanometric size, inability to divide, lack of risks of immunogenicity, malignant transformation, and thrombosis. In this work, cytochalasin B–induced membrane vesicles (CIMVs) from MSCs isolated from the adipose tissue were obtained and characterized, and the possibility of their penetration into the brain after intranasal administration was studied. Preliminarily, MSCs were transduced with the recombinant replication-deficient lentivirus containing RFP gene. The study was carried out on a model of sporadic AD in olfactory bulbectomized (OBX) mice, demonstrating behavioral, biochemical, and morphological signs of neurodegenerative process of the Alzheimer's type. Four hours after intranasal administration, presence of vesicles containing the fluorescent protein RFP was observed in the hippocampus and neocortex of OBX mice, i.e., in the brain areas most vulnerable to AD. It is assumed that microvesicles administrated intranasally can act as nanocontainers for target delivery of biologically active compounds present in MSCs, or even drugs to the brain regions affected by neurodegeneration, and are a promising therapeutic agent for the treatment of AD.

6047. Zheng, H. X., et al. (2021). "Iatrogenic pseudoaneurysm of the superficial temporal artery following craniectomy from a scalp hook retractor penetrating injury: Case report and literature review." International journal of surgery case reports **84**.

Background: Iatrogenic pseudoaneurysms in scalp vessels are an uncommon complication after cranial surgery. This paper reports a case of scalp pseudoaneurysm in the superficial temporal artery (STA) after forceful hook retraction

in craniectomy and reviews the relevant literature. Case description: A 36-year-old man with history of hypertension and depression presented to the emergency department with head injury after using sedation medication. Brain computed tomography (CT) revealed a 2-cm-thick right parietal extradural hematoma (EDH) with parietal skull fracture, a bilateral lower frontotemporal contusional intracerebral hematoma, diffuse subarachnoid hemorrhage, and a right frontotemporoparietal subdural hematoma. To prevent EDH progression, frontotemporal emergency craniectomy to remove the EDH was performed. The next day, a firm, painful mass measuring 3 × 3.5 cm2 was discovered over the right frontal scalp. The mass was close to the site where the scalp hook retractor had been placed during surgery. Sonography revealed pulsatile blood flow with an arterial feeder inside the mass. CT angiography revealed a 1 × 1.2 × 0.7 cm3 pseudoaneurysm in the right frontal scalp from the frontal branch of the STA. We scheduled a resection of the pseudoaneurysm and combined cranioplasty on the 29th postoperative day. The pseudoaneurysm was resected en bloc. The patient was discharged with clear consciousness and intact muscle power. Conclusion: The complications of STA pseudoaneurysms caused by scalp hook retractors are rare and not yet well reported. Surgeons must avoid injuring the STA when using a scalp hook retractor.

6048. Zheng, M., et al. (2012). "Nature's pharmacy: Eburnamonine and its derivative as therapeutics against brain tumors." Cancer Research **72**(8).

Brain tumors are highly aggressive and often afflict younger patients. In 2011 there were 22,340 estimated new cases of brain tumors in the United States with 40% arising from metastatic lesions originating mostly from lung, breast, and melanoma tumors. Treatment options remain limited and include steroids, whole brain radiation, and surgery. Because of difficulty penetrating the blood-brain barrier (BBB), chemotherapy is usually not a viable option. Therefore, any intervention that can block the malignant colonization of the brain and/or eliminate symptomatic and occult brain lesions will significantly improve both quality of life and survival. To target brain tumors, a successful therapy has to meet the following criteria: 1) penetrate the BBB; 2) exhibit specificity for the tumor cells; and 3) have minimal off-target effects. Here we investigate a Periwinkle minor derived natural product, eburnamonine (EBN), and its structural analog, 15-methylene-(-)-eburnamonine (15-M-EBN), as therapeutic agents against brain lesions from glioblastoma multiforme and metastatic breast cancer. The two common subtypes of breast tumors giving rise to brain metastases are triple negative and Her2 positive primary tumors. Potency of EBN and 15-M-EBN was evaluated in cultures of chemosensitive (U87) and chemoresistant (SF767) glioma cell lines and 'brain-seeking' metastatic breast cancer cells, MDA-MB-231BR (triple negative) and MDA-MB-231BR-Her2 (Her2 positive). To test whether our compounds can overcome the environment-mediated drug resistance (EM-DR) cells were treated in the context of extracellular matrix (ECM) (hyaluronic acid, collagen IV/laminin, and collagens I and IV/laminin/fibronectin to reconstruct the brain, mammary gland, and bone marrow microenvironments respectively). The off-target toxicity of EBN and 15-M-EBN was tested on normal neuronal cells, bone marrow stromal cells, and non-malignant mammary epithelial cells. To evaluate the capacity of EBN and 15-M-EBN to penetrate the BBB, we utilized a transwell model with hCMEC/D3 cell monolayer mimicking the BBB. We demonstrate that EBN and 15-M-EBN are cytotoxic against glioma and 'brain-seeking' metastatic breast cancer cells (LC50=42 micromolar and 14 micromolar respectively) with minimal toxicity against non-malignant cells. Moreover, 15-M-EBN is active in the tumor environment and predicted to cross the BBB and have anti-cancer stem cell activity. Our preclinical data establish that 15-M-EBN meets the major criteria for a successful therapeutic agent to target brain lesions, both primary and metastatic, due to its ability to: 1) exhibit specificity for the tumor cells; 2) have minimal neurotoxicity and off-target effects; and 3) penetrate the BBB. In vivo studies are in progress to establish a pro-drug strategy to increase water solubility and bioavailability of 15-M-EBN for further clinical development.

6049. Zhong, W., et al. (2017). "Biological and cognitive underpinnings of religious fundamentalism." Neuropsychologia **100**: 18-25.

Beliefs profoundly affect people's lives, but their cognitive and neural pathways are poorly understood. Although previous research has identified the ventromedial prefrontal cortex (vmPFC) as critical to representing religious beliefs, the means by which vmPFC enables religious belief is uncertain. We hypothesized that the vmPFC represents diverse religious beliefs and that a vmPFC lesion would be associated with religious fundamentalism, or the narrowing of religious beliefs. To test this prediction, we assessed religious adherence with a widely-used religious fundamentalism scale in a large sample of 119 patients with penetrating traumatic brain injury (pTBI). If the vmPFC is crucial to modulating diverse personal religious beliefs, we predicted that pTBI patients with lesions to the vmPFC would exhibit greater fundamentalism, and that this would be modulated by cognitive flexibility and trait openness. Instead,

we found that participants with dorsolateral prefrontal cortex (dlPFC) lesions have fundamentalist beliefs similar to patients with vmPFC lesions and that the effect of a dlPFC lesion on fundamentalism was significantly mediated by decreased cognitive flexibility and openness. These findings indicate that cognitive flexibility and openness are necessary for flexible and adaptive religious commitment, and that such diversity of religious thought is dependent on dlPFC functionality.

6050. Zhou, J., et al. (2012). "Hydrogen-rich saline reverses oxidative stress, cognitive impairment, and mortality in rats submitted to sepsis by cecal ligation and puncture." The Journal of surgical research **178**(1): 390-400.

BACKGROUND: Sepsis is associated with high morbidity and mortality, and survivors can present with cognitive dysfunction. The present study was performed to investigate the effects of hydrogen-rich saline (HRS) on oxidative stress in the brain, cognitive dysfunction, and mortality in a rat model of sepsis., METHODS: A rat model of sepsis was induced by cecal ligation and puncture. Physiologic saline or HRS was administered intraperitoneally (2.5 mL/kg or 10 mL/kg) 10 min before the operation. The survival rate was recorded, and cognitive function was tested using the Morris water maze. The reactive oxygen species and malondialdehyde levels and superoxide dismutase activity in the hippocampus were observed to evaluate the oxidative stress levels. The caspase 3 levels were measured to detect apoptosis. The histopathologic changes in the hippocampus were evaluated by hematoxylin-eosin staining and the terminal deoxynucleotidyl transferase-mediated deoxyuridine triphosphate nick end labeling assay., RESULTS: Cecal ligation and puncture resulted in a poor survival rate, evidence of brain injury, and cognitive dysfunction. The hippocampal reactive oxygen species and malondialdehyde levels increased significantly, and superoxide dismutase activity decreased significantly. HRS reversed these changes in a dose-dependent manner., CONCLUSIONS: These findings indicate that HRS could attenuate the consequences of sepsis induced by cecal ligation and puncture in rats, at least in part, by the inhibition of oxidative stress.

6051. Zhou, L., et al. (2014). "Phase 1 trial of icotinib combined with whole-brain radiation therapy for EGFR-mutated non-small cell lung cancer patients with brain metastases: Updated results." International Journal of Radiation Oncology Biology Physics **90**(5): S38-S39.

Purpose/Objective(s): Icotinib has been demonstrated to provide similar efficacy to gefitinib in non-small cell lung cancer (NSCLC) patients. This phase 1 trial (NCT01516983) evaluated the dose-escalation toxicities of icotinib combined with whole brain radiation therapy (WBRT) in EGFRmutated NSCLC patients with brain metastases, and cerebrospinal fluid (CSF) penetration rates of icotinib were assessed in the dose-escalation. Materials/Methods: The cohorts were constructed with a 3 + 3 design, and the dose-escalation schedule of icotinib was set as 125 mg tid, 250 mg tid, 375 mg tid, 500 mg tid, and 625 mg tid. Icotinib was started 7 days before and continued during WBRT (37.5 Gy/15 f/21 d), and maintained until disease progression or intolerable toxicities occurred. The blood and CSF samples were obtained on day 7 (before WBRT), day 29 (after WBRT), and day 57 of therapy. Neurocognitive function (NCF) was assessed with Mini-Mental Status Examination. Results: Fifteen patients were enrolled in this trial. The most frequent treatment-related toxicities were grade 1-2 alopecia (15/15), acne-like rash (14/15) and nausea (11/15). At dose level of 500 mg tid, 3 out of 6 patients experienced dose-limiting toxicity including 1 grade 3 alanine aminotransferase elevation and 2 grade 3 nausea. The mean CSF penetration rate of icotinib was 4.04% (range: 1.23%-9.71%), and there was a good correlation between plasma and CSF concentrations (R2=0.577, P<.001). There were no statistical differences in plasma concentrations, CSF concentrations, and penetration rates of icotinib between day 7, day 29, and day 57. However, CSF concentration (154.09 ng/mL, P<.001) and penetration rate (7.06%, P<.001) of icotinib were much higher at dose of 375 mg tid. After the median follow-up time of 56 weeks, the overall response rate (ORR), disease control rate (DCR) and median progress free survival (PFS) were 80%, 100%, and 46 weeks (95% CI: 43-49 weeks), corresponding to 80%, 100%, and 78 weeks (95% CI: 20.4-123.6 weeks) of intracranial lesions. There were no statistical differences in NCF of patients in low-dose group (125 mg tid-250 mg tid) and high-dose group (375 mg tid-500 mg tid) within 20 weeks of treatment. Moreover, compared to baseline, there were no significant differences in NCF of patients within 20 weeks either. Conclusions: WBRT with concurrent and maintenance icotinib (125 mg tid-375 mg tid) were tolerable and efficient in EGFR-mutated NSCLC patients with brain metastases. WBRT might not increase penetration rate of icotinib, and there were the highest CSF concentration and penetration rate at dose of 375 mg tid. Within 20 weeks of treatment, there was no neurocognitive function deterioration observed in this trail.

6052. Zhou, S., et al. (1998). "Experimental study on firearm wound in maxillofacial region." Chinese medical journal **111**(2): 114-117.

OBJECTIVE: To make clear the range of firearm wound in the maxillofacial region, the optical repair time and the characteristics of accompanied indirect brain damage, and to offer the principle of emergency treatment and the early repair of war wound., METHODS: With the aid of the standard Sweden model, 200 dogs were used in the experiment. Varies tissues around the primary canal were harvested chronologically, in different zone and different tissue, for histopathological examination., RESULTS: The necrotic range of various tissues in the maxillofacial region was less than that in the extremities. In the maxillofacial region, there was a significant temporary cavity following the passing of bullet, which caused indirect brain damages., CONCLUSION: These findings are helpful to the treatment of war wound in the maxillofacial region. Early bone transplantation using microvascular anastomosis in the treatment of gunshot wound in the maxillofacial region is recommendable.

6053. Zhou, S. W., et al. (2019). "Traumatic Globe Luxation With Chiasmal Avulsion." Journal of neuro-ophthalmology : the official journal of the North American Neuro-Ophthalmology Society **39**(1): 41-43.

BACKGROUND: To describe an unusual case of traumatic globe luxation with optic chiasmal avulsion and review the existing literature on this rare condition for further discussion of mechanisms, diagnosis, and management., METHODS: Case report and review of existing case reports and case series identified through literature search., RESULTS: A 28-year-old woman, with no previous medical history, had left globe luxation and optic chiasm avulsion after being stabbed directly into the left orbit with the use of the stiletto high heel of a shoe. Automated visual field testing detected a temporal hemianopia in the unaffected eye despite normal central visual acuity. Chiasmal avulsion was demonstrated by MRI., CONCLUSIONS: This case suggests that perimetry and MRI should always be considered in traumatic globe luxation to localize the site of injury. Temporal hemianopia in the fellow eye indicates a concomitant chiasmal injury.

6054. Zhou, X.-b., et al. (2013). "Vitreoretinal surgery combined with C-arm fluoroscopic-guided removal of intraorbital foreign body following ocular perforating injury." Chinese medical journal **126**(15): 2993-2995.

6055. Zhou, Z., et al. (2011). "Penetrating injury of rectum and vertebral body by steel bar causing cauda equina syndrome." Spine **36**(12): E803-807.

STUDY DESIGN: Case report., OBJECTIVE: To report an extremely rare case of combined penetrating injury to rectum and vertebral body by steel bar causing cauda equina syndrome., SUMMARY OF BACKGROUND DATA: Only one similar case has been reported. Our case was more severe and posed more challenges to physicians., METHODS: A 37-year-old male had a penetrating rectal injury by a long steel bar as a result of a falling accident. He was firstly treated with removal of the bar, debridement, and fecal diversion. Spine and cauda equina injuries were found the second day by lumbar and sacral CT. Because of infection after the first surgery, decompressive surgery was performed 2 months from injury. Cerebrospinal fluid fistula happened on the 12th day after surgery which was managed by debridement, irrigation and drainage, suture of the leaking skin and combined use of antibiotics., RESULTS: When being discharged, he could ambulate independently but could not control his voiding. The colostomy and urinary canal was preserved during the follow-up., CONCLUSION: Steel bar penetrating injury of rectum and vertebral body can be severe and cause complex injuries. Complications included infection and cerebrospinal fluid fistula. Thorough history and physical examination and CT and MRI inspection are very important for timely diagnosis and early treatment of spine and cauda equina injuries. Dural tear should be carefully inspected and repaired during posterior lumbar decompression surgery. Cooperation of experienced surgeons from orthopedics and gastrointestinal department is needed to give the patient the most appropriate treatment and improve prognosis.

6056. Zhu, H.-s., et al. (2004). "[Pathological changes of cat brain tissues after cranial gunshot wound in hot and humid environment]." Di 1 jun yi da xue xue bao = Academic journal of the first medical college of PLA **24**(7): 761-764.

OBJECTIVE: To investigate pathological changes in cat brain tissues after gunshot wound in the head in hot and humid environments., METHODS: Sixteen cats were randomly divided into 4 groups, namely the normal environment (group 1), gunshot in normal environment (group 2), hot and humid environment (group 3), and gunshot wound in hot

and humid environment (group 4) groups. Pathological changes of the cat brain tissues were observed with both optical and electron microscopes., RESULTS: The early-stage changes in group 2 were high-lighted by vasomotor dysfunction, with the coexistence of both vascular spasm and dilation. In group 3, vascular spasm was depressed while hemorrhagic changes increased. On the brain tissue sections in group 4 for optical microscopic observation and ultra-thin sections for electron microscopic examination, the number of viable neural cells was obviously reduced, and edema, degeneration of the organelle occurred; loosening of the capillary tight junction, rupture and bleeding of the blood vessels, as well as degeneration and loosening of the myelin sheath were observed by transmission and scanning electron microscopes, and such changes were more serious than those in group 2., CONCLUSION: The hot and humid environment can significantly affect the pathological changes in the brain tissues of cat with cranial gunshot wound.

6057. Zhu, R., et al. (2018). "Case report: Management of intracranial nail gun injury." Journal of neurotrauma **35**(16): A268-A269.

Background: Penetrating nail gun injury to the head is an extremely rare mechanism of neurotrauma with relatively low mortality and morbidity as compared to other high-velocity trauma modalities. Due to its rare occurrence, other concomitant injuries and clinical judgment of the neurosurgeon direct immediate and ongoing surgical/ medical management. Case Presentation: A 30-year-old man with recently initiated antidepressant therapy walked into the emergency department with his wife after an apparent suicide attempt. The mechanism of injury was firing a single nail from a pneumatic nail gun directed at his left temple, prompting trauma team activation. He denied the loss of consciousness or other trauma. He was hemodynamically stable and neurologically intact, able to recall all events preceding and following the injury, and moving all extremities with a Glasgow coma scale of 15. Secondary survey was significant for left frontal temporal penetrating head wound without an associated contralateral exit wound. Computed tomography of the brain shows a 6.3cm nail in the right frontal region without major intracerebral vessel disruption. The neurosurgery team took the patient to the operating room for left temporal wound washout, debridement of gross contamination, and closure with titanium cranial fixation plate. The foreign body was not accessible on initial surgical intervention; instead left in place to define the anatomy and plan for subsequent removal. The neurosurgery team used thin-slice computed tomography to create 3D reconstructions and stereotactic navigation techniques for subsequent right craniotomy and foreign body removal on hospital day two. The patient tolerated the procedures well and recovered with full neurologic function. Based on the extensive wound contamination on initial presentation, infectious disease recommended broad-spectrum antibiotics for 4 weeks postoperatively. Conclusion Limited guidance exists for management of low velocity penetrating cranial injuries. Care providers should direct attention to determining if there is a need for emergent surgery. Literature review suggests care teams pursue immediate surgical exploration for removal of gross contamination and control of hemorrhage. Foreign body removal is left to the clinical judgment of the neurosurgeon, and initiation of broad-spectrum antibiotic therapy is advisable as soon as possible after recognizing such injuries.

6058. Zhu, R. C., et al. (2021). "Treatment of a self-inflicted intracranial nail gun injury." BMJ case reports **14**(1).

A 30-year-old man walked into the emergency department after a suicide attempt by firing a nail from a pneumatic nail gun directed at his left temple. He was haemodynamically stable and neurologically intact, able to recall all events and moving all extremities with a Glascow Coma Scale of 15. CT of the brain showed a 6.3 cm nail in the right frontal region without major intracerebral vessel disruption. He was taken to the operating room for left temporal wound washout, debridement of gross contamination and closure with titanium cranial fixation plate. The foreign body was not accessible on initial surgical intervention and was left in place to define anatomy and plan for subsequent removal. Thin slice CT images were used to create 3D reconstructions to facilitate stereotactic navigation and foreign body removal via right craniotomy the following day. The patient tolerated the procedures well and recovered with full neurological function.

6059. Zhu, W., et al. (2003). "Different glial reactions to hippocampal stab wounds in young adult and aged rats." The journals of gerontology. Series A, Biological sciences and medical sciences **58**(2): 117-122.

Brain injury induces reactive gliosis. To examine the activation of glial cells after brain injury in young versus aged rats, we used a brain stab-wound model and examined the expression of cells positive for ED1 (ED1(+)) and glial

fibrillary acidic protein (GFAP(+)) in the hippocampus in young-mature (3 months) and aged (25 months) Wistar rats at various times following hippocampal stab injury. ED1(+) cells appeared more frequently in the aged rats than in the young-mature rats under control conditions, whereas the number of GFAP(+) cells was not different between two groups. Following the stab wound, there was an increase in ED1 expression that was delayed but stronger in the aged rats and that persisted longer; the increase of the number of GFAP(+) cells also persisted longer. We conclude that different glial reactivity in the aged brain suggests that aging is associated with increased glial responsiveness that may enhance susceptibility to injury and disease in the brain.

6060. Zhu, X., et al. (2003). "[The clinical study of 1,267 cases therapeutic keratoplasty using donor corneal grafts in long-time preservation with dehydrated]." Yan ke xue bao = Eye science **19**(2): 110-113.

PURPOSE: To evaluate its effects of 1,267 cases therapeutic keratoplasty using donor corneal grafts in long-time preservation with dehydrated., METHODS: The long-time preservated donor corneal grafts came from Xi'an Eye Bank, they accorded with the clinical demands. To select 1,267 cases therapeutic keratoplasty in August 1976 to December 1999, and make an analysis of preoperation and postoperation visual contrast, original focus controlling, donor corneal graft reviviscence., RESULT: The transparent rate of donor corneal grafts after preservation was 94.9%, the clinical cure rate: Infective corneal ulcer/perforation 88.8%, pannus totalis and corneal opacity 98.3%, chemical burn and heat burn (perforation corneoblepharon) 92.1%, keratoconus and acute keratoconus 99.5%, corneal degeneration(marginal shallow of stroma) 99.0%, other cases 88.9%, mean all effective rate 93.5%., CONCLUSION: 1. For the treatment of serious corneal infection, and cases which poorly respond to medicine, therapeutic keratoplasty may be the only effective method. 2.Long-time corneal dehydration in water-free calcium chloride-silica gel may provide clinical supply of corneal materials whenever necessary, so it is an easy and simple, highly applicable method.

6061. Zhuo, L., et al. (2009). "[Application of confocal laser scanning microscope in forensic pathology]." Fa yi xue za zhi **25**(6): 455-458.

Confocal laser scanning microscopy(CLSM) is a new technique for microscopic imaging, which can collect the transverse section image of the samples and produce three-dimensional reconstruction and present higher spatial resolution than the conventional light microscope. As a precision instrument for the microscopic image, it plays an important role in forensic pathology. The article reviews the recent research achievements from sudden cardiac death, bullet wound and nervous system damage, etc, and explores the potential applications of the forensic pathology research and forensic practice.

6062. Zide, M. F. and B. N. Epker (1979). "Short-range shotgun wounds to the face." Journal of oral surgery (American Dental Association : 1965) **37**(5): 319-330.

To efficiently treat short-range shotgun wounds to the face, it is imperative to have a basic understanding of the causes, pathogenesis, probable extent of initial injury, primary treatment principles, and secondary reconstruction problems associated with these injuries. This paper deals with these basic principles in an attempt to provide a guide to the treatment of these devastating injuries.

6063. Zilinskiene, L., et al. (2014). "Emergency radiology: Maxillofacial and skull-base trauma." Trauma (United Kingdom) **16**(4): 243-255.

Craniofacial trauma is common following road-traffic accidents, assaults and falls and may occur in isolation or associated with other body injuries. Due to the complexity of the maxillofacial and skull-base region, initial diagnosis may be inaccurate or delayed, leading to significant morbidity. Multidetector computed tomography is the modality of choice following high-energy blunt or penetrating trauma. It allows accurate evaluation of the fracture patterns and associated soft tissue complications and aids the appropriate medical and surgical treatment. In this article, we review and classify the most common traumatic injuries to the maxillofacial and skull-base region and outline the role of imaging in establishing complications and prognosis.

6064. Zimmer, J., et al. (1979). "Orbital gunshot wound causing a carotid-cavernous fistula and ipsilateral occlusion of the internal carotid artery: case report." Military medicine **144**(7): 485-486.

6065. Zingg, S., et al. (2021). "Evolving critical care air transport team operations within Afghanistan." Critical care medicine **49**(1 SUPPL 1): 676.

INTRODUCTION: The United States Air Force Critical Care Air Transport Teams (CCATTs) are flying more unregulated missions in Afghanistan as a result of military force drawdown. Due to situational urgency, an unregulated mission cannot undergo pre-flight validation by a flight surgeon, and initial patient data is incomplete. This hinders CCATTs' ability to formulate a specific pre-flight care plan. Understanding CCATT mission details within Afghanistan may inform CCATT readiness training and prepare providers for these ill-defined missions. METHODS: Data was obtained from all 2017-2019 patient records stored in the Tactical Critical Care Evacuation Team database, which is maintained by the United States Air Force 59th Medical Wing Pilot Unit. RESULTS: The database records included 148 patients transferred via 70 unregulated and 66 regulated missions. The median age was 30 years, and 97% of the patients were male. In total, 87.6% suffered a traumatic injury, the majority of which were caused by gunshot wounds (39.3%) and improvised explosive devices (35.1%). Common injuries included soft tissue (48.0%), orthopedic (36.5%), and traumatic brain (33.1%) injuries. In-flight interventions involved maintaining mechanical ventilation (57.4%), as well as the administration of blood products (16.2%), paralytics (17.6%), vasopressors (18.2%), and sedation (64.2%). En route complications including hypothermia (2.7%), hypotension (6.1%), and hypoxia (2.7%) were not common. Significant ($p<0.05$) differences between the treatments provided during regulated and unregulated missions were identified for vasopressors (26% vs. 7%), propofol (50% vs. 27%), fentanyl (59% vs. 37%), and mechanical ventilation (68% vs. 44%). The unregulated missions were shorter, lasting an average of 30 min vs. 60 min for regulated flights ($p<0.01$); the unregulated missions included two mass casualty events and one in-flight diversion. CONCLUSIONS: Logistical and clinical treatment differences were identified between unregulated and regulated CCATT missions in Afghanistan. Common treatments provided during the shorter unregulated missions included mechanical ventilation, blood transfusion, and administration of vasopressors, sedation, and analgesia. Although uncommon, CCATTs should be prepared for in-flight diversions and mass casualty events.

6066. Zito, E., et al. (2002). "[Amniotic membrane transplantation in severe corneal epithelial diseases. Preliminary results]." Greffe de membrane amniotique dans les pathologies severes de l'epithelium corneen. **25**(9): 879-888.

PURPOSE: To evaluate amniotic membrane transplantation (AMT) in severe corneal epithelial diseases., METHODS: Amniotic membrane transplantation was performed in 14 eyes of 14 patients from four groups: A, five severe ocular burns; B, four cases of cicatricial keratoconjunctivitis; C, three persistent epithelial defects after penetrating keratoplasty; D, two cases of pseudophakic bullous keratopathy. Five patients underwent AMT alone; two patients underwent AMT combined with limbal transplantation; the other three patients had limbal transplantation performed before AMT. Eight patients required combined penetrating keratoplasty. Patients with corneal stable reepithelialization, no corneal neovascularization, and no recurrence of the initial pathology were considered successful., RESULTS: The mean follow-up was 7+/-3 months. All but three patients underwent corneal reepithelialization within 6 weeks of AMT, with a mean healing time of 31+/-23 days. The success rate was 75% at 6 months (Kaplan-Meier method). Three of four procedures in group B failed. In eight patients, visual acuity improved, in one it worsened, and in the last five patients it remained unchanged. Visual acuity increased by an average of 7+/-9 lines., CONCLUSION: AMT is a useful technique for ocular surface reconstruction, especially in association with limbal transplantation. It could also improve the prognosis of penetrating keratoplasty in patients with severe corneal conditions.

6067. Zivkovic, V., et al. (2019). "Suicidal head impalement with a hydraulic press machine - occupation-related suicide in a psychiatric patient." Forensic science, medicine, and pathology **15**(1): 143-146.

A 63-year-old mechanic, diagnosed with schizophrenia, was found next to a hydraulic press used for removing car wheel bearings. He was in a sitting position, bent towards the machine, with his head placed between the piston and the pressing plate. His flexed left arm was resting on the lever beneath the machine pedestal, and on the right side there was a power switch that was still in the "on" position. His right arm was beside his body, but away from the machine. On the pressing plate, beneath the decedents head, was a piece of bloody cloth. Blood spatters were present on the left

hand and left trouser leg. At autopsy there was a gaping laceration in the right temporal area extending to the right ear lobe, where a piece of helix was missing. This missing tissue was found on the inner surface of the left temporal bone. The temporal lobes and brain-stem were destroyed along the wound trajectory but there were no brain contusions present. There was blood aspiration in both lungs, but all other findings were unremarkable. Death was attributed to the fatal head injury that resulted from the low-velocity penetration of the hydraulic press piston. While the cause of death was self-evident and undoubted, the manner of death required medico-legal investigation. The protective cloth that had been placed on the pressing plate, a medical history of schizophrenia, and the absence of any defensive injuries, all led to the conclusion that this was a case of a rather unusual suicide, which could be regarded as related to the decedents occupation.

6068. Zoltewicz, J. S., et al. (2013). "Biomarkers track damage after graded injury severity in a rat model of penetrating brain injury." Journal of neurotrauma **30**(13): 1161-1169.

The goal of this project was to determine whether biochemical markers of brain damage can be used to diagnose and assess the severity of injury in a rat model of penetrating ballistic-like brain injury (PBBI). To determine the relationship between injury magnitude and biomarker levels, rats underwent three discrete PBBI severity levels defined by the magnitude of the ballistic component of the injury, calibrated to equal 5%, 10%, or 12.5% of total rat brain volume. Cortex, cerebrospinal fluid (CSF), and blood were collected at multiple time points. Levels of three biomarkers (alphaII-spectrin breakdown product [SBDP150], glial fibrillary acidic protein [GFAP], and ubiquitin C-terminal hydrolase-L1 [UCH-L1]), were measured using quantitative immunoblotting and/or enzyme-linked immunosorbent assays. In injured cortex, SBDP150 and GFAP levels were increased significantly over controls. Cortical SBDP150 was elevated at 1 day but not 7 days, and GFAP at 7 days but not 1 day. At their respective time points, mean levels of SBDP150 and GFAP biomarkers in the cortex rose stepwise as injury magnitude increased. In the CSF, increasing severity of PBBI was associated with increasing concentrations of both neuronal and glial biomarkers acutely at 1 day after injury, but no trends were observed at 7 days. In plasma, SBDP150 was elevated at 5 min after 10% PBBI and at 6 h after 12.5% PBBI. UCH-L1 levels in plasma were elevated acutely at 5 min post-injury reflecting injury severity and rapidly decreased within 2 h. Overall, our results support the conclusion that biomarkers are effective indicators of brain damage after PBBI and may also aid in the assessment of injury magnitude.

6069. Zoltewicz, S., et al. (2011). "Biomarkers track injury severity in a rat model of penetrating ballistic brain injury." Journal of neurotrauma **28**(6): A39.

The goal of this project is to determine whether the severity of brain injuries resulting from bullets, shrapnel, or other penetrating objects can be tracked or diagnosed by measuring biomarker levels. We have used a rat model of penetrating ballistic-like brain injury (PBBI) for these studies. To assess the relationship between injury magnitude and biomarker levels, rats were subjected to one of three discreet PBBI severity levels operationally defined by the magnitude of the ballistic component of the injury (calibrated to equal 5%, 10%, or 12.5% of total rat brain volume; n = 5 per group). Brain tissue and cerebrospinal fluid (CSF) were collected from these rats at two time points (1 and 7 days post injury), and levels of two biomarkers (SBDP150 and GFAP; markers of axonal injury and gliosis, respectively) were measured using quantitative immunoblotting and ELISAs. We found that SBDP150 levels were significantly elevated 1 day after PBBI in the brain tissue compared to controls, but not at 7 days. SBDP150 levels in brain at 1 day showed clear stepwise increases as injury severity increased across all three injury magnitudes, although differences did not reach statistical significance at n = 5. In contrast, GFAP levels were observed to increase significantly over controls after 7 days in brain, but not at 1 day. However the increase in GFAP in brain 7 days post-PBBI was not correlated with injury magnitude. Regarding CSF, levels of both SBDP150 and GFAP were significantly elevated 1 day after injury compared to controls, and the level of GFAP correlated to the magnitude of brain injury. Therefore we have two promising biomarkers for early detection of PBBI which show promising changes associated with injury magnitude. Further studies are warranted to increase sample sizes.

6070. Zorman, D., et al. (1990). "Treatment of mandibular fractures by external fixation." Oral surgery, oral medicine, and oral pathology **69**(1): 15-19.

This series encompasses thirteen fractures of the mandible treated by external fixation. The indications were five fractures of edentulous mandible, four fractures through missile wounding, and four fractures without soft tissue

lesion treated in Africa. Twelve patients were found to show good or excellent results. In our indications, this method is a successful approach to the treatment of the fractured jaw.

6071. Zugibe, F. T. and J. T. Costello (1993). "The Iceman murder: one of a series of contract murders." Journal of forensic sciences **38**(6): 1404-1408.

A body with a gunshot wound to the head was discovered in a wooded area in mid September 1983 wrapped with about 20 consecutive layers of plastic garbage bags and rope. Examination of the body revealed a bullet hole in the occipital-parietal region and a peculiar decomposition of the body. Following a forensic reconstruction of our autopsy findings, microscopic studies and other ancillary factors, we concluded that the body had been frozen for about 2 and one-quarter years prior to its being dumped along a mountain road here in Rockland County. The means by which we concluded that the victim had been frozen for about 2 and one-quarter years and other important aspects of this case are fully discussed.

6072. Zuravleff, J. J. and M. H. Johnson (1997). "An ophthalmic surgeon's view of orbital imaging techniques." Seminars in ultrasound, CT, and MR **18**(6): 395-402.

Selection of an orbital imaging technique requires a thorough understanding of pertinent anatomy applied to relevant clinical history and detailed ophthalmic examination. The clinical finding should direct the clinician to the imaging study that provides maximum information and narrows diagnostic considerations for the individual patient. Clinical examples are provided to illustrate the rationale in ordering magnetic resonance images, computed tomography, ocular ultrasound, and color Doppler arteriography of orbital processes.

6073. Zwart, I., et al. (2009). "Umbilical cord blood mesenchymal stromal cells are neuroprotective and promote regeneration in a rat optic tract model." Experimental neurology **216**(2): 439-448.

Exploitation of the ability of stem cells to protect damaged neuronal tissue may be a more viable strategy than cell replacement for repair of the central nervous system (CNS). In this study we assessed the capacity of human umbilical cord blood (hUCB)-derived mesenchymal stromal cells (MSCs) to protect and promote regeneration of axotomised neurons within the rat optic system. The optic tract of neonatal rats was transected at the level of the lateral geniculate nucleus, and MSCs were introduced into the lesion site. MSCs survived well up to 2 weeks after grafting, and did not migrate significantly or differentiate. In the presence of MSC grafts, host axonal processes were found to be present in the lesion site, and there was stimulation of an endogenous neural precursor population. Four weeks after grafting, retrograde tracer experiments demonstrated that grafted MSCs, as well as cells of a human fibroblast line, exerted a neuroprotective effect, rescuing a significant percentage of axotomised retinal ganglion cells (RGCs). Further experiments with retrograde and anterograde tracers strongly indicated that MSCs could also promote re-growth of axotomised RGCs to their target, the superior colliculus (SC). Further analysis showed that hUCB-derived MSCs secreted several immunomodulatory and neurotrophic factors in vitro, including TGFbeta1, CNTF, NT-3 and BDNF, which are likely to play a role in neuroprotection. Our data indicate that hUCB-derived MSCs may be an easily accessible, widely available source of cells that can contribute towards neural repair through rescue and regeneration of injured neurons.

6074. Zweckberger, K., et al. (2011). "Transorbital penetrating skull-base injuries: two severe cases with wooden branches and review of the literature." Central European neurosurgery **72**(4): 201-205.

6075. Zwetyenga, N., et al. (2012). "Reconstruction of large mandibular and surrounding soft-tissue defects using distraction with bone transport." International journal of oral and maxillofacial surgery **41**(10): 1215-1222.

Reconstruction of large bone and soft-tissue defects of the inferior third of the face is possible using various surgical techniques. Patients who require these procedures need to be in good general health, may have sequelae linked to donor sites, and require several interventions to achieve good aesthetic and functional results. The aim of this study was to report outcomes in patients with large mandibular and soft-tissue defects treated using osteogenic distraction with bone transport. Between 2001 and 2008, 14 patients had distraction with bone transport. Most patients were men

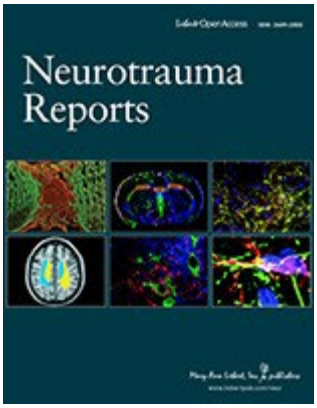
(92.1%). The mean age was 43.1 years. The average mandibular bone reconstruction was 13.6 cm. The mean duration of distraction was 2.3 months. No infections occurred, and in all cases reconstruction of soft tissues was obtained. Two patients had non-union and underwent reconstruction using an iliac bone graft. Patients with sufficient bone height (57.1%) had dental implants. 44 implants were inserted, two of which were lost. 36 implants were activated. Six patients had satisfactory oral rehabilitation with implant-supported prostheses. Osteogenic distraction with bone transport allows total or partial restoration of oral function, provides an acceptable appearance, and enables patients to resume a reasonable quality of life.

6076. Zyck, S., et al. (2016). "Treatment of Penetrating Nonmissile Traumatic Brain Injury. Case Series and Review of the Literature." World neurosurgery **91**: 297-307.

INTRODUCTION: Penetrating traumatic brain injuries (TBIs), with the exception of gunshot wounds, are relatively rare occurrences and affect all ages. Clinical presentation varies depending on the mechanism of the injury. Prompt surgical treatment is often indicated and is influenced by patient clinical examination, anatomic trajectory, and the penetrating object's size, shape, and velocity., METHODS: We present 3 cases of penetrating TBI. Their similarities and differences affecting operative and medical management are compared. We relate our experience with management of penetrating intracranial foreign bodies in general and discuss the relevant literature., RESULTS: Our first case was a 12-year-old male who presented with a self-inflicted transfacial transcranial injury by a crossbow. The arrow passed through the left sphenoid and cavernous sinus and exited through the parietal calvarium. Our second case was a 37-year-old man with a transoral intracranial stab wound by a knife. In our third case, we present a 46-year-old male who accidentally fired a nail gun into his right ear. The nail traversed the posterior wall of the external auditory canal into the posterior fossa, ending in the cerebellar vermis. Each case was treated with craniotomy and foreign body removal. All resulted in good outcomes after surgical treatment., CONCLUSION: Surgery in penetrating TBI is the treatment of choice. Our cases demonstrate how certain principles applied to individual patient scenarios may optimize clinical results. Severity of the injury and operative approach are among the most important considerations to achieve the best patient outcomes.

6077. Zyskowski, M., et al. (2017). "[Penetrating head injurys]." Kopf von Rosenstutze aufgespiest. **159**(12): 39-41.

ANNEX F. Publication, NeuroReports, 10/4/2022



Rationale and Methods for Updated Guidelines for the Management of Penetrating Traumatic Brain Injury

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Rationale and Methods for Updated Guidelines for the Management of Penetrating Traumatic Brain Injury

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Open Abstract
Penetrating traumatic brain injury (pTBI) affects civilian and military populations resulting in significant morbidity, mortality, and healthcare costs. No up-to-date and evidence-based guidelines exist to assist modern medical and surgical management of these complex injuries. A preliminary literature search revealed a need for updated guidelines, supported by the Brain Trauma Foundation. Methodologists experienced in TBI guidelines were recruited to support project development alongside two cochairs and a diverse steering committee. An expert multi-disciplinary workgroup was established and vetted to inform key clinical questions, to perform an evidence review and the development of recommendations relevant to pTBI. The methodological approach for the project was finalized. The development of up-to-date evidence- and consensus-based clinical care guidelines and algorithms for pTBI will provide critical guidance to care providers in the pre-hospital and emergent, medical, and surgical settings.

Keywords: blast injury; guidelines; head trauma; penetrating brain injury; traumatic brain injury

Introduction
Penetrating (pTBI) traumatic brain injury (TBI) is a catastrophic primary wounding mechanism encountered in military and civilian settings and is characterized by the violation of the skull and brain by a foreign body. For those who survive, the constellation of cerebral injuries in the setting of either pTBI or blast-related pTBI creates complex management scenarios for pre-hospital and in-hospital healthcare providers. Recovery and rehabilitation are often protracted and complicated for these patients. Civilian pTBI accounts for an estimated 20,000 deaths in the United States each year with mortality in up to 90% of victims.[1,2] The high lethality of civilian pTBI likely relates to the predominance of missile injury, including gunshot wounds, the absence of protective gear, and the violent circumstances that frequently surround the injury (i.e., attempted suicide, homicide, and other close-range mechanisms). From the military perspective, pTBI was prevalent in recent conflicts in Iraq and Afghanistan and most often results from a blast mechanism. pTBI outcomes in these modern conflicts are better than in past reports,3–10 most likely because of more aggressive clinical care.[6] Before the conflicts in Iraq and Afghanistan, management in those who survived to reach care included limited surgical debridement and wound closure.[11] In contrast, the new military model includes early cranial decompression and prevention of cerebrospinal fluid leak with skull base repair, causes of secondary brain injury are aggressively sought and mitigated (i.e., cerebrovascular injury), and a multidisciplinary approach to cranial reconstruction is used.mpTBI clinical practice guidelines were first published in 2001 by an independent group.12 Topics addressed included antibiotic prophylaxis, antiseizure prophylaxis, management of cerebrospinal fluid leaks, surgical management, vascular complications, intracranial pressure monitoring, and prognosis. The 2001 guideline has not, however, been updated to reflect modern militaryexperiences nor incorporate newer evidence- and consensus-based practices. There are no known published pTBI treatment algorithms informing patientmanagement, despite the tremendous popularity of blunt TBI management algorithms13–15 and despite important changes to medical and surgical care over the past two decades. In response, the Brain Trauma Foundation (BTF) in collaboration with military and civilian TBI experts in the field, and with funding from the American Department of Defense (US ArmyMedical Research and Acquisition Command, BA200139: The Development of Best Practice Penetrating TBI Guidelines for Military and Civilian Patients) will generate an updated, evidence- and consensus-based pTBI clinicalpractice guideline and new care algorithms. The BTF has published numerous clinical practice guidelines for TBI care over the past quarter century[16,17] and is undertaking this update with permission from the original pTBI guideline authors.

Methods
Key definitions
For this work, pTBI will be defined as a head injury with violation of, at minimum, the skull and likely dura and brain by a foreign body (Table 1). Linear non-displaced skull fractures alone, which result from a relevant wounding mechanism, will not be included. pTBI encompasses penetrating, tangential, and perforating injuries. pTBI has previously been subclassified as high-velocity missile, low-velocity missile, and non-missile injuries. However, because of the practical difficulty distinguishing high- and low-velocity missile injuries clinically, we will instead subclassify pTBI mechanistically as: 1) missile injuries (e.g., gunshot wounds); 2) blast fragment injuries (i.e., type II blast injury—blast overpressure plus fragment injury); and 3) low-velocity injuries (e.g., knives). Our working group ratified the latter classification scheme with a blinded consensus vote. Development of an expert workgroup BTF leadership, alongside civilian and military clinicians with topical expertise in pTBI, comprise the pTBI Expert Workgroup. The workgroup and its efforts are led by two co-chairs with guidance and governance provided by a core multi-disciplinary steering committee. Workgroup members were selected for diversity among disciplinary expertise relevant to the management of TBI,

scientific expertise, and demographic and geographical, representation. Represented medical disciplines include neurosurgery, plastic surgery, neurology, general/trauma surgery, orthopedic surgery, ENT (ear, nose, and throat) surgery as well as emergency medicine, physical medicine, pediatrics, pre-hospital care, and rehabilitation. A military medic and a patient (service member recovered from a pTBI) are included. Sex and ethnic diversity was also specifically sought.

Systematic review

Topic identification and refinement. Workgroup members were divided into three areas of clinical focus: pre-hospital and emergent management; surgical management; and medical management, led by A.L.B., B.A., and J.G., respectively. Each workgroup will update the topics included in the 2001 guidelines and will develop clinically relevant key questions as well as inclusion and exclusioncriteria using the Population, Interventions, Comparators, Outcomes, Timing, Setting and Study design (PICOTS) framework. The present effort will endeavor to only inform aspects of care in which pTBI care would be distinct from, orotherwise insufficiently informed by, the ‘‘umbrella’’ recommendations found in the fourth edition of the Severe Traumatic Brain Injury Guidelines, which largely focus on blunt head injury. Generated recommendations aim to be relevant to all patients with pTBI.However, evidence supporting distinct recommendations for key patient subgroups will be reported and may include differentiation by wounding mechanism (missile, blast fragment, or lowvelocity injuries), military versus civilian victims, and adult versus pediatric victims.

Literature search. We will search Ovid MEDLINE, EMBASE, and Cochrane CENTRAL without date limits. The search strategy will be developed and executed by a specialized medical research librarian with experience in systematic reviews with peer review by a second librarian. Study selection. Review of abstracts and full-text articles will be informed by pre-specified PICOTS and corresponding inclusion and exclusion criteria. All abstracts identified by the literature search will be assessed by one reviewer and excluded abstracts confirmed by a second reviewer. Independent, dual review of the full text of any potentially relevant article identified at abstract level will be conducted. Disagreements will be resolved by consensus or with the addition of a third reviewer. Included and excluded articles, and reasons for exclusion, at the full-text level will be provided to the Guideline Panel for review and will be included as an appendix in the full Evidence report. Studies meeting inclusion criteria will be in children, adolescents, and/or adults with traumatic injuries that violate the skull and that provide evidence for a key question. Included outcomes of intervention studies consist of mortality, morbidity, function, and selected intermediate outcomes (Table 2). We will not exclude studies based on sample size, location of study, or baseline Glasgow Coma Scale score. Data abstraction and risk ofbias assessment. We will abstract data from all studies that include population characteristics (e.g., age, sex, wounding mechanism, and military/civilian status), intervention and comparator characteristics (e.g., methods of resuscitation, prophylactic drug and dose, and type of surgery performed),

Table 1. Key Definitions

_ Penetrating traumatic brain injury (pTBI): a head injury with violation of, at minimum, the skull and likely dura and brain by a foreign body. Linear non-displaced skull fractures alone will NOT be included.

_ pTBI encompasses penetrating, tangential, and perforating injuries as follows:

- Penetrating: a foreign object penetrates skull and dura and remains within the skull. This wounding mechanism lacks an exit wound.
- Tangential: a foreign object glances off the skull, which often drives skull fracture fragments into the brain.
- Perforating: a ‘‘through-and through’’ injury, characterized by entry and exit wounds.

Of these three, perforating brain injuries are associated with a worse outcome.

_ pTBI will be subclassified as:

- Missile injuries (such as gunshot wounds)
- Blast fragment injuries (such as type II blast injury—blast overpressure plus fragment injury)
- Low-velocity injuries (such as knives) numbers enrolled and analyzed, relevant outcomes (i.e., mortality, neurological function, selected morbidities, and cost), and funding source.

All included studies will be assessed for risk of bias using criteria specific for the type of study design. Randomized trials will be assessed for risk of bias based on the randomization process, method for allocation concealment, similarity of baseline characteristics, blinding, missing data overall and differences between groups, whether intent-to-treat analysis was used, and possible reporting bias. Assessment of non-randomized studies with a comparison group will include selection of participants, whether differences in prognostic factors between groups were present, missing data, prespecification of outcomes, whether ascertainment of outcomes was unbiased, and adjustment for potential confounding.

Assessment of single-group trials will include selection of participants, pre-specification of outcomes, whether ascertainment of outcomes was unbiased, and assessment of missing data. Case series and case reports are studies with high risk of bias and will not be individually assessed. Study risk of bias will be assessed by two independent reviewers. Data synthesis and quality of the body of evidence. When there is more than one study of an intervention, data will be synthesized quantitatively if a meta-analysis is appropriate (i.e., when studies are clinically homogeneous enough to provide meaningful combined estimates). When statistical heterogeneity is present in a pooled analysis, we will explore the reasons for this using stratified analysis and sensitivity analysis, as appropriate. We will also consider the potential effects of various participant subgroups (e.g., based on demographic characteristics, severity of injury, and injury mechanism) on intervention effects. When data cannot be pooled, we will provide a qualitative summary and analysis of findings.

Table 2. Inclusion/Exclusion Criteria for Source Literature

PICOTS Inclusion / Exclusion Populations
All ages
Penetrating brain injury including blast, tangential, and perforating injury from missiles, blast fragments, or low velocity
_ All baseline GCS levels
_ Mixed types of brain injury with at least 85% penetrating if results not reported individually
_ Non-human studies
_ Injury limited to linear, non-displaced skull fracture or isolated face/neck injuries
_ Mixed types of brain injury and results not presented by injury type or <85% penetrating injury
Interventions Pre-hospital, prolonged field care, transport, ED, and trauma center evaluation:
_ Initial resuscitation and prevention/mitigation of secondary injury
_ On-scene wound management
_ Cervical spine immobilization
Surgical management:
_ Prevention and treatment of cerebrospinal fluid leaks
_ Vascular injuries
_ Foreign body removal and prerequisites
_ Cranial decompression
Medical management:
_ Intracranial pressure monitoring (if distinct from fourth edition)
_ Intracranial pressure treatment (hyperosmolar therapy, lumbar drainage,
CPP management including BP thresholds, ventilation therapies)
_ Seizure prophylaxis
_ Antibiotic prophylaxis
_ DVT prophylaxis
_ Chemoprophylaxis for stroke prevention
Comparators Placebo, no intervention, active control, waitlist control, delayed treatment,
head-to-head studies
None
Outcomes _ Mortality
_ Neurological function
_ Selected morbidity
_ Cost
_ Satisfaction
_ Quality of life
_ Sleep
Timing Outcomes up to 1 year post-injury Outcomes >1 year post-injury
Setting Pre-hospital, trauma center, medical, surgical setting in all countries.
Battlefield and mass causality as well as civilian
_ Rehabilitation setting
Study designs _ All experimental study designs, observational studies including case series and case report
_ Epidemiological studies for salvageability
_ Current, well-conducted systematic reviews (may also use systematic
reviews to identify studies searches may have missed)
_ Abstracts, comments letters

_ Non-English language
_ Narrative reviews
_ Systematic reviews not meeting inclusion
Criteria: BP, blood pressure; CPP, cerebral perfusion pressure; DVT, deep vein thrombosis; GCS, Glasgow Coma Scale.

We will assess the quality of the body of evidence by outcome using the GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach with the following criteria: risk of bias of included studies,

, consistency of effect, precision of the estimate, directness of the evidence, and potential publication bias.[9] The quality of the body of evidence will be rated high, moderate, low, and very low. As an example, the highest-quality evidence (rated high) would come from multiple, well conducted randomized trials with consistent findings, a precise pooled estimate of effect of the intervention on an included outcome, and be absent other bias. The lowest-quality evidence (rated very low) would come from expert opinion in the absence of any study data. We will generate a summary of findings table that includes ratings for quality of the body of evidence.

Development of recommendations.

The development of recommendations is the next step after the evidence has been identified and synthesized and rated for risk of bias. Evidence-based recommendations are based on the quality of the body of evidence, applicability, and generalizability. For topics where there is little or no research, recommendations may be developed using rigorous Delphi consensus methodology. Recommendations will be assigned a level based on the quality of the body of evidence. We will recognize five levels of recommendation based on the quality of the body of evidence:

_ Level I recommendations are based on high quality of the body of evidence.
_ Level II recommendations are based on moderate quality of the body of evidence.
_ Level III recommendations are based on low quality of the body of evidence.
_ Level IV recommendations are based on very low quality of the body of evidence.
_ Level C: recommendations based on consensus in the absence of research evidence.

Delphi process for consensus

Blinded consensus voting will be conducted to establish consensus for key aspects of the project. This will be particularly important for consensus-based algorithm development. A vote of 80% will be required to declare consensus as having been achieved where at least 80% of the panel participates in the vote. This is the same threshold used for consensus in the recent Seattle International Severe Traumatic Brain Injury Consensus Conference (SIBICC) effort.[14,18] A week-long in-person meeting will be held 18 months into the 2-year project to finalize the recommendations and algorithm. A private company will facilitate electronic, blinded voting at this meeting to enable the Delphi methodology.

Discussion

Benefit from guideline and treatment algorithms

Clinical practice guidelines evaluate and consolidate available literature into evidence-based recommendations designed to inform best care. Guidelines for the management of TBI created by the BTF were the first surgical clinical practice guidelines published,[16] and their implementation has been credited with an*50% reduction in mortality.[19,20] Because of their demonstrated benefit, compliance with the BTF guidelines is mandated for U.S. trauma centers to maintain trauma accreditation. Because of the success of the BTF guidelines and their demonstrated benefit, multiple editions of the BTF adult guidelines have been published,[15,16,21,22] and TBI guidelines have been developed for numerous additional topics, including pediatrics,[23] combat, pre-hospital care,[24] and prognosis.[25] The BTF's infrastructure has been key for disseminating and updating these important documents, with the most recent fourth edition TBI guidelines largely addressing closed head injury published in 2017.[22]

Algorithms for care bridge published evidence and its gaps with the realities of practice. Such care pathways were included with the first and second editions of the BTF adult guidelines, and they were the most popular aspect of these documents. These algorithms are inherently and necessarily consensus based, and

Table 3. Proposed Topics for pTBI Evidence-Based Guidelines

Overview: definitions, scope, and methodology
Pre-hospital
_ Pre-hospital/emergent and prolonged field care, transport, and initial evaluation

_ Prognosis and outcome predictiona
_ Antibiotic prophylaxis: indications and agents
_ Invasive and non-invasive neuroimaging: role, timing, and techniques
Surgical
_ Indications, timing, and techniques for surgical management
_ Vascular injuries: screening and managementa
_ Prerequisites for foreign body removal
_ Cerebrospinal fluid leaks: prevention, diagnosis, and management Critical care

_ Delayed vascular complications: screening and management including chemoprophylaxis for stroke preventiona
_ Seizure prophylaxis: indications and agents
_ Intracranial pressure monitoring
A denotes a new topic NOT previously included in published guidelines.[12]

pTBI, penetrating traumatic brain injury.
their construction requires methodologies distinct from those for developing evidence-based clinical practice guidelines. To address the gap between evidence-based recommendations and patient care for severe blunt TBI patients, the SIBICC was recently convened, which led to two well-received and high-impact publications. [13–16, 26] In contrast, no such algorithms for the management of penetrating and blast-penetrating TBI have ever been published.

Penetrating traumatic brain injury guidelines
Guidelines for the management of pTBI were last published in the Journal of Trauma more than two decades ago[12, 27–33] and, of course, do not reflect important subsequent advances in the literature and clinical standards of care (see Literature Search below).[34] The combination of outdated pTBI guidelines and nonexistent treatment algorithms may negatively impact morbidity and mortality because of the lack of consolidated clinician guidance on best practices for the medical and surgical care of pTBI. Because BTF did not lead the 2001 guideline, the organization sought permission to update the pTBI guidelines from the leadership of the original effortand this was granted.

New penetrating traumatic brain injury literature
To estimate the volume of new studies to be screened and assist resource planning, a preliminary literature search was conducted (on April 8, 2020), using PubMed (https://www.ncbi.nlm.nih.gov/pubmed) and the basic search term ‘‘penetrating brain injury.’’ A total of 968 references were identified when limiting the search criteria to publication dates between January 1, 1933 andDecember 31, 2001. This search time frame includes the references that formed the foundation of the existing and outdated pTBI guidelines referenced above and specifically includes all periods of armed conflict from World War II to 2001.When using the same search term and limiting publication dates from January 1, 2002 to the present, 2413 candidate references were identified. This suggests that the overwhelming majority of the existing information on pTBI has been published after the last guidelines were generated in 2001 and, in large part, reflect the experiences and care provided during the conflicts in Iraq and Afghanistan. This affirms the strong need fo updated pTBI guidelines.

Contrasting civilian and military experiences
Although pTBI is problematic in both civilian and military populations, military neurosurgeons garner more experience managing these patients than most civilian neurosurgeons. Consequently, the military experience has led to important paradigm shifts in pTBI management over time. Such an important early advance for pTBI came from the Vietnam War. In the early days of the Vietnam War,neurosurgeons performed aggressive debridement of intracranial foreign bodies in an effort to prevent infection.[35–38] A paradigm shift emanated from this conflict because it was judged that the neurological damage resulting from this aggressive debridement di more harm than good. As a result, to this day neurosurgeons typically leave inaccessible fragments behind at the time of an initial craniotomy, retrieving them later only if they should become infected. The most recent conflicts in the Middle East have seen thelongest period of sustained conflict in America’s history. A return to more aggressive surgical and clinical approaches have seen outcomes in service members improve, beyond those typical of civilians despite more severe wounding mechanisms.[39] The modern military paradigm involves early cranial decompression, prevention of cerebrospinal fluid leak with skull base repair, and aggressive efforts to mitigate secondary insults. One important study supporting this new approach involved wounded American soldiers from 2003 to 2008.[4] Of the 408 head injuries studied, 228 were penetrating, with >80% resulting from primary and secondary blast injury. Of those who survived their initial trauma, field resuscitation, and transport to Walter Reed National Military Medical Center for definitive care, 154 received emergent decompressive craniectomy.

A remarkably high proportion of these persons survived with good clinical outcomes.[4] Increased attention to neurovascular injuries and vasospasms related to blast exposure has also been central to this new paradigm.[39–41] These advances in military pTBI care are the central impetus for updating the pTBI guidelines.

Blast as a factor complicating penetrating brain injury

The recent conflicts in Iraq and Afghanistan have created renewed interest in blast as a mechanism of TBI. The Centers for Disease Control and Prevention (CDC) has defined blast injuries as ''.characterized by the anatomic or physiologic changes from the direct or reflective over-pressurization force impacting the body's surface.''[42] Blast injuries are subdivided into four submechanisms: impact of body surfaces with the overpressure wave (primary blast injury); penetrating injury resulting from fragments propelled by blast (secondary blast injury); results of persons propelled or thrown by the blast wind (tertiary blast injury); and all explosion-related injuries (e.g., burns, crush injury, and quaternary blast injury). Given the importance of blast injury accompanying pTBI in the military, we have decided to include an analysis of such patients in this project. Given the risk of vasospasm inherent to blast-related pTBI, this patient subgroup mandates consideration of distinct management.[35]

Conclusion

A methodologically rigorous BTF effort, funded by the U.S. Department of Defense, is underway to update 2001 recommendations for the clinical care of pTBI. The vetted, multi-disciplinary workgroup will also develop the first treatment algorithms for pTBI to bridge gaps in published evidence with the practicalities of patient care.[17] Future work will strategize and examine dissemination and implementation of the finalized guideline and algorithm to assess impact.

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Authors' Contributions

The project was conceptualized and has been led by R.B. and G.H. Methodological work has been led by Sh.Se. and A.T. Members of the steering committee reviewed and refined the methods (B.A., J.G., J.E., and St.Sh.). The manuscript has been drafted by G.H., R.B., S.S., A.T., and A.L.B. and has undergone critical review and revision based on input from all authors. All authors have reviewed and approve of the final version of the manuscript.

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References

1. Aarabi, B., Tofighi, B., Kufera, J.A., Hadley, J., Ahn, E.S., Cooper, C., Malik, J.M., Naff, N.J., Chang, L., Radley, M., Kheder, A. and Uscinski, R.H. (2014). Predictors of outcome in civilian gunshot wounds to the head. *J. Neurosurg*. 120, 1138–1146.
2. Deng, H., Yue, J.K., Winkler, E.A., Dhall, S.S., Manley, G.T., and Tarapore, P.E. (2019). Adult firearm-related traumatic brain injury in United States trauma centers. *J. Neurotrauma* 36, 322–337.
3. Larkin, M.B., Graves, E.K.M., Boulter, J.H., Szuflita, N.S., Meyer, R.M., Porambo, M.E., Delaney, J.J., and Bell, R.S. (2018). Two-year mortality and functional outcomes in combat-related penetrating brain injury: battlefield through rehabilitation. *Neurosurg.Focus* 45, E4.
4. Bell, R.S., Mossop, C.M., Dirks, M.S., Stephens, F.L., Mulligan, L., Ecker, R., Neal, C.J., Kumar, A., Tigno, T., and Armonda, R.A. (2010). Early decompressive craniectomy for severe penetrating and closed head injury during wartime. *Neurosurg. Focus* 28, E1.

5. Bell, R.S., Vo, A.H., Neal, C.J., Tigno, J., Roberts, R., Mossop, C., Dunne, J.R., and Armonda, R.A. (2009). Military traumatic brain and spinal column injury: a 5-year study of the impact blast and other military grade weaponry on the central nervous system. *J. Trauma* 66, S104–S111.
6. DuBose, J.J., Barmparas, G., Inaba, K., Stein, D.M., Scalea, T., Cancio, L.C., Cole, J., Eastridge, B., and Blackbourne, L. (2011). Isolated severe traumatic brain injuries sustained during combat operations: demographics, mortality outcomes, and lessons to be learned from contrasts to civilian counterparts. *J. Trauma* 70, 11–16; discussion, 16–18.
7. Ecker, R.D., Mulligan, L.P., Dirks, M., Bell, R.S., Severson, M.A., Howard, R.S.,and Armonda, R.A. (2011). Outcomes of 33 patients from the wars in Iraq and Afghanistan undergoing bilateral or bicompartmental craniectomy. *J. Neurosurg*. 115, 124–129.
8. Rosenfeld, J.V.,McFarlane, A.C., Bragge, P., Armonda, R.A., Grimes, J.B., and Ling, G.S. (2013). Blast-related traumatic brain injury. *Lancet. Neurol.* 12, 882–893.
9. Weisbrod, A.B., Rodriguez, C., Bell, R., Neal, C., Armonda, R., Dorlac, W.,Schreiber, M., and Dunne, J.R. (2012). Long-term outcomes of combat casualties sustaining penetrating traumatic brain injury. *J. Trauma Acute Care Surg.* 73, 1525–1530.
10. Shackelford, S.A., Del Junco, D.J., Reade, M.C., Bell, R., Becker, T., Gurney, J., McCafferty, R., and Marion, D.W. (2018). Association of time to craniectomy with survival in patients with severe combat-related brain injury. *Neurosurg. Focus* 45, E2.
11. Klimo, P., Jr., and Ragel, B.T. (2010). Introduction: military neurosurgery, past and present. *Neurosurg. Focus* 28,
12. Introduction. (2001). Part 1: Guidelines for the management of penetrating brain injury. Introduction and methodology. *J. Trauma* 51, S3–S6.
13. Chesnut, R., Aguilera, S., Buki, A., Bulger, E., Citerio, G., Cooper, D.J., Arrastia, R.D., Diringer, M., Figaji, A., Gao, G., Geocadin, R., Ghajar, J., Harris, O., Hoffer, A., Hutchinson, P., Joseph, M., Kitagawa, R., Manley, G., Mayer, S., Menon, D.K., Meyfroidt, G., Michael, D.B., Oddo, M., Okonkwo, D., Patel, M., Robertson, C., Rosenfeld, J.V., Rubiano, A.M., Sahuquillo, J., Servadei, F., Shutter, L., Stein, D., Stocchetti, N., Taccone, F.S., Timmons, S., Tsai, E., Ullman, J.S., Vespa, P., Videtta, W., Wright, D.W., Zammit, C., and Hawryluk, G.W.J. (2020). A management algorithm for adult patients with both brain oxygen and intracranial pressure monitoring: the Seattle International Severe Traumatic Brain Injury Consensus Conference (SIBICC). *Intensive Care Med*. 46, 919–929.
14. Hawryluk, G.W.J., Aguilera, S., Buki, A., Bulger, E., Citerio, G., Cooper, D.J., Arrastia, R.D., Diringer, M., Figaji, A., Gao, G., Geocadin, R., Ghajar, J., Harris, O., Hoffer, A., Hutchinson, P., Joseph, M., Kitagawa, R., Manley, G., Mayer, S., Menon, D.K., Meyfroidt, G., Michael, D.B., Oddo, M., Okonkwo, D., Patel, M., Robertson, C., Rosenfeld, J.V., Rubiano, A.M., Sahuquillo, J., Servadei, F., Shutter, L., Stein, D., Stocchetti, N., Taccone, F.S., Timmons, S., Tsai, E., Ullman, J.S., Vespa, P., Videtta, W., Wright, D.W., Zammit, C., and Chesnut, R.M. (2019). A management algorithm for patients with intracranial pressure monitoring: the Seattle International Severe Traumatic Brain Injury Consensus Conference (SIBICC). *Intensive Care Med*. 45, 1783–1794.
15. (2000). The Brain Trauma Foundation. The American Association of Neurological Surgeons. The Joint Section on Neurotrauma and Critical Care. Critical pathway for the treatment of established intracranial hypertension. *J. Neurotrauma* 17, 537–538.
16. Bullock, R., Chesnut, R.M., Clifton, G., Ghajar, J., Marion, D.W., Narayan, R.K., Newell, D.W., Pitts, L.H., Rosner, M.J., and Wilberger, J.W. (1996). Guidelines for the management of severe head injury. Brain Trauma Foundation. *Eur. J. Emerg. Med.* 3, 109–127.
17. Hawryluk, G.W.J., and Ghajar, J. (2021). Evolution and impact of the Brain Trauma Foundation guidelines. *Neurosurgery* 89, 1148–1156.
18. Chesnut, R., Aguilera, S., Buki, A., Bulger, E., Citerio, G., Cooper, D.J., Arrastia, R.D., Diringer, M., Figaji, A., Gao, G., Geocadin, R., Ghajar, J., Harris, O., Hoffer, A., Hutchinson, P., Joseph, M., Kitagawa, R., Manley, G., Mayer, S., Menon, D.K., Meyfroidt, G., Michael, D.B., Oddo, M., Okonkwo, D., Patel, M., Robertson, C., Rosenfeld, J.V., Rubiano, A.M., Sahuquillo, J., Servadei, F., Shutter, L., Stein, D., Stocchetti, N., Taccone, F.S., Timmons, S., Tsai, E., Ullman, J.S., Vespa, P., Videtta, W., Wright, D.W., Zammit, C., and Hawryluk, G.W.J. (2020). A management algorithm for adult patients with both brain oxygen and intracranial pressure monitoring: the Seattle International Severe Traumatic Brain Injury Consensus Conference (SIBICC). *Intensive Care Med*. 46, 919–929.
19. Gerber, L.M., Chiu, Y.L., Carney, N., Hartl, R., and Ghajar, J. (2013). Markedreduction in mortality in patients with severe traumatic brain injury. *J. Neurosurg* 119, 1583–1590.
20. Faul, M., Wald, M.M., Rutland-Brown, W., Sullivent, E.E., and Sattin, R.W. (2007). Using a cost-benefit analysis to estimate outcomes of a clinical treatment guideline: testing the Brain Trauma Foundation guidelines for the treatment of severe traumatic brain injury. *J. Trauma* 63, 1271–1278.
21. Brain Trauma Foundation; American Association of Neurological Surgeons; Congress of Neurological Surgeons; Joint Section on Neurotrauma and Critical Care, AANS/CNS; Carney, N.A., and Ghajar, J. (2007). Guidelines for the management of severe traumatic brain injury. Introduction. *J. Neurotrauma* 24, Suppl. 1, S1–S2.

22. Carney, N., Totten, A.M., O'Reilly, C., Ullman, J.S., Hawryluk, G.W., Bell, M.J.,Bratton, S.L., Chesnut, R., Harris, O.A., Kissoon, N., Rubiano, A.M., Shutter, L., Tasker, R.C., Vavilala, M.S., Wilberger, J., Wright, D.W., and Ghajar, J. (2017). Guidelines for the Management of Severe Traumatic Brain Injury, Fourth Edition. *Neurosurgery* 80, 6–15.
23. Adelson, P.D., Bratton, S.L., Carney, N.A., Chesnut, R.M., du Coudray, H.E., Goldstein, B., Kochanek, P.M., Miller, H.C., Partington, M.D., Selden, N.R., Warden, C.R., and Wright, D.W.; American Association for Surgery of Trauma; Child Neurology Society; International Society for Pediatric Neurosurgery; International Trauma Anesthesia and Critical Care Society; Society of Critical Care Medicine; World Federation of Pediatric Intensive and Critical Care Societies. (2003). Guidelines for the acute medical management of severe traumatic brain injury in infants, children, and adolescents. Chapter 10. Use of hyperosmolar therapy in the management of severe pediatric traumatic brain injury. *Pediatr. Crit. Care Med*. 4, S40–S44.
24. Badjatia, N., Carney, N., Crocco, T.J., Fallat, M.E., Hennes, H.M., Jagoda, A.S., Jernigan, S., Letarte, P.B., Lerner, E.B., Moriarty, T.M., Pons, P.T., Sasser, S., Scalea, T., Schleien, C.L., and Wright, D.W.; Brain Trauma Foundation; BTF Center for Guidelines Management. (2008). Guidelines for prehospital management of traumatic brain injury 2nd edition. *Prehosp. Emerg. Care* 12, Suppl. 1, S1–S52.
25. (2000). The Brain Trauma Foundation. The American Association of Neurological Surgeons. The Joint Section on Neurotrauma and Critical Care. Age.. *J. Neurotrauma* 17, 573–581.
26. Hawryluk, G.W.J., Aguilera, S., Buki, A., Bulger, E., Citerio, G., Cooper, D.J.,Arrastia, R.D., Diringer, M., Figaji, A., Gao, G., Geocadin, R., Ghajar, J., Harris, O., Hoffer, A., Hutchinson, P., Joseph, M., Kitagawa, R., Manley, G., Mayer, S., Menon, D.K., Meyfroidt, G., Michael, D.B., Oddo, M., Okonkwo, D., Patel, M., Robertson, C., Rosenfeld, J.V., Rubiano, A.M., Sahuquillo, J., Servadei, F.,Shutter, L., Stein, D., Stocchetti, N., Taccone, F.S., Timmons, S., Tsai, E., Ullman, J.S., Vespa, P., Videtta, W., Wright, D.W., Zammit, C., and Chesnut, R.M. (2019). A management algorithm for patients with intracranial pressure monitoring: the Seattle International Severe Traumatic Brain Injury Consensus Conference (SIBICC). *Intensive Care Med.* 45, 1783–1794.
27. (2001). Neuroimaging in the management of penetrating brain injury. *J. Trauma* 51, S7–S11.
28. (2001). Intracranial pressure monitoring in the management of penetrating brain injury. *J. Trauma* 51, S12–S15.
29. (2001). Surgical management of penetrating brain injury. *J. Trauma* 51, 2 Suppl., S16–S25.
30. (2001). Vascular complications of penetrating brain injury. *J. Trauma* 51, 2 Suppl., S26–S28.
31. (2001). Management of cerebrospinal fluid leaks. *J. Trauma* 51, 2 Suppl., S29–S33.
32. (2001). Antibiotic prophylaxis for penetrating brain injury. *J. Trauma* 51, 2 Suppl., S34–S40.
33. (2001). Antiseizure prophylaxis for penetrating brain injury. *J. Trauma* 51, 2 Suppl., S41–S43.
34. Bell, R.S., Ecker, R.D., Severson, M.A. III, Wanebo, J.E., Crandall, B., and Armonda, R.A. (2010). The evolution of the treatment of traumatic cerebrovascular injury during wartime. *Neurosurg. Focus* 28, E5.
35. Rish, B.L., Dillon, J.D., Caveness, W.F., Mohr, J.P., Kistler, J.P., and Weiss, G.H. (1980). Evolution of craniotomy as a debridement technique for penetrating craniocerebral injuries. *J. Neurosurg*. 53, 772–775.
36. Carey, M.E., Young, H., Mathis, J.L., and Forsythe, J. (1971). A bacteriological study of craniocerebral missile wounds from Vietnam. *J. Neurosurg.*34, 145–154.
37. Hagan, R.E. (1971). Early complications following penetrating wounds of the brain. *J. Neurosurg*. 34, 132–141.
38. Hammon, W.M. (1971). Analysis of 2187 consecutive penetrating wounds of the brain from Vietnam. *J. Neurosurg*. 34, 127–131.
39. Rosenfeld, J.V., Bell, R.S., and Armonda, R. (2015). Current concepts in penetrating and blast injury to the central nervous system. *World J. Surg*. 39, 1352–1362.
40. Bell, R.S., Vo, A.H., Roberts, R., Wanebo, J., and Armonda, R.A. (2010). Wartime traumatic aneurysms: acute presentation, diagnosis, and multimodal treatment of 64 craniocervical arterial injuries. *Neurosurgery* 66, 66–79; discussion, 79.
41. Armonda, R.A., Bell, R.S., Vo, A.H., Ling, G., DeGraba, T.J., Crandall, B., Ecklund, J., and Campbell, W.W. (2006). Wartime traumatic cerebral vasospasm: recent review of combat casualties. *Neurosurgery* 59, 1215– 1225; discussion, 1225.
42. Centers for Disease Control and Prevention. (2022). Explosions and Blast Injuries: A Primer for Clinicians. United States Department of Health and Human Services. Available from: https://www.cdc.gov/masstrauma/ preparedness/primer.pdf [Las accessed May 26, 2022].

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Abbreviations Used
BTF - Brain Trauma Foundation

PICOTS - Population, Interventions, Comparators, Outcomes, Timing, Setting and Study design
pTBI - penetrating traumatic brain injury
SIBICC - Seattle International Severe Traumatic Brain Injury Consensus Conference
TBI ¼ traumatic brain injury